

The invention relates to a method of feeding conical bobbin tubes to the winding heads of a textile machine, wherein bobbin tubes nested in the form of columns are kept available at a supply station and are separated for removal, and each separated bobbin tube is brought into a conveying position and is transferred to a storage- and transport device in which the bobbin tubes are stored and transported to the winding heads of the textile machine, and the invention further relates to a device for the execution of the method.

It has already been proposed to nest conical bobbin tubes to form bobbin tube columns or rods, to store these bobbin tube columns vertically in a rotatable supply container and to separate the bobbin tubes consecutively, by means of a device for separating bobbin tube columns (DE-PS 2,131,957). The known proposal contains no detailed information as to how the separated bobbin tube is subsequently handled.

From FR 2 543 931 A1 it is known to separate bobbin tubes from a bobbin tube column and to transfer them to a conveying means which feeds the bobbin tubes to a magazine. Here the bobbin tubes are firstly conveyed standing upright and are then pivoted into a vertical position by the conveying means. From this position the bobbin tubes are transferred via a chute to a magazine. With this method of transporting the bobbin tubes, after their separation a defined position of the bobbin tube relative to the conveying means is initially established. This position does not correspond to the position of the bobbin tube required for changing the bobbins. During further transport the conveying means changes its direction of conveyance, as a result of which the bobbin tubes lose their defined position in the conveyor. When the bobbin tubes have been transferred to the moveable magazine, the bobbin tubes must be repositioned in

order that they can be transferred from the magazine to the winding head. The already established conveying position, which comprises a defined position of the empty bobbin tube, is thus initially relinquished as a result of the further transport steps and must then be re-established. This renders the device costly and liable to malfunction.

The aim of the present invention is to provide a method and a device which allow the bobbin tube released from a bobbin tube column to be fed in a simple fashion to the winding heads in the position required for the changing of the bobbins.

Commencing from a method for feeding conical bobbin tubes to the winding heads of a textile machine in which bobbin tubes nested in the form of columns are kept available at a supply station and are separated for removal, and each separated bobbin tube is brought into a conveying position and is transferred to a storage- and transport device in which the bobbin tubes are stored and transported to the winding heads of the textile machine, this aim is fulfilled in accordance with the invention in that this conveying position corresponds to the position required at the winding heads for the changing of the bobbins, and the bobbin tubes are transferred to the storage- and transport device maintaining this conveying position.

In a further development of the method it is provided that the bobbin tube is stripped from a vertically arranged bobbin tube column in the direction of its end which tapers conically downwards, and then is brought from its vertical position into a horizontal position, in which it is transferred to the magazine. The transfer of the bobbin tubes to the magazine advantageously takes place successively until bobbin tubes have been transferred for all the supply locations of the magazine, whereupon the magazine is returned to its starting position.

The device for the execution of the method, comprising a bobbin tube magazine, in which at least one bobbin tube column formed by nested, conical bobbin tubes is arranged, comprising a device for separating the bobbin tubes and means for transferring the individual bobbin tubes from their column-like position into a conveying position, comprising a device for storing and transporting the bobbin tubes to the winding heads of the textile machine, and comprising means for transferring the bobbin tube into the storage- and transport device, is characterised in that the storage- and transport device consists of a conveyor belt which extends along all the winding heads, the means for transferring the bobbin tubes into their conveying position consist of a curved bobbin tube chute which is arranged following the bobbin tube magazine, and that the means for transferring the bobbin tube into the storage- and transport device comprise an ascending conveyor which maintains the conveying position of the bobbin tubes.

With a space saving arrangement of the bobbin tube column in a vertical position, the bobbin tube is transferred into a horizontal conveying position preferably by means of a bobbin tube chute of curved formation which is arranged following the bobbin tube magazine and which terminates at a horizontally arranged bobbin tube depositing table.

Here it is provided that the bobbin tube depositing table is assigned transfer means for transferring a bobbin tube to an ascending conveyor which is followed by a gripper which transfers the bobbin tube to the conveyor belt.

In a further development of the invention the bobbin tube depositing table is assigned stops which fix the position of the bobbin tube. Here the rear stop, considered in the sliding direction of the bobbin tube, is expediently

provided with means which damp the impact of the bobbin tube. A possible springing back of the bobbin tube onto the chute is easily prevented in that the front stop, considered in the sliding direction of the bobbin tube, is formed by the bobbin tube chute.

