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A thread store

The present invention relates to a thread store with a rotary drive mechanism as well as a storage roll which can be driven by this rotary drive mechanism, to whose
5 feed end the thread can be fed approximately tangentially from a feed point and from whose discharge end the thread can be taken off against the action of a retaining element through a thread guide arranged in an extension of its axis.

10 Thread stores of this type are known in a wide variety of designs (German Offenlegungsschriften Nos. 2,555,802 and 2,607,460). The thread is invariably fed tangentially to the storage roll, loops it several times and leaves the storage surface in an axial direction
15 between storage roll and a retarding ring placed on its discharge end, for which purpose the thread has to be guided through an annular thread guide. Such thread stores are used in yarn-processing machines such as hosiery, knitting and weaving machines (German
20 Offenlegungsschrift No. 2, 555, 802), but also in yarn-producing machines, in particular open end spinning machines (German Offenlegungsschriften Nos. 2,553,892 and 2,717,314). These known devices all have the disadvantage that the thread has to be threaded into the retarding ring
25 and into the thread guide in a complicated fashion, which is time consuming and necessitates a stationary arrangement of the thread store even if storage is only needed

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temporarily.

The object of the present invention is therefore to provide a thread store of the type mentioned at the outset which enables the thread to be brought to the thread store
5 in a simple manner. A further object of the invention is to develop the thread store in such a way that it can be brought into the thread course merely temporarily without interrupting the thread travel and can store the thread.

This object is achieved according to the invention in
10 that the storage roll has a retaining element which is open in a radially outward direction and can be driven in rotation about the storage roll axis and in that the thread guide can be opened and closed. To enable the retaining element which is open radially outwards to be driven, a retaining
15 force is always applied to the thread during take-off to prevent the thread from being taken off the storage roll in an uncontrolled fashion. This retaining force enables the retaining element to be open radially outwards in design, avoiding complicated threading of the thread. The possibility
20 of opening and closing the thread guide also avoids a complicated threading procedure. This design of retaining element and thread guide enables a continuous thread to be placed on the thread store for temporary storage and then to be released again completely by the thread store.

25 The retaining element which is driven and is open radially outwards can be designed in various ways.

According to a design which is mechanically extremely simple, the retaining element is formed by the circumferential area of the storage roll which is provided with a plurality of openings which open into the interior of the storage roll which, in turn, is connected to a reduced pressure source. The reduced pressure acting on the thread through the openings in the circumferential area of the storage roll cause the take-off force exerted from the discharge side of the storage roll on the thread to be countered by an opposing force which prevents the thread from leaving the storage roll in an uncontrolled fashion. The openings are preferably designed as slots which extend approximately over the entire storage length of the storage roll as the thread windings can always be retained well on the storage roll in this way and can be produced in a simple fashion independently of the position of the individual thread windings collected on the storage roll.

To improve the retaining effect which the openings exert with the aid of the reduced pressure acting through them on the thread, it is proposed in a further embodiment of the device according to the invention that the retaining element formed by the openings should additionally comprise an annular bead arranged at the discharge end of the storage roll. The resultant additional deflection of the thread means that the thread is exposed to increased friction so that uncontrolled take-off of the thread from the storage roll is prevented even if there is a relatively low reduced pressure inside the storage roll.

If the thread store is intended only for temporary storage of a limited thread supply, the thread advance disc which is conventional in itself in such thread stores can be dispensed with. Instead, the storage roll can be made axially adjustable
5 relative to the thread feed point and the thread guide. Each new winding is thus deposited finely and cleanly next to the winding previously deposited on the storage roll. The advance movement of the thread store with the storage roll - or also the storage roll in the thread store - can
10 be controlled using means which also bring the thread store from a rest position into a working position.

The storage roll driving mechanism must be elastic in design so that the driving speed of the storage roll can be adapted to the tensions of the supplied and taken off
15 thread. This can be effected, for example, by means of a torque motor. The storage roll then has a coupling which permits slippage.

According to a preferred embodiment of the subject of the invention, the retaining element is formed by a thread
20 retaining ring which can be driven relative to the storage roll instead of by the circumferential area of the storage roll provided with openings. This rules out a special reduced pressure connection for the storage roll, and also leads to a reduction in the noise level. To lower the frictional
25 values between thread and thread retaining ring and to increase the service life of the thread retaining ring, the thread

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retaining ring is preferably composed of plastic.

The storage roll is preferably provided with a filling monitor which assumes monitoring of other devices depending on the parameters determined by the application. For example, 5 the driving mechanism of the thread store can be stopped or the speed of a subsequent thread take-up station (for example bobbin) can be raised (see, for example, British Patent 1.573.869).

