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Method and device for winding a newly joined thread onto a tube newly inserted into a winding device.

This invention relates to a method for winding a newly joined thread onto a tube newly inserted into a winding device on an open-end spinning device, as well as to a device for perfoming this method.

It is known to spin a thread join after a stoppage of the machine by means of a thread delivered back by a starter bobbin and subsequently to wind this thread join onto this starter bobbin, whereupon the starter bobbin is exchanged for an empty tube without interrupting the spinning process and the thread is then delivered to this empty bobbin. In this case no new spinning of a thread join is connected with the beginning of winding-on so that the start of the bobbin has no thread join but a starting bobbin is required for the spinning of a thread join.

In connection with a bobbin change it is further known to interrupt the spinning process at the spinning station concerned, to clean the spinning elements and to join the thread again (Süssen-WST-Technische Mitteilungen: "The automation of the rotary spinning machine with CleanCat/CLC and SpinCat/SPC - aspects and perspectives-" page 23, paragraph 3.1.2:"Removal of thread breaks which occur when bobbins are changed - "interrupted bobbin change"-"). In this case, however,

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the thread join which occurs passes onto the bobbin. Usually this thread join forms a thick or thin point and thus a fault in the yarn and is therefore undesirable.

In order to avoid the thread join passing onto the bobbin it is further known to replace the thread join by a knot (GB-PS 1.418.961 ,claim 3). Although knots have the advantage that they do not reduce the strength of the yarn they also form a fault in the yarn. For this reason it is desirable for the further processing that the yarn should contain as few knots as possible. When the yarn is further processed the thread end of an unwinding bobbin should be readily joined to the beginning of the thread of a new bobbin so that bobbin-connecting knots of this type are unavoidable. In addition to these joining knots, however, there are in their immediate vicinity the knots which replace the thread joins. In order to remove this type of knot which replaces the thread joins the bobbin coming from the open-end spinning machine has to be rewound in an additional working operation, wherein this knot replacing the thread join is separated.

It is therefore the object of the present invention to provide a method and device which render it impossible for either a thread join or a thread connection replacing this thread join to pass onto the beginning of a newly inserted tube despite rejoining of the thread and without the assistance of a starter bobbin which has to be replaced.

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In accordance with the method of the present invention before the beginning of the bobbin build-up, the newly joined thread with the thread join is led off, whereupon the thread section containing the thread join is separated from the thread and then the thread subsequently delivered by the open-end spinning device is delivered to the newly inserted tube . The winding-up operation, according to the invention, of a rejoined thread onto a tube newly inserted into the winding device may thus be performed after the machine has been stopped for a relatively long time, in connection with a change of the spinning device, for example a spinning rotor, the change of the fibre material, a bobbin change or the like. The thread join in the rejoined thread is thus led off before the beginning of the bobbin build-up and consequently the thread section containing the thread join is separated from the remaining thread. The thread join is removed in this manner. The thread subsequently delivered by the open-end spinning device therefore no longer contains any faults and is of satisfactory quality. It is then delivered to the tube which was newly inserted beforehand.

Since the winding-on of the thread join - which occurs when the bobbin is changed - onto the newly inserted tube is avoided by means of the method according to the invention, the spinning process may be interrupted when the bobbin is changed without any disadvantageous consequences. In accordance with the invention, therefore, a thread break is produced for changing the full bobbin for a new tube , the open-end spinning device is cleaned and subsequently the thread is rejoined. In this manner

it is possible for each new bobbin to be produced under the same spinning conditions which essentially depend on the state of the collecting surface of the open-end spinning device.

Advantageously, in particular in the case of difficult thread joining conditions, the spinning of a thread join after the bobbin has been changed occurs by means of a thread on the newly inserted tube and in the form of starter windings, since in this way a starter bobbin, with the requirements of drive and space required therefor, is not necessary. In order to avoid auxiliary bobbins or tubes with starter windings upon them in normal thread-joining conditions, the spinning of a thread join in this case advantageously occurs before the bobbin is changed, by means of the thread delivered back from the full bobbin.

It is usual to drive the bobbin device during the thread-joining process, not only for the return delivery but also for the beginning of the thread drawing-off process. So that additional control apparatus or auxiliary units are not required for the immediate removal of the thread after return delivery in connection with the method according to the invention, it is advantageously provided that the thread, after return delivery, is firstly wound with the thread join onto the full bobbin or onto the newly-inserted tube and subsequently the thread section with the thread join is again unwound from th full bobbin or the newly-inserted tube in order to be led off together with the thread which is subsequently delivered by the open-end spinning device.