A reliable and gentle gripping of the conical bobbin tube is assured in that the transfer means assigned to the bobbin tube depositing table are in the form of swivelling curved rods. The curved rods are preferably attached to a bearing block mounted so as to be rotatable. In an advantageous further development of the device, a rotary movement of the bearing block about its axis, which results in a swivelling movement of the curved rods, is generated via a lever arm which is attached to the bearing block and to which a cam lever is articulated. In a manner which greatly simplifies the device, the swivelling movement of the curved rods in the direction of the ascending conveyor is produced by a bobbin tube carrier of the ascending conveyor, which carrier acts on the cam lever.

Expediently the bobbin tube lying on the bobbin tube depositing table is transferred to the same bobbin tube carrier which actuates the cam lever. By virtue of the fact that the curved rods are adjustable in the bearing block transversely to the running direction of the ascending conveyor, their position can be changed and adapted to bobbin tubes of different conicity and diameter.

An exemplary embodiment of the invention will be described in the following making reference to the drawings in which:-

Figure 1 is a perspective view of one end of a textile machine comprising a bobbin tube loading station and an endless bobbin tube conveyor belt;

Figure 2 is a front view of the bobbin tube loading station;

Figure 3 is a side view of a bobbin tube depositing table with transfer means and an ascending conveyor;

Figure 4 is a plan view of a bearing block with curved rods attached thereto and

Figure 5 is a perspective view of a bobbin tube separating device.

The textile machine 1, for example an open-ended spinning machine, of which only an end section has been shown in Figure 1, comprises the usual number of operating stations each comprising a winding device for winding yarn onto a bobbin tube. The individual winding devices are supplied with empty bobbin tubes by means of a conveyor belt 2 which is provided with bobbin tube holders 20 and which is arranged above the winding heads. The bobbin tubes are introduced into the bobbin tube holders 20 in the longitudinal direction of the machine, sorted with their ends facing in the same direction. The conveyor belt 2 is assigned a stationary bobbin tube loading device which is arranged in a housing 3 at one end of the machine 1.

The bobbin tube loading device comprises a bobbin tube magazine which has been provided with the overall reference 4 and which accommodates at least one bobbin tube rod or column 5. The bobbin tube column 5 is composed of nested, conical bobbin tubes 40 and is arranged vertically in the bobbin tube magazine 4, with the conically tapering ends of the bobbin tubes facing in the direction of release of the bobbin tube column 5, thus downwards in the exemplary embodiment. In the exemplary embodiment the bobbin tube

magazine 4 is formed by a horizontally arranged rotary table 42 which is attached to a rotary shaft 41 and which contains a plurality of openings 43, arranged along a circular path, each for a respective bobbin tube column 5 (Figures 1 and 2). The rotary shaft 41 is mounted vertically on the stationary base plate 44.

One of the bobbin tube columns 5 is arranged on a support in the form of a base plate 45 which can be swivelled out of the vertical plane of the bobbin tube column 5 and which is attached to a driveable shaft 46 which is mounted so as to be rotatable. The reserve bobbin tube columns 5 are supported by a stationary base plate 44 and can be displaced consecutively onto the swivelling base plate 45 by the rotation of the rotary table 42. In order to better stabilize the bobbin tube columns 5, between the rotary table 42 and the base plates 44 and 45, at the level of the last bobbin tube of the bobbin tube columns 5, a further rotary table 47 provided with openings is attached to the rotary shaft 41. At the same time the respective last bobbin tube of the bobbin tube column 5 which is to be released is precisely guided by the second rotary table 47.

The bobbin tube column 5 located on the swivelling base plate 45 is assigned a device arranged on the rotary shaft 46, which device serves to separate the nested bobbin tubes and comprises a moveable bobbin tube clamp 48, which co-operates with a stationary bobbin tube clamp 481 and serves to clamp the last but one bobbin tube, and a bobbin tube stripper 49, which is attached to a vertically moveable rotary shaft 46 and serves to strip off the last bobbin tube from the bobbin tube column 5 (Fig. 5).

The two clamping jaws 48 and 481 are arranged on a bearing plate 482, the clamping jaw 48 being able to be swivelled about a shaft 483 arranged on the bearing plate

482. The swivelling movement is produced, for example, by means of a compressed air cylinder 484, the piston rod of which is connected to a pin arranged on the clamping jaw 48.