The retaining element is preferably formed by a thread 10 retaining ring which can be driven relative to the storage roll with whose thread retaining device the thread engages, and which is provided with a device for determining the rotational direction of the thread retaining ring which, together with the rotation monitoring device is connected 15 to a pulse counter which can be switched from forwards to backwards counting and vice versa as a function of a change in the rotational direction of the thread retaining ring. The thread retaining ring which can be driven relatively to the storage roll remains stationary when the take-off 20 speed coincides with the delivery speed. When the delivery speed of the thread to the storage roll exceeds the take-off speed of the thread from the storage roll, the thread retaining ring revolves in the rotational direction of the storage roll whereas the thread retaining ring revolves in the opposite 25 direction to the storage roll when the take-off speed is

higher than the delivery speed. The degree of revolution of the thread retaining ring therefore indicates how much thread is stored on the storage roll. For this reason, the rotation monitoring device determines how far the thread retaining ring has revolved while the device for determining the rotational direction of the thread retaining ring determines whether the thread supply on the storage roll is increasing or decreasing. The pulse counter therefore adds or subtracts the pulses received by the rotary monitoring device as a function of the rotational direction of the thread retaining ring so that the stored number of pulses relates directly to the stored thread supply. This device for measuring the thread length stored on the storage roll can be used not only in a thread store of the above-mentioned type with retaining elements which are open radially outwards but also in retaining elements having eyelets or being designed in the form of eyelets.

The pulse counter preferably has a control connection to the drive of a take-off device to prevent certain minimum or maximum quantities from being fallen below or exceeded on the storage roll.

The take-off device is preferably formed by a thread take-up point arranged downstream of the thread store in the direction of thread travel, which can be the winding device or also a yarn-processing station, for example a knitting or weaving machine.

If the thread store is followed by a thread connecting device to rectify thread breakages or to eliminate irregularities in the thread, the thread guide arranged in the extension of the axis of the storage roll is connected to both the thread store and the thread connecting device. In this way, the thread connecting device can be arranged very closely after the thread store, producing a compact structure.

In a further development of the subject of the invention, the device for determining the rotational direction of the thread retaining ring can be formed by a thread connecting device which is arranged between the thread store and thread take-up point and which has a control connection to the drive mechanism of the thread take-up point. While the thread connecting device is in operation, the thread must be stationary in its working region so that the thread take-up device is stationary. A subsequently delivered thread is therefore merely wound on the storage roll. Once the thread connecting device has finished its work, it sets the thread take-up station into operation again. With a winding device, the thread take-up speed is usually higher than the delivery speed of a thread to the storage roll due to the necessary drawing, so that the storage roll is emptied again. To prevent this emptying process from taking too much time, a speed control device connected to the pulse counter is advantageously provided for controlling the speed of the thread take-up

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station as a function of the thread length located on the storage roll.

To prevent over-filling of the storage roll, the filling monitor can be connected to a stopping device.

5 In order to simplify further the beginning of the storage procedure, the retaining element preferably has a thread retaining device which is arranged at the discharge end of the storage roll. This can be designed or mounted in various ways. According to a preferred embodiment of the subject
10 of the invention, it is mounted lowerably in the storage roll. In this case, the thread retaining device is advantageously loaded resiliently in a radially inward direction while there is provided in the storage roll an axially movable adjusting cone which can be caused to act on the internal end of the
15 thread retaining device. To reduce the friction between adjusting cone and thread retaining device, the thread retaining device can be guided in the storage roll with security against rotation and can bear on its internal end a small wheel which
20 is orientated in the circumferential direction of the storage roll for supporting the thread retaining device on the adjusting cone.

A design of the subject of the invention in which the storage roll projects beyond its discharge end in the form of a tapering truncated cone on whose surface the thread retaining
25 device is arranged has proven extremely extremely

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advantageous. By altering the orientation of the thread store relative to the thread course, by altering the distance between the thread store and the subsequent thread guide or by movement of the thread retaining device relative to the truncated cone, it is possible for the thread retaining device to be located sometimes on a path crossing the thread course and at other times remote from it and not to obstruct the path of the thread taken off the thread store. The arrangement of the thread retaining device in the immediate vicinity of the larger diameter of the truncated cone is particularly advantageous as, in this way, by arranging the thread store relative to the surface course in such a way that the surface line and thread course assume an approximately parallel path, the thread can easily be taken off by a thread retaining device which projects relatively slightly beyond the surface line of the truncated cone. The thread can be taken up by altering the thread course or by altering the position of the thread retaining device relative to the thread course. The thread retaining device is preferably mounted in a lowerable manner in the circumferential area of the truncated cone for this purpose.

If a thread retaining ring is used as retaining element, the thread retaining device is preferably part of this thread retaining ring which can be driven relative to the storage roll. To obtain simple driving mechanisms for storage roll and thread retaining ring, the storage

roll and thread retaining ring are preferably both connected via a respective slip coupling to a common driving shaft, the storage roll as well as the thread retaining ring preferably bearing a respective hysteresis disc and a permanent magnet preferably being arranged on the common driving shaft between these two hysteresis discs.

In an advantageous embodiment of the subject of the invention, the thread retaining device is designed as a hook which has an open groove in the driving direction, wherein the thread retaining device can bear a ceramic insert in its groove to increase the service life.