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Advantageously, in order to be able to drive each bobbin individually in this case, the bobbin may be driven during the thread-joining process and bobbin change independently of the drive which operates during the normal spinning process.

According to an advantageous feature of the invention the full bobbin is discharged from the winding device during a bobbin change subsequently a new tube is inserted in the winding device and then the course of the thread of the re-joined and constantly led-off thread is extended beyond the winding device, whereupon the thread is deflected in the direction towards the newly inserted tube so that the thread partially winds around the tube . Since the course of the thread is extended beyond the winding device after the full bobbin has been removed and the new tube has been inserted, the rejoined thread which is removed is between the drive roll of the winding device and the tube. By deflecting the thread in the direction of the tube , a partial winding around the tube is obtained such that the latter entrains the thread upon rotation, particularly when the surface of the tube is rough.

According to a preferred embodiment of the invention, after the bobbin has been changed, the course of the thread of the rejoined and led-off thread - in relation to the conveying direction of the thread subsequently delivered by the open-end spinning device - is extended so that the course of the thread crosses the path of a thread-gripping device provided on

the winding device. In this way the extension of the course of the thread may occur out of synchronization with the exchange of the full bobbin for a new tube after the bobbin has been changed.

The tube which abuts the drive roller is driven so that in the region of the clamping line between the drive roller and the tube its direction of movement coincides with the direction in which the thread is conveyed. A thread gripping device, which is provided at the winding device and may grip the thread only in the region of the tube which is turned away from the clamping line, moves therefore in a direction which is opposite the direction in which the thread is conveyed so that the thread slackens when it is received by the tube. Since, in addition, the thread is not changed during the formation of the reserve windings, the winding-up speed here is also lower than the speed of the thread which is subsequently delivered by the open-end spinning device. In order to compensate these thread lengths, during the beginning of the winding-on process - which process includes the formation of the reserve windings - the excess lengths of the subsequently delivered thread which occur are intermediately stored and, after the beginning of the bobbin build-up, are used again when the normal bobbin windings are built up. Since the thread subsequently delivered after the separation of the thread section with the join may be longer than for the reserve thread, advantageously the excess thread length is separated and led away in connection with the transfer of the thread subsequently delivered by the open-end spinning device to the newly inserted tube, which excess thread length is not required for the transfer and the

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formation of a reserve thread.

In order to provide the prerequisite that both the separation process for breaking the thread subsequently delivered from the bobbin and the separation process for removing the join location in the newly joined thread and the separation process for separating the excess thread length when the thread is transferred to the new tube are performed with one and the same separation device, the thread section containing the thread join is preferably led off as a loop.

A thread suction device, a thread supplier, which transfers the thread delivered to the thread suction device to the newly inserted tube, as well as a thread separation device associated with the thread suction device and/or the thread supplier are used to perform the method according to the invention. The object of the thread suction device is to lead off the thread section with the thread join, whereupon this section is divided by means of the thread separation device, the thread join which occurred during joining being removed. The separated thread section is then led away via the thread suction device. The thread supplier now moves into a position such that the thread may be transferred to the newly inserted tube, it being possible for the excess thread length to be cut off by the thread separation device and this excess length then being led away likewise through the thread suction device.

According to a particularly simple and therefore preferred embodiment of the invention the thread supplier is formed by the mouth of the thread suction device which may be brought into a thread pick-up position between the open-end spinning device and the winding device as well as into a thread transfer position in order to transfer the thread to the newly inserted tube.

In order to transfer the thread to the newly inserted tube it is advantageously provided that the mouth of the thread suction device may be brought out of the thread transfer position to the side - of the newly inserted tube - which faces away from the thread delivery side and subsequently may be moved perpendicular to the tube axis in such a way that the thread extending with respect to the mouth of the thread suction device is partially wound around the tube. In order to improve the contact of the thread on the tube, in particular after the excess thread length has been separated, the thread suction device may be switched over to a compressed air source such that the thread end may be blown against the tube.

However, it may also be provided for the transfer of the thread to the tube that the mouth of the thread suction device may be brought out of the thread pick-up position into a thread transfer position such that the course of the thread crosses the path of a thread gripping device provided at the winding device.

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In order to be able to perform all the separation processes necessary for performing the method according to the invention with a single thread separation device, the thread separation device is preferably disposed in the thread suction device. Advantageously in this connection the thread separation device is formed as a closing member for the thread suction device, since in this way neither a separate closing member nor an actual control member is necessary for controlling the underpressure which is active in the thread suction device.