The bobbin tube stripper 49 is attached to the rotary shaft 46 which is mounted so as to be rotatable in the stationary clamping jaw 481 and a bracket 462 connected to the piston rod of a compressed air cylinder 461. A compressed air cylinder 491, the piston rod of which is connected to a pin on the bobbin tube stripper 49, produces the rotary movement of the shaft 46 and thus the movement of the bobbin tube stripper 49 towards the bobbin tube column and the swivelling of the base plate 45 out of the region of the bobbin tube column 5.

The vertical movement of the shaft 46, with which the bracket 462 is pressed against stop rings on the shaft 46, is produced by means of a compressed air cylinder 461, the piston rod of which is connected to the bracket 462. During the downwards movement the bobbin tube stripper 49 attached to the shaft 46 presses against the upper edge of the last bobbin tube 50 and then strips the latter from the bobbin tube column.

A light clamping pressure is sufficient to retain the last but one bobbin tube by means of the clamping jaws 48 and 481, as when the bobbin tube is subject to an axial loading force in the direction of stripping off of the bobbin tubes, which force may exceed the clamping force of the clamping jaws, this last but one bobbin tube, with its conically expanded diameter, moves into the clamping jaws 48, 481 and is thus automatically secured. This serves to avoid damage to the bobbin tubes. In an equally gentle fashion the last bobbin tube of the bobbin tube column is released from the column by the bobbin tube stripper 49 which positions itself smoothly on the edge of the bobbin tube.

Between the bobbin tube magazine 4 and the conveyor belt 2 is arranged a conveyor device, by means of which a bobbin tube 50 released from the bobbin tube column 5 can be brought into a conveying position and fed to the conveyor belt 2 in the conveying position. The conveying device comprises a bobbin tube chute 51 which is arranged beneath the swivelling base plate 45 and which is curved towards, and terminates at, a stationary bobbin tube depositing table 52 mounted laterally and beneath the bobbin tube magazine 4. The upwardly moving run of an ascending conveyor 6 moves past close to the bobbin tube depositing table 52, with the bobbin tube carriers 61 of the said ascending conveyor (Figure 3) facing in the same direction as a bobbin tube 50 arranged on the bobbin tube depositing table 52. The bobbin tube depositing table 52 is assigned transfer means for transferring a bobbin tube 50, deposited on the bobbin tube depositing table 52 and projecting laterally therefrom, to one of the bobbin tube carriers 61 of the ascending conveyor 6.

The transfer means consist of two curved rods 71 which are arranged on both sides of the bobbin tube depositing table 52 in such manner that they can grip a bobbin tube 50 lying on said table in the region of its two ends. The curved rods 71 are secured in a bearing block 7 by means of a clamping strip 72 and when screws 73 have been released can be adjusted in the bearing block 7 in the direction of the ascending conveyor 6 and in the direction opposite thereto (Figure 4). The bearing block 7 is mounted in its holder so as to be rotatable. The rotation of the bearing block in a clockwise direction, whereby a swivelling movement towards the ascending conveyor 6 is imparted to the curved rods 71, is achieved by means of a cam lever 74 which acts on a lever arm 75 attached to the bearing block 7 and is pushed out of its rest position into the position 74',

indicated by broken lines in Figure 3, by one of the bobbin tube carriers 61 of the ascending conveyor 6. For this purpose the cam lever 74 can be swivelled about a shaft 76 and is articulated to the lever arm 75 by means of a pin 77 which is attached to the lever arm 75 and which engages into a slot in the cam lever.

In running operation firstly the respective last bobbin tube is removed from the bobbin tube column 5 arranged on the swivelling base plate 45 above the bobbin tube chute 51. For this purpose the last but one bobbin tube of the bobbin tube column 5 is retained by the bobbin tube clamps 48 and 481, the base plate 45 is swivelled out of the region of the bobbin tube column 5, and the last bobbin tube is stripped from the bobbin tube column 5 by the bobbin tube stripper 49 which engages onto the upper edge of the bobbin tube. With its conically tapered end leading, this bobbin tube 50 falls onto the curved bobbin tube chute 51 and slides downwards on the latter, whereby it firstly changes