If the thread store does not have to operate all the time for any reason, as is the case, for example, with open end spinning devices, the thread store is located in such a position that the thread course is not influenced by it in any way - by deflection. In this case, the thread guide is preferably designed as a thread supplier which brings the thread from the predetermined thread course into a thread course crossing the path of the revolving thread retaining device, the thread guide preferably consisting of two thread guide members which can be separated from each other.

If a thread breakage occurs without the subsequent thread supply to the thread store being interrupted, this causes over-filling of the thread store. If the thread store is used merely for temporary storage of the thread

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and then releases the thread, which returns into a normal,
i.e. undeflected, thread course, then the thread loses tension
temporarily. For such cases, i.e. take-up of the subsequently
delivered thread length or thread length occurring due to
5 tension drop, the opening of a suction tube is arranged in
the vicinity of the thread course of the thread supplied
to the storage roll in a further embodiment of the invention.
If such a thread breakage occurs after the thread store,
for example in the thread connecting device, due to failure
10 of the thread connecting process, it is advantageous if a
thread controller which is connected in terms of control
to the device for producing and/or delivering the thread
is arranged downstream of the thread connecting device in
the thread course to prevent over-filling of the thread store.
15 To stop the subsequent delivery of the thread to the thread
store and also to enable the thread store to be emptied,
the thread controller advantageously has a control connection
to the rotary drive mechanism of the storage roll so that
the rotational direction of the rotary driving mechanism
20 can be reversed.

If the thread store is needed not always but merely
for specific working phases, then it is proposed according
to the invention, with a textile machine having a plurality
of working stations and a maintenance device which travels
25 past these working stations and can be connected to these

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working stations selectively, that the storage roll and the thread course be adapted so that they can be brought to an acute angle relative to each other in such a way that the discharge end of the storage roll is located
5 closer to the thread course than its feed end.

The thread store designed according to the invention is extremely versatile. It can be used for all known applications, for example in weaving, knitting and hosiery machines and also in open end spinning machines, as
10 hitherto in a stationary fashion. The preparation for work, during which the thread is brought on to the predetermined thread course, is simplified considerably as the thread can be threaded into the thread store without an open thread end having to be available. Rather, it is
15 possible with the design of the thread store according to the invention to feed the continuous thread from the side into the thread store. This opens up completely new possibilities for using the thread store and such a thread store can now be used even if it is to be supplied
20 to the working station only temporarily for a quite specific operating phase. The thread store can thus be kept in readiness outside this operating phase in the vicinity of the working station or even on a maintenance device which has to serve a plurality of similar working
25 stations. Considerable savings in space and materials are thus made, particularly if the thread store is to be used on machines with a large number of similar working

stations - for example, on an open end spinning machine.

The invention is described in detail below with reference to drawings which show only the elements which are absolutely essential for understanding the invention.

- 5 Figure 1 shows a first embodiment of a thread store designed according to the invention in section in an open end spinning machine with a thread connecting device which is shown only in section and schematically.
- 10 Figure 2 shows a front view of the thread store shown in Figure 1, omitting the elements unnecessary for the explanation, and of the thread guide connected to the thread store.

Figure 3 shows a detail from Figure 2.

- 15 Figure 4 shows another embodiment of the thread store according to the invention, the thread store being shown in cross-section in the top half of the figure and in a side view in the bottom half.

- 20 The thread store 1 which is shown in Figures 1 and 4 can be used on basically any textile machines on which thread stores 1 with a storage roll 10 are used, for example on hosiery and knitting machines or even on weaving machines. However, as the operating conditions
- 25 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 structure and functioning of the thread

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store 1 is explained below with reference to an example of an open end spinning machine.

Figure 1 shows only 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 a 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.

10 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. 15 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. 20

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 25 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 shown in Figure 1 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 Figure 1, 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

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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 according to Figure 1. 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.

Figures 2 and 3 show a portion of the thread retaining ring 14. As can be seen, 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 open radially outwards so that the thread 31 can be brought into the contact area of the thread retaining device 141 from the outside. According to Figures 2 and 3, the thread retaining device 141 has the form of a hook which has an open groove 144 in the driving direction 145 (see Figure 2) of the thread retaining ring 14. For protection against wear, this groove 144 is provided with a ceramic insert 146

according to Figure 3. 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. According to Figure 1, 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. According to Figure 2, the two thread guide members 40 and 41 are fork-shaped in design, the thread guide member 41 being mounted pivotally on the pivot axis 42. 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

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31 following the thread course 32 and takes it into the position shown in Figure 2 in which the thread 31 is enclosed between the thread guide members 40 and 41 and guided.

5 The storage roll 10 is provided with a rotation monitoring device which comprises a scanner 50 scanning the thread retaining ring 14. The scanner is connected to a pulse counter 5 to which the thread connecting device 23 is also connected in terms of control. The pulse counter
10 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
15 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
20 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
25 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 α 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 follow 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.

5 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
10 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
15 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.