In order to be able to control the course of the thread for the pick up of the thread by the thread suction device and/or for the transfer to the newly inserted tube and/or for the length of the thread reserve to be formed, a thread guide is preferably provided in the course of the thread between the open-end spinning device and the winding device, which thread guide may be moved along the bobbin and with which a controllable thread releasing device is associated. Preferably this thread guide, which may be moved parallel to the bobbin, may be brought to the discharge end of a centering spindle which is reduced in diameter and which, in a particularly simple way, forces the thread from any thread course into a fixed thread course.

Preferably a thread store is arranged in the path of the thread before the bobbin in order to equalize deviations in thread tensions which occur during the beginning of the winding-on operation.

The invention does not require any starter bobbins which have to be changed and is simple with respect to construction, function and control and renders it possible to produce bobbins without joins or other connections, which replace these thread joins, e.g. knots, which otherwise normally pass onto the newly inserted tube during bobbin changing. In this manner a yarn is produced with work and time expenditure which is considerably lower than previously, which yarn does not contain the known faults which otherwise occur as a result of the thread joining process which coincides with the beginning of winding.

Further features and advantages of the invention will be apparent from the following description by reference to the accompanying drawings in which only the parts of an open-end spinning station necessary for comprehending the invention are illustrated. In these drawings:

Fig. 1 is a schematic illustration of an open-end spinning station developed in accordance with the invention;

Fig. 2 shows in a front view a section from the winding device illustrated in figure 1, during transfer of the thread to a newly inserted tube;

Fig. 3 shows a section from a winding device in front view, in which the transfer of the thread to the newly inserted tube occurs in a manner which is somewhat altered with respect to figure 2;

Fig. 4 is a schematic illustration of another development of the invention;

Fig. 5 is a section of the device shown in figure 4 in another stage of operation; and

Fig. 6 is a further variation of the device according to the invention.

Firstly the invention is to be explained with reference to the embodiment shown in figure 1. In this illustration the essential parts of a spinning machine 1 operating according to the open-end spinning method are reproduced, which parts are necessary for joining threads and transferring a thread 35 to a newly inserted tube 38 after the thread join has been removed. In practice these parts are usually distributed on the spinning machine 1 and a servicing device 2 which may be moved along the spinning machine 1. however, the invention may also be used in the case of a spinning machine 1 without a movable servicing device 2.

The spinning machine 1 comprises a plurality of spinning stations of which figure 1 shows one. An open-end spinning device which produces the thread is located in a housing 10. The housing 10 has a thread outlet tube 11 through which the thread; leaves the housing 10 under the effect of a pair of draw-off rollers 12.

In order to wind on the thread 35 the spinning machine 1 comprises a winding device 3 which essentially has a drive roller 30 for driving the bobbin 32 which is supported between two bobbin arms

31. The bobbin arms 31 are pivotable about a shaft 33. Each of the two bobbin arms 31 of the winding device 3 has a bobbin support 36 for taking-up and centering the bobbin 32, one of which bobbin supports bears a thread gripping device 37 (figure 2).

As shown in figure 1 there is a switch 34 in the spinning machine 1 which may be actuated by one of the bobbin arms 31 when a certain pivot position has been reached. This switch is connected controllably to a sliver delivery device 13- with which a sliver is delivered to the spinning device via a sliver releasing device which is not shown - and is connected to a cleaning device 14 for the spinning device.

In addition a pneumatic thread store 15 is provided in the path of the thread between the spinning device and the winding device 3. A changing thread guide 16 or another changing device is usually associated with the winding device 3.

The servicing device 2, which may travel along the spinning machine 1, accommodates the thread joining device which essentially comprises a pivotable suction tube 20 with an elongated slot, (not shown) on the side facing the path of the thread as well as an auxiliary pair of rollers 21 which is mounted on a swivel arm 22. The swivel arm 22 may move the auxiliary pair of rollers 21 so that the latter may pick up the thread 35 after this has left the suction tube 20 and deliver it to the mouth of the thread outlet

tube 11. In addition, this auxiliary pair of rollers 21 may be driven in both directions of rotation.

Furthermore, a rocking lever 23 is disposed in the servicing device 2 which lever 23 may lift the bobbin 32 from its drive roller 30. For the drive of the bobbin 32 the thread joining device further has an auxiliary drive roller 24 which is carried by a pivotable lever 25 and may be brought to rest on the bobbin 32 which is lifted off the drive roller 30.