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.

25 The two thread portions to be connected are guided parallel to each other in the 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 that they can be taken up reliably by the thread connecting device 23 for thread connection.

Providing the thread connecting device 23 has not yet commenced its work, the thread retaining ring 14 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 can therefore be used for measuring the quantity of thread stored on the storage roll 10. The storage roll 10 is therefore provided with the rotation monitoring device whose scanner 50 essentially contains a light source and a photocell or is designed as an induction scanner. The rotation monitoring device therefore determines the passages of the thread retaining

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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
5 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
10 determined by the 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
15 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
20 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.
25 The thread connecting device therefore acts as a device for determining the rotational direction of the thread retaining ring 14, 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
5 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
10 switches over so that it will count forwards again during the next storage process.

Such a device for measuring the state of fullness of the storage roll 10 by means of a pulse counter has the advantage that it operates independently of the thread
15 speed, the thread thickness, the speeds on the thread store and the dimensions of the thread store. This applies regardless of the duration of storage. The degree of filling of the thread store 1 is determined only by the number of rotations of the thread retaining ring
20 14 in the winding direction (= driving direction 145).

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
25 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

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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 acts as a retaining element which 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 shown in Figure 1, however, is particularly advantageous as it is extremely compact,
5 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.
10 It is advantageous but not necessary in all cases for the thread catching device 141 to be designed as a hook 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
15 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
20 unwinding from the thread store 1.

The thread retaining ring 14 can be produced from metal and can be protected by ceramic inserts 146 in the region of the grooves 144 of the thread retaining device 141. It is also possible to provide, instead of ceramic
25 inserts 146, small wheels whose axis is orientated in such a way that the wheels can rotate in the direction of thread travel, thus reducing the friction. However,

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a thread retaining ring 14 composed of plastic is particularly advantageous as the thread retaining ring 14 should have a minimal moment of inertia due to the need to be able to accelerate the thread retaining ring 14 quickly at the beginning of storage. To increase the resistance to wear of a thread retaining ring 14 composed of plastic, the thread retaining ring 14 can have coated, for example chromium-plated, thread retaining devices 141 which not only increase the service life but also reduce the sliding values between thread 31 and thread retaining ring 14.

The thread guide 4 which can be opened and closed can also be designed in various ways. For thread stores 1 which are to be used on hosiery and knitting or even weaving machines, in particular, it may be sufficient to design the thread guide 4 having a form of eyelet with an arc-shaped portion which is held elastically in contact with the arc-shaped remainder of the thread guide 4 and can be folded open manually or automatically against the action of a spring. The illustrated design of a divisible thread guide 4 with two thread guide members 40 and 41 which can be removed from each other is particularly suitable as thread supplier with which the thread 31 can be brought into the position in prolongation of the axis 122 of the thread store 1 between the two thread guide members 40 and 41 by a pivoting or also pushing movement of the movable thread guide member 41. However, it is

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also possible, by suitable arrangement of the thread store 1 relative to the thread course 32, to ensure that the thread 31 also crosses the path of the thread retaining device 141 without the aid of a thread supplier and enters the correspondingly controlled thread guide 4, with the aid of the thread retaining device 141 if necessary. With a thread connecting device 23 which is arranged downstream of the thread store 1 in the direction of thread travel, this thread guide 4 can also be arranged in such a way that it is connected not only to the thread store 1 but at the same time to the thread connecting device 23, and presents the thread 31 to this thread connecting device 23 in the manner required for subsequent operation of the thread connecting device 23.

15 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 provide the thread retaining ring 14 or the storage roll 10 with a pair of scanners 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

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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.

Monitoring of the fullness can also be dispensed with, depending on the application of the thread store 1. In this case, it is sufficient to connect from the thread connecting device 23 a timing member which measures the duration of operation of the thread connecting device 23 and emits a signal that the thread store 1 is empty as a function of this period. For this purpose, the timing member can be adjusted beforehand in various ways so that different times for thread connection, different thread delivery and take off speeds, different initial tensions can be taken into consideration in this time with sufficient reliability etc.

If a filling monitor is provided, then it can be designed in various ways. As shown in the example in Figure 1, a pulse counter 50 is provided which determines by forwards or backwards counting whether the storage roll 10 is full or empty. As an alternative, the thread advance disc 13 can be elastically charged in such a way that it actuates a switch when thread windings are applied and releases this switch by the action of the charging force during release by thread windings - i.e. when the storage roll 10 is empty. Or, one of the catch slots is extended towards the discharge end of the storage roll 10 and takes up an arm which is normally pressed outwards

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beyond the peripheral surface of the storage roll 10 by the action of a spring. However, if a thread supply is stored on the storage roll 10, the thread windings cover this elastically mounted arm and press it radially inwards
5 against the action of the spring. This elastically mounted arm is part of a switch or actuates it, thus providing a monitor of fullness, as in the example described with reference to the thread advance disc 13.

In particular, if the thread store 1 can be connected
10 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
15 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
20 but is also designed as a speed control. This speed control which, as shown, communicates with the pulse counter 5 (or a fullness monitor of a different design as well as the thread connecting device 23) receives a signal from the thread connecting device 23 when it
25 commences operation, to stop the auxiliary pair of take-off rolls 20 and the winding device 6. The 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
5 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,
10 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/
15 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.
20 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
25 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

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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 used up 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 25. 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
5 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
10 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
15 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
20 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).

25 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.

As shown and described, the thread store 1 is located in a position which is inclined at an acute angle α to the thread course 32 as supply of the thread 31 to the thread store 1 is simplest in this case. However,

5 different arrangements of the thread store 1 relative to the thread course 32 are also possible if suitable stationary or moving thread guides ensure that the thread 31 can be brought into a path crossing the thread retaining device 141.

10 With a stationary arrangement of the thread store 1, i.e. if the thread store invariably remains in the operating position during operation of the device to which it is connected, for example the thread feed position of a knitting machine, and thus invariably bears a certain

15 quantity of stored thread, a thread collector is not necessary as the thread 31 is then firstly applied to the thread store 1 manually and suitable measures ensure that the stored quantity of thread does not fall below certain minimum values nor exceed certain maximum values.

20 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

25 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.

An embodiment of a thread store 7 which can be designed both with and without a thread retaining device or catcher 8 is described below with reference to Figure 4. The reference numerals used in Figure 1 are also used in the following description for the elements which are the same as the corresponding elements in Figure 1.

The thread store 7 according to Figure 4 is shown in section in the top half of the figure but in an elevation in the bottom half of this figure.

Like the thread store 1 shown in Figure 1, the thread store 7 also has a base 11 by means of which the thread store 7 is mounted in a suitable manner, for example in a maintenance device 2 so as to remain in the example of

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an open end spinning machine. In the hub 110 of the base 11 there is again mounted by means of a bearing 111 a shaft 12 with which the storage roll 70 is rotationally engaged at one end. The other end of the driving shaft 12 is connected to a rotary driving mechanism 120 (see Figure 1, for example torque motor or other motor with an interposed slip coupling), so that the storage roll 70 is driven as a function of the resistance opposed by the thread 31.

10 In the example shown in Figure 4, the storage roll 70 has on its feed end 101 facing the base 11 slots 102 which, unlike the embodiment in Figure 1, are sealed on the interior of the storage roll by an inserted ring 71. The thread advance disc 13 engaging in these slots 102, also 15 unlike the embodiment in Figure 1, is mounted on its exterior in the surface 112 of the base by means of a bearing 113.

The storage roll 70 has an annular bead 72 on its discharge end 103 which passes into a tapering truncated 20 cone 73. Over the entire storage length 74, i.e. between the feed end 101 and the discharge end 103, the storage roll 70 has over its peripheral surface a plurality of uniformly distributed openings 75 which are designed as longitudinal slots in the embodiment shown. Also, a corresponding 25 number of cylindrical bores which are distributed over the storage length 74 in such a way that the stored thread 31 is always located in the region of influence of at least



one such opening 75, can be used, these openings 75 advantageously being located in lines which loop the storage roll 70 in the manner of screw threads.

A tubular portion 76 into which the suction nozzle 5 77 of a suction line connected to a vacuum source (not shown) opens is connected to the base 11 on the side turned away from the storage roll 70. The portion 76 is connected via bores 760 in the base 11 to the interior 78 of the storage roll 70.

10 If the thread store 7 is in operation, there is connected to the suction nozzle 77 a vacuum which acts through the bores 760 and the openings 75 on the exterior of the storage rolls 70 as the interior of the thread store is otherwise sealed to the exterior (see ring 71).

15 If a thread 31 is placed on the storage length 74 of the storage roll 70 which is driven by a rotary driving mechanism 120 permitting slippage, the vacuum sucks the thread 31 and holds it securely. If the thread 31 is to be removed from this storage roll 70 at a later moment, 20 these openings 75 and the vacuum acting on the thread 31 act as retaining element for the thread 31. To increase this retaining effect of the thread 31 on the storage roll 70, the storage length 74 of the storage roll 70 is limited on its discharge side 103 by the above-mentioned 25 annular bead 72 as an additional measure in the embodiment illustrated, as this annular bead 72 provides an additional deflection for the thread 31 and therefore additional

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frictional surfaces for the thread to be taken off. In comparison with a design of such a thread store 7 whose retaining element is formed by openings 75 subjected to suction, but having no such annular bead 72, the retaining effect is even better.

A thread retaining device 8 is also provided in this case to enable the thread 31 to be supplied automatically in such an arrangement of the thread store 7 of the storage roll 70. In contrast to the design according to Figure 1, in which the thread collector 141 can perform a movement relative to the storage roll 10, the thread retaining device 8 is always entrained by the storage roll 70 during its rotational movement. To enable the thread retaining device 8 to operate only during its collecting work but not otherwise to obstruct thread take-off from the thread store 7, the thread store 7 is designed and mounted in the storage roll 70 in such a way that it can be lowered in the storage roll 70 and no longer projects beyond the surface of the storage roll 70.