The servicing device 2 also has a thread suction device 4, whose mouth 40 may be brought into a thread pick-up position 40a in which it is located in the region of the path of the thread between the spinning element and the winding device 3. In addition the mouth 40 of the thread suction device 4 may be brought into a thread transfer position 40b in which the thread 35 entering the thread suction device 4 crosses the path of the thread gripping device 37 (figure 2).

In the thread suction device 4 a thread separation device 41 is disposed which preferably comprises one separation element which may be moved transverse to the passage cross-section and one counter-separation element provided in the wall of the thread suction device 4.

When the bobbin 32 reaches its nominal size during the spinning process, the switch 34 is closed and causes the sliver delivery device 13 to stop. In this way a thread break is produced.

In a known manner the servicing device 2 is called to the spinning station concerned and is stopped there. The cleaning device 14 for the spinning device is actuated by the servicing device 2 or also by the switch 34 via a control device, which is not shown, such that remains of fibres etc. are removed from the spinning device.

Subsequently the thread 35 is joined in a manner which is also known. According to figure 1, for this purpose the bobbin 32 is lifted from the drive roller 30 by means of the rocking lever 23. The suction tube 20 is then brought out of its rest position shown into position 20a, in which the mouth 26 is in the immediate vicinity of the full bobbin 32. The auxiliary drive roller 24 is brought to rest on the bobbin 32 by tilting the lever 25 and is now driven in the unwinding direction. The mouth 26 of the suction tube 20 now picks up the end of the thread 35 unwound from the bobbin. The thread 35 is now drawn off into the suction tube 20 in accordance with the unwinding speed of the bobbin and thus emerges in the form of a chord from the elongated slot of the suction tube 20. In this case the

thread 35 occupies the position 35a in which it is located in the pivot area of the auxiliary pair of rollers 21. The auxiliary pair of rollers 21 is then pivoted from its rest position into position 21a in front of the mouth of the thread outlet tube 11. During this movement the auxiliary pair of rollers 21 grasps the thread 35, which is separated, in a manner not shown, below the auxiliary pair of rollers 21 by a separating device which forms part of the thread joining device and then supplies it to the thread outlet tube 11. By driving

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the pair of auxiliary drive rollers 21 and the bobbin 32 in a corresponding manner the thread 35 passes onto the collecting surface of the spinning device as a result of the underpressure in the latter and, in a known manner, fibres are again delivered thereto. By reversing the direction of rotation of the pair of auxiliary rollers 21 and the bobbin 32 the thread 35 is now again drawn off out of the thread outlet tube 11.

The mouth 40 of the thread suction device 4 is now brought into its thread pick-up position in the immediate vicinity of the course of the thread. After a period of time which is sufficient to ensure that the thread 35 has been delivered to the clamping area of the pair of draw-off rollers 12 owing to its tension, the pair of auxiliary rollers 21 is forced apart and pivoted back into its rest position from its position 21a. At the same time the direction of rotation of the bobbin 32 is again reversed by means of the auxiliary drive roller 24. The thread 35 is thus drawn into the thread suction device 4 in the form of a loop owing to its decreasing tension and is continuously led off, this loop being enlarged by the thread being delivered back from the bobbin 32 and the thread subsequently delivered by the spinning device.

When this loop has reached a size such that the thread join location which was previously wound onto the full bobbin 32 has passed the thread separation device 41, this thread separation device 41 is actuated and the separated loop is led away. As a result of this, the full bobbin 32 is separated from the subsequent-

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ly delivered thread 35. Subsequently the full bobbin 32 is driven for a short time in the winding-on direction in order to draw the thread, which extends from the bobbin 32 to the thread separation device 41, out of the thread suction device 4 and wind it onto the bobbin 32. By lifting the auxiliary drive roller 24, the full bobbin 32 is brought to a standstill and is now exchanged for a new tube 38 (figure 2) in a known manner. When this has occurred, the tube 38 is lowered onto the drive roller 30 by releasing the bobbin arm 31, so that the tube 38 is driven in the winding-on direction. The mouth 40 of the thread suction device 4 is, moreover, pivoted in two planes into its thread transfer position 40b which causes the thread 35 to occupy position 35b and cross the path of the thread gripping device 37. The thread 35 is thus wound onto the tube 38. In addition, the length of the thread section located in the thread suction device 4 is now limited by renewed actuation of the thread separation device 41, so that the position of the thread separation device 41 in the thread suction device determines the length of the free thread end at the end of the tube. The thread, which extends from the spinning device to the thread gripping device 37, continues to travel further towards the centre of the tube until it is grasped by the changing thread-guide 16. As the thread 35 travels into the operational area of the changing thread-guide 16 from the thread gripping device 37 the thread forms more windings as a reserve thread.