The thread retaining device 8 must also be open outwards, for which purpose thread collectors designed as hooks can also be used, as also shown in the embodiment in Figures 2 and 3.

According to a structurally simple and therefore preferred embodiment which is described with reference to the embodiment in Figure 4, there is connected on the side of the annular bead 72 turned away from the storage length



74 of the storage roll 70 a truncated cone 73 whose largest diameter corresponds to the diameter of the annular bead 72 and which tapers towards its free end. A bush 80 for taking up the thread retaining device 8 is mounted in this truncated cone 73 in the vicinity of the annular bead 72 and comprises a retaining pin 81. The retaining pin 81 bears inside the bush 80 a plate 82 on whose side facing the exterior of the truncated cone 73 there rests a compression spring 83 which, in turn, rests on the external base 84 of the bush 80. Another base 85 of the bush 80 against which the plate 82 rests during release of the internal end of the catching pin 81 is provided on the side facing the interior 78 of the thread store 7 to limit the lifting movement.

In the storage roll 70 there is guided an axially movable adjusting cone 9 bearing a support disc 90 which serves on the one hand to support the storage roll 70, and to which there are connected, on the other hand, several driving bolts 91 which are uniformly distributed over its periphery and are guided with security against rotation in the base 11 by correspondingly distributed bores 114. The driving bolts 91 are connected at their end turned away from the support disc 90 to a suitable lifting driving mechanism (not shown), for example a lifting magnet, a pneumatically or hydraulically charged lifting piston etc.

On the side of the support disc 90 facing the



truncated cone 73, there is located the actual cone 92 which can be caused to act on the retaining pin 81 by moving along the driving shaft 12 of the thread store 7 and releases the retaining pin 81 again. As the storage
5 roll 70 and the driving shaft 12 revolve whereas the adjusting cone 9 does not rotate, suitable bearings can obviously be provided between adjusting cone 9 and storage roll 70 on the one hand and between adjusting cone 9 and driving shaft 12 on the other hand.

10 If the path of the retaining pin 81 and the thread course 32 cross as the result of suitable movement of the thread guide 4 (Figure 1) or of the thread store, the cone 92 is brought to rest against the internal end of the retaining pin 81 or, if several retaining pins 81 are
15 provided, on the inner ends thereof by actuating the lifting driving mechanism (not shown) via the driving bolt 91. As a result, the retaining pin or pins 81 are pushed out of the surface of the truncated cone 73 of the storage roll 70 against the action of the compression springs 83
20 allocated to them. The thread 31 is grasped by the retaining pin 81 or one of them during rotation of the storage roll 70 and the winding of the thread 31 on the thread store 7 effected in this way. Before the take-off of the thread 31 from the thread store 7 is interrupted,
25 the thread 31 is wound on the storage roll 70 as quickly as it is taken off so that a single winding initially remains.

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To ensure that this one winding is not formed before the thread 31 is stopped in the region downstream of the thread store 7, the lifting driving mechanism of the adjusting cone 9 is preferably also actuated from the device causing stoppage of thread take-off in the region of the thread connecting device 23. Thus, it is proposed when using a thread store 7 instead of the thread store 1 in an open end spinning device according to Figure 1 that the thread connecting device 23 control the lifting magnets for the driving bolts 91. When the lifting magnet falls on completion of the work of the thread connecting device 23, the cone 92 is retracted from the collecting pin 81 which now releases the thread 31. However, the thread 31 is retained on the surface of the storage roll 70 due to the vacuum acting in the openings 75 until the thread is taken off the storage roll 70 exactly as required by exertion of the increased tension exerted by the winding device 6 on the thread 31.

In a simple design of the device it is sufficient to keep the wear of the retaining pin 81 in acceptable limits by suitable choice of material and by the choice of the shape of the internal end of the retaining pin 81. However, to increase the service life, it may also be proposed that the retaining pin 81 be secured against rotation, for example by non-round shape of the retaining pin 81 itself or of its plate 82 and corresponding guidance through the bush 80 or its bases 84 and 85, and



that it bear on its internal end a small wheel 86 which is orientated in the direction of revolution of the storage roll 70 and rolls on the cone 90 when the cone 90 comes into contact with the small wheel 86.

5 The retaining pin 81 can obviously also be driven radially in a different manner than shown. For example, the internal end of the retaining pin 81 has a driving foot which is guided in a radial wall (not shown) of the storage roll 2 in one of two parallel guide tracks, and the driving
10 foot of the retaining pin 81 can be passed from one guide track to another by an adjustable distributing guide. The distributing guide can be actuated mechanically or electromagnetically. The two guide tracks are arranged concentrically to each other and merely have distributing
15 guides with whose aid the driving foot can pass from the internal guide track into the external guide track. If the driving foot is located in the internal guide track, the retaining pin 81 is lowered in the peripheral wall of the truncated cone 73 whereas if the driving foot is
20 located in the external track, the collecting pin projects beyond the peripheral wall of the truncated cone.