As figure 2 illustrates, it is not necessary for the course of the thread to be extended so that it extends as far as the other side

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of the tube 38 - with respect to the direction in which the thread is conveyed. If the conditions with respect to space allow it, the mouth 40 of the thread suction device 4 may also be on the side of the bobbin support 36.

When the thread 35 is grasped by the thread gripping device 37 the latter travels against the thread conveying direction. In addition, when the reserve windings are formed on the tube 38 the thread is not changed. The winding-on speed is therefore lower than the thread delivery speed in this case. This period is relatively short so that when there are low thread draw-off speeds this temporary thread excess may possibly be tolerated. However, if the thread draw-off speeds are greater it is advantageous if the excess thread length, which occurred at the beginning of winding, i.e. in the time from the gripping of the thread 35 until after termination of the reserve winding operation, when the actual bobbin build-up begins, is temporarily stored intermediately. For this purpose the above-mentioned pneumatic thread store 15 is provided.

When a reserve thread of a defined and controllable length is desired, this may be obtained according to the execution shown in Fig. 2 in that a thread guide 5 is provided in the path of the thread between the open-end spinning element and the winding device 3, which thread guide 3 is movable along the bobbin 32 (or the tube 38) and with which a controllable releasing device 50 is associated, by means of which the thread 35 may be discharged from the thread guide 5. The thread guide 5 is formed in such a way that it may take up the thread 35 between the open-end spinning

element and the mouth 40 of the thread suction device 4 which is in the thread pick-up position 40a. When the mouth 40 occupies its thread transfer position 40b the course of the thread is thus secured. By displacing the thread guide axially from its position illustrated, in which it catches the released thread 35, it is brought into a second position 5a in which it delivers the thread 35 to the region of the tube 38 which is reserved for the reserve windings. By displacing the thread guide 5 in the direction towards the centre of the tube as well as by subsequently actuating the releasing device 50 the thread 35 is discharged from the thread guide 5 in the operational area of the changing thread-guide 16 and is thus released and grasped by the changing thread-guide 16.

In order to facilitate the pick-up of the thread by the thread guide 5 and so that the latter may have small dimensions, there is advantageously provided in the path of the thread between the spinning device and the winding device 3 a centering spindle 51 which comprises a centering groove 52 and connected thereto two screw threads, for guiding the thread 35, which lead into this centering groove 52 from opposite sides. The centering spindle 51 is associated with a reversible drive motor, not shown, and, with respect to the centering groove 52, has a smaller diameter on its discharge end 53 facing away from the drive motor than on its side 54 facing the drive motor.

When the thread leaves the suction tube 20 through the slot it passes onto the centering spindle 51 which delivers the thread 35 by rotating in one direction to its centering groove 52. When thread joining has terminated the centering spindle 51 is rotated in the opposite direction so that the thread 35 travels to the discharge end 53 of the centering spindle 51 and is discharged there. Previous to this, however, the thread guide 5 has been moved to the discharge end 53 of the centering spindle 51 and grasps the thread 35.

In order to avoid lateral movements of the thread suction device 4, according to figure 3, it is provided that the mouth 40 of the thread suction device 4 only has to perform a pivoting movement in a single plane perpendicular to the axis of the bobbin 32. In order to be able to supply the thread 35 to the thread gripping device 37 the thread guide 5 in this case may occupy a further operating position 5b in which the thread 35 occupies position 35c. The reserve thread formed in this way is particularly advantageous since, as a result of the relative arrangement of the mouth 40 of the thread suction device 4 and the thread guide 5, it is reliably ensured by the conical shape of the bobbin support 36 that the thread 35 does not wind itself around the bobbin arm. Likewise, no free thread end arises; on the contrary there is a small loop which, during further processing, enables the reserve thread to be drawn off the bobbin in a simple manner for connection with the next bobbin.

Advantageously the movement plane of the thread suction device 4 is selected so that it is in the area of the reserve thread. In this way it is brought about that the thread end, which is drawn out of the thread suction device 4 after the separation process, passes the front end of the coiling and reaches the tube during winding immediately before the bobbin 32 is discharged, in which tube a further one or two windings are formed over the reserve thread forming before the beginning of the bobbin build-u Access to this thread section, which is located at the front end, is particularly good for the connection with other bobbins which is necessary in the case of further processing, and it is therefor unnecessary to search for this thread section for a long time

In the embodiment of the invention shown the thread separation device 41 is disposed in the thread suction device 4. Since the separation process occurs very rapidl even a temporary interruption of the reduced pressure in the thread suction device 4 is of no significance. For this reason the movable separation element is preferably formed so that it assumes the function of a closing member for the thread suction device 4, which leads to a structural simplification of the device of the invention.