 In a design of a thread store 7 according to Figure 4, it is possible in principle to arrange the thread retaining device 8 also on the cylindrical end of the
25 storage length 74 of the storage roll 70 or on the periphery of the annular bead 72 so that the truncated cone 73 is not necessary. However, it has been found

that the arrangement of the collecting pin 81 in the truncated cone 73, particularly in the vicinity of its greatest diameter, is particularly advantageous, as the thread 31 can be collected by a relatively short retaining pin 81 and therefore by a relatively short lift of the adjusting cone 9 if the thread store 7 is arranged relative to the thread course 32 in such a way that the surface line of the truncated cone 73 is located approximately parallel to the thread course and in the immediate vicinity thereof, even if the thread guide 4 is not designed as a thread supplier.

Instead of a lowerable retaining pin 81 in the truncated cone 73, it is also possible for this truncated cone 73 to have a non-controllable thread collector on its surface and for this thread collector to be brought into the region of the thread course 32 by shortening the axial distance between thread store 7 and thread guide 4. The thread store 7, or possibly only the storage roll 70, is also adjusted relative to a feed position (take-off roll pair 30). It is therefore also possible to continue this movement after collection of the thread 31 so that the thread 31 can be deposited winding by winding next to each other on the storage roll 70 without the aid of a thread advance disc 13, so that the thread advance disc 13 can also be dispensed with.

With a device according to Figure 4, it is also simple



to determine whether the storage roll 70 still carries thread windings or is empty by means of a fullness monitor comprising a pulse counter. When winding the thread 31, the stored quantity of thread can be measured during the
5 passage of the retaining pin 81, in the same manner as described with reference to Figure 1. When taking the thread off the storage roll 70, the thread revolutions on the annular bead 72 can be counted, which oppose those of the annular bead, which is permitted by suitable choice of
10 material for storage roll 70 and thread 31 with differing reflex properties.

If the delivery of the thread 31 to the thread store 1 or 7 is interrupted during the occurrence of a thread breakage, for example on knitting machines, the suction
15 tube 24 can also be dispensed with, while the suction tube 26 is not needed on knitting machines anyway.

The auxiliary devices connected to the thread store 1 and 7 are therefore provided only when using the thread store 1 and 7 in specific machines or devices, whereas
20 they can be dispensed with in other machines or devices. Thus, for example, the thread controller 25 is not necessary in all applications since, for example, the fullness monitor can interrupt the subsequent delivery of the thread 31 to the thread store 1 or 7 in the case of a
25 thread breakage downstream of the thread store 1 or 7. Nevertheless, the thread store 1 or 7 also has the advantage that the continuous or uninterrupted thread 31

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can be applied to the thread store 1 or 7 at any time and
can be stored there, but on the other hand the thread 31
can also be taken down again from the thread store 1 or 7
without interruption of its thread path. The thread store
5 1 or 7 therefore opens up numerous applications and is not
restricted to the described applications on an open end spinning
station, on a knitting, a hosiery or even a weaving machine,
but can be used anywhere in the textile industry where the
compensation of temporary variations in thread tension is
10 necessary and where it is necessary to take up in a regular
fashion excess thread material which is temporarily being
formed in such a way that it can be supplied directly to
a thread take-up station as the temporarily stored quantity
of thread is used up. A thread take-up station should be
15 interpreted here as a yarn-processing station, for example
a knitting, hosiery or weaving station, but also a thread
collecting station, for example, the winding device 6.



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CLAIMS:

1. A thread store with a rotary drive mechanism and a storage roll which can be driven by this rotary mechanism and to whose feed end the thread can be fed approximately tangentially from a feed point and from whose discharge end the thread
5 can be taken off against the action of a retaining element through a thread guide arranged in prolongation of its axis, characterised in that the storage roll has a retaining element which is open in a radially outward direction and can be driven in rotation about the storage roll axis, and in that
10 the thread guide can be opened and closed.
2. A thread store according to Claim 1, characterised in that the retaining element is formed by the circumferential area of the storage roll provided with a plurality of openings, which openings open into the interior of the storage roll
15 which, in turn, is connected to a reduced pressure source.
3. A thread store according to Claim 2, characterised in that the openings are designed as slots which extend approximately over the entire storage length of the storage roll.
4. A thread store according to Claim 2 or 3, characterised
20 in that the retaining element comprises an annular bead arranged at the discharge end of the storage roll.



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5. A thread store according to any of Claims 1 to 4, characterised in that the storage roll is axially adjustable relative to the thread feed point and the thread guide.
6. A thread store according to any of Claims 1 to 5, characterised in that the storage roll has a coupling which permits slippage.
7. A thread store according to Claim 1 or 6, characterised in that the retaining element is formed by a thread retaining ring which can be driven relative to the storage roll.
8. A thread store according to Claim 7, characterised in that the thread retaining ring is composed of plastic.
9. A thread store according to any of Claims 1 to 8, characterised in that the storage roll is provided with a filling monitor.
10. A thread store according to Claim 1, characterised in that the retaining element is formed by a thread retaining ring which can be driven relative to the storage roll with whose thread retaining device the thread engages and which is provided with a rotation monitoring device, and in that there is provided a device for determining the rotational direction of the thread retaining ring which, together with



the rotation monitoring device, is connected to a pulse counter which can be switched over from forwards to backwards counting and vice versa as a function of a change in the rotational direction of the thread retaining ring.

- 5 11. A thread store according to Claim 10, characterised in that the pulse counter has a control connection to the drive mechanism of a take-off device.
- 10 12. A thread store according to Claim 11, characterised in that the take-off device is formed by a thread take-up point arranged downstream of the thread store in the direction of thread travel.
- 15 13. A thread store according to one or more of Claims 1 to 12, with a thread connecting device arranged downstream of the thread store, characterised in that the thread guide is connected to both the thread store and the thread connecting device.
- 20 14. A thread store according to one or more of Claims 9 to 13, characterised in that the device for determining the rotational direction of the thread retaining ring is formed by a thread connecting device which is arranged between thread



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store and thread take-up point and has a control connection to the drive mechanism of the thread take-up point.

15. A thread store according to one or more of Claims 12 to 14, characterised by a speed control device connected to the pulse counter for controlling the speed of the thread take-up point as a function of the thread length located on the storage roll.

16. A thread store according to one or more of Claims 9 to 15, characterised in that the filling monitor is connected to a stopping device.

17. A thread store according to one or more of Claims 1 to 16, characterised in that the retaining element has a thread retaining device which is arranged at the discharge end of the storage roll.

18. A thread store according to Claim 17, characterised in that the thread retaining device is mounted lowerably in the storage roll.

19. A thread store according to Claim 18, characterised in that the thread retaining device is loaded resiliently in a radially inward direction and in that an axially movable



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adjusting cone is also provided in the storage roll and can be caused to act on the internal end of the thread retaining device.

20. A thread store according to Claim 19, characterised
5 in that the thread retaining device is guided in the storage roll with security against rotation and bears on its internal end a small wheel which is orientated in the circumferential direction of the storage roll for supporting the thread retaining device on the adjusting cone.

10 21. A thread store according to one or more of Claims 17 to 20, characterised in that the storage roll projects beyond its discharge end in the form of a tapering truncated cone on whose surface area the thread retaining device is arranged.

22. A thread store according to Claim 21, characterised
15 in that the thread retaining device is arranged in the immediate vicinity of the larger diameter of the truncated cone.

23. A thread store according to Claim 22, characterised in that the thread retaining device is lowerable in the peripheral area of the truncated cone.



24. A thread store according to Claim 17, characterised in that the thread retaining device is part of a thread retaining ring which can be driven relative to the storage roll.

25. A thread store according to Claim 24, characterised
5 in that the storage roll as well as the thread retaining ring are connected via a respective slip coupling to a common driving shaft.

26. A thread store according to Claim 25, characterised in that the storage roll as well as the thread retaining
10 ring bear a respective hysteresis disc and a permanent magnet is arranged on the common driving shaft between the two hysteresis discs.

27. A thread store according to any of Claims 13 to 26, characterised in that the thread retaining device is designed
15 as a hook which has an open groove in the driving direction.

28. A thread store according to Claim 27, characterised in that the thread retaining device bears a ceramic insert in its groove.

29. A thread store according to any of Claims 13 to 28,
20 characterised in that the thread guide is designed as a thread supplier which brings the thread from a predetermined thread



course into a thread course crossing the path of the revolving thread retaining device.

30. A thread store according to Claim 29, characterised in that the thread guide consists of two thread guide members, which can be separated from each other.

31. A thread store according to any of Claims 1 to 30, characterised in that the opening of a suction tube is arranged in the vicinity of the thread course of the thread fed to the storage roll.

32. A thread store according to any of Claims 1 to 31 with a thread connecting device arranged downstream of the thread store and with a device for producing and/or delivering a thread, characterised in that a thread controller which has a control connection to the device for producing and/or delivering the thread is arranged downstream of the thread connecting device in the thread course.

33. A thread store according to Claims 31 and 32 with a thread controller characterised in that the thread controller has a control connection to the rotary drive mechanism of the storage roll, the rotational direction of the rotary drive mechanism being reversible.



34. A thread store according to any of Claims 1 to 33 incorporated
in a textile machine with a plurality of working stations
and a maintenance device which travels past these working
stations and which can be allocated selectively to these
5 working stations, characterised in that the storage roll
and the thread course can be brought into an acute angle
relative to each other in such a way that the discharge end
of the storage roll is located closer to the thread course
than its feed end.

10 35. A thread store with rotary drive mechanism and a storage
roll constructed substantially as hereinbefore described
with reference to, and as shown in, the accompanying drawings.