If desired or depending upon the type of transfer of the thread 35 to the bobbin 32 or to the tube 38 the thread end may or should be brought to a certain length. In a case of this type a thread separation device 41 is required which is not disposed

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in the thread suction device 4 but at its mouth 40. However, it is then no longer possible to lead the thread 35 away in the form of a loop through the thread suction device 4 which is particularly advantageous with respect to the effectiveness of this thread suction device 4.

Figure 6 shows one example of a thread suction device 4 with a thread suction device 41 disposed at or in the vicinity of the mouth 40. In this embodiment the thread suction device 4 - in relation to the thread conveying direction - is disposed in a stationary manner after the winding device 3. Associated with the latter is a pivotable, mechanical thread supplier 42 which picks up the thread 35 in the region of the course of the thread between the spinning device and the winding device 3 and delivers it to the mouth 40 of the stationary thread suction device 4. It may thereby be ensured by a suitable thread guide, which is not shown, for example the thread guide 5, that the subsequently delivered thread 35 may only come into contact with the newly inserted tube 38 when the thread join has been led off. Apart from this the method corresponds to the method previously described with reference to figures 1 to 3.

If desired, a separation device 41 may be provided both at the thread supplier 42 and at or in the thread suction device 4.

Numerous variations of the subject matter of the invention are possible both with respect to the method and to the device. Thus

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in the embodiment described a method has been illustrated in which a change of bobbins occurs. However, the method according to the invention may also be used without performing a bobbin change, e.g. when the spinning machine has been stopped for a relatively long time, as a result of maintenance or repair work, and is then put into operation again or if, for example, the spinning devices are exchanged for other spinning devices having a different form or dimensions. In the first case no thread break has to be produced, whereas in the second case the spinning device does not have to be cleaned so that the thread joining process and the processes further described may be carried out immediately. Also in this manner the thread section with the thread join is eliminated before the bobbin build-up is begun - the few windings, which are wound up onto the bobbin 32 or the tube 38 during the thread joining process, contribute nothing to the bobbin build-up since they are subsequently led off through the thread suction device 4.

In the example illustrated, the thread joining occurs by means of the thread 35 which is delivered back from the full bobbin 32 to the spinning device before the bobbins are changed. However, it is certainly possible to perform the bobbin change first of all and to equip the spinning location with a tube 38 which carries a thread length in the form of starter windings which is sufficient for the thread joining process. After the thread joining process - as is described in the example of the full bobbin 32 - the thread 35 is firstly wound onto the tube 38; then, however, it is completely unwound from the tube 38 by

means of the auxiliary drive roller 24 and is led off through the thread suction device 4. Winding-up then occurs again onto the new tube 38 which is thus used as a starter tube and as a tube for receiving the bobbin.

The drive of the tube 38 or the bobbin 32 during the thread joining process - i.e. for the return delivery of the thread for effecting the thread join, the drawing-off of the thread section with the thread join and for the further return delivery in order to deliver the thread section with the thread join to the thread suction device 4 - may occur in principle by means of the spinning machine 1, in that the drive roller 30 via a coupling is temporarily driven by the main machine drive via an intermediate drive. However, it is more simple if the tube 38 or the bobbin 32 is driven by the servicing device 2 via an auxiliary drive roller 24, since then the synchronization with the other operating steps may be performed more easily during the thread joining process and the beginning of the winding-up operation.

Instead of the windings firstly being wound up onto the full bobbin 32 or the tube 38 after the thread joining process, it is also possible to draw off the thread 35 from the spinning device simply through the thread suction device 4, wherein if necessary the auxiliary pair of rollers 21 must continue to operate until, after the already described transfer of the thread 35 to the tube 38, the thread 35 is drawn into the clamping line of the pair of draw-off rollers 21 by the tensioning draft.

The device which triggers the bobbin change may likewise be constructed in a different manner. Instead of the switch 34 shown, which scans the position of the bobbin arm 31, a light barrier which scans the bobbins, a timing element or a yarn length registering device etc. may be provided.

The construction of the cleaning device 14 is also of no importance for the present invention. Unless the construction of the spinning device (spinning rotor, electrostatic spinning element etc.) requires a particular construction, this cleaning device 14 may be provided in a stationary manner with respect to a spinning station and actuated from the spinning station or the servicing device 2. The cleaning device 14 may however also be disposed in the servicing device 2 and caused to act upon the spinning device by opening the housing 10 or by inserting a cleaning element through a suitable aperture in the housing 10, e.g. the thread outlet tube 11. The same also applies in principle to the thread-joining device which may be disposed in a stationary manner with respect to a spinning station or in a servicing device 2 for the entire spinning machine 1.

In the following a further embodiment of the invention will be described in which the thread suction device 4 is coupled to a bobbin changing device. As figure 4 shows, an oscillating connecting link 6 is provided in the servicing device 2, the side of which link 6 facing the spinning machine 1 is used as a discharge member for the full bobbin 32. On the side facing away from (oppos the spinning machine 1 the oscillating connecting link 6 has a tub

gripping device 60, the object of which is to fetch a tube 38 from a store or the like, which is not shown, and to insert this between the bobbin arms 31 of the winding device 3. At the lateral edge the oscillating connecting link 6 bears the thread suction device 4, with the mouth 40 of which a thread separation device 41 is associated.

If a bobbin change, in connection with a cleaning operation of the spinning device and a thread rejoining process, is to be undertaken, the oscillating connecting link 6 is brought from its rest position 6a into the thread pick-up position shown in figure 4. In this position the thread 35 is delivered to the mouth 40 of the thread pick-up device 4, possibly with the assistance of a centering spindle 51 and a thread guide 5. In one of the above-mentioned ways the thread section with the thread join is led away through the thread pick-up device 4 and the thread 35, which extends to the bobbin 32, is divided by actuating the thread separation device 41. Subsequently the oscillating connecting link 6 is raised further, the tube-gripping device 60 releasing the tube 38 when it is located precisely between the bobbin supports 36 of the bobbin arms 31. By raising the oscillating connecting link 6 further to the position 6b the full bobbin 32 is conveyed onto a lead-off ramp 61. The bobbin arms 31 are still located in their raised position during this time (compare with figure 1). In this way the course of the thread is extended beyond the winding device 3. The thread 35

is constantly led off via the thread suction device 4 which always follows the movements of the oscillating connecting link 6. The oscillating connecting link 6 is now moved perpendicular to the axis of the tube 38 and brought into the transfer position 6c so that the course of the thread is deflected the direction towards the newly inserted tube and the thread 35, which extends with respect to the mouth 40 of the thread suction device 4, partially winds around the tube 38. By constructing the surface of the tube 38 in a suitable manner the tube 38 now entrains the thread 35, after the lowering of the tube 38 onto the drive roller 30 which now follows, which thread 35 is now separated by the thread separation device 41 from the remaining thread 35 located in the thread suction device 4. Subsequently the oscillating connecting link 6 returns to its rest position 6a.

In order to improve the entrainment of the thread 35 by the tube 38, in accordance with figure 4, a reversing valve 43 is provided in the thread suction device 4, by means of which valve 43 the thread suction device 4 may be optionally connected to a suction line 44 or a compressed air line 45. In order to transfer the thread 35 to the tube 38, i.e. when the oscillating connecting link 6 occupies its transfer position 6c, the reversing valve 43 is thus actuated in order to connect the thread suction device 4 via the compressed air line 45 to a compressed air source. Otherwise - apart from when it is in its rest position 6a - the thread suction device 4 is always connected to the suction line 44.

Further amendments of the subject matter of the invention by interchanging features with one another or by replacing them with equivalent features and combinations thereof fall within the scope of the present invention.

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CLAIMS

1. A method of winding up a newly joined thread onto a tube newly inserted into a winding device on an open-end spinning device, the thread for thread joining being returned to the open-end spinning device from the winding device, wherein after the thread joining operation the thread is led off with the thread join; whereupon the thread section containing the thread join is separated from the thread and the thread subsequently delivered from the open-end spinning device is transferred to the newly inserted tube.

2. A method as claimed in Claim 1 in which the open end spinning device is stopped when a predetermined bobbin size is reached, and the fibre-collecting surface of the device is cleaned and wherein a thread break is produced in order to change a full bobbin for an empty tube and to effect the thread join.

3. A method as claimed in Claim 1 or Claim 2, wherein for thread joining, the thread is returned to the open-end spinning device from the full bobbin which is still in the winding device, and the thread is drawn off after thread joining and is led off with the thread join; and in that only then is the full bobbin exchanged for the

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empty tube and subsequently the thread subsequently delivered from the open-end spinning device is transferred to the empty tube and the thread end being led-off is separated.

4. A method as claimed in Claim 1, wherein after the open-end spinning device has been stopped, the full bobbin is exchanged for an empty tube provided with starter windings and thread joining occurs by means of these starter windings and subsequently both the thread subsequently delivered from the open-end spinning device and the thread located on the empty tube as starter windings are led off.

5. A method as claimed in any of Claims 1 to 4, wherein the drawing off of the thread after thread joining firstly occurs by means of the winding device; and in that subsequently the thread section with the thread join is unwound again and is led off together with the thread subsequently delivered from the open-end spinning device.

6. A method as claimed in any of Claims 1 to 5, wherein firstly the full bobbin is ejected from the winding device and the thread path of the newly joined and led off thread is extended beyond the winding device and subsequently the new tube is inserted in the winding device, whereupon the thread path is deflected in the

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direction of the newly inserted tube so that the thread is partially wound around the tube.

7. A method as claimed in any of Claims 1 to 6, wherein after bobbin changing has been performed the thread path of the newly joined and led off thread - in relation to the transport direction of the thread subsequently delivered from the open-end spinning device - is extended to the extent that the thread path crosses the path of a thread gripping device on a winding device.

8. A method as claimed in any of claims 1 to 7, wherein during the beginning of the winding-on process the excess length of the subsequently delivered thread which appears is intermediately stored and is used again after the beginning of the bobbin build-up.

9. A method as claimed in any of Claims 1 to 8, wherein in connection with the transfer of the thread subsequently delivered from the open-end spinning device to the newly inserted tube the excess thread length is separated and led off.

10. A method as claimed in any of claims 1 to 9, wherein the thread section containing the thread join is led off as a loop.

11. Apparatus for performing the method as claimed in Claim 1, including an open-end spinning device, a winding device and a thread joining device having

auxiliary drive means for a bobbin for rotating the bobbin at least in a direction for re-winding a thread to be returned to the open-end spinning device, such apparatus comprising a thread suction apparatus for withdrawing and leading off a thread newly joined by means of the thread joining device, a thread separating apparatus associated with the thread suction apparatus for separating the thread section containing the thread join, and a transfer element for transferring the thread to an empty tube which has been placed in the winding device.

12. Apparatus as claimed in Claim 11, wherein the transfer element is formed by the mouth of the thread suction apparatus, which mouth is movable from a thread pick-up position, between the open-end spinning device and the winding device, into a thread transfer position for transferring the thread to the empty tube.

13. Apparatus as claimed in Claim 12, wherein the mouth of the thread suction apparatus is movable from the thread pick-up position to the side of the empty tube, which is remote from the thread delivery side.

14. Apparatus as claimed in Claim 13, wherein the mouth of the thread suction apparatus is movable from its thread transfer position perpendicularly to the axis of the tube in such a way that the thread extending to the mouth of the thread suction apparatus partially winds around the tube.

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15. Apparatus as claimed in Claim 14, wherein the thread suction apparatus is switchable to a compressed air source.

16. Apparatus as claimed in Claim 13, wherein the mouth of the thread suction apparatus is movable from the thread take up position into a thread transfer position such that the thread path crosses the path of a thread gripping apparatus provided on the bobbin device.

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17. Apparatus as claimed in any of Claims 11 to 16, wherein the thread separating apparatus is disposed in the thread suction apparatus.

18. Apparatus as claimed in Claim 17, wherein the thread separating apparatus is formed as a closing member for the thread suction apparatus.

19. Apparatus as claimed in Claim 11, wherein the thread suction apparatus is stationary and the transfer element is formed by a thread supplier which is associated with the thread suction apparatus for the transfer of the thread to the thread suction apparatus, and to the empty tube.

20. Apparatus as claimed in any of Claims 11 to 19, wherein a thread guide is situated in the thread path between the open-end spinning device and the winding device so as to be movable along the bobbin and with which a controllable thread releasing apparatus is associated.

21. Apparatus as claimed in Claim 20, wherein the thread guide, which is movable parallel to the bobbin, is movable to the discharge end of an associated thread-centering spindle having a reduced diameter discharge end portion.

22. Apparatus as claimed in any of Claims 11 to 21, wherein a thread store is disposed in the thread path in front of the bobbin.

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23. A method of winding up a newly joined thread onto a tube newly inserted into a winding device on an open-end spinning device substantially as hereinbefore described by reference to the accompanying drawings.

24. Apparatus for performing a method as claimed in any of Claims 1 to 10 or Claim 23 and constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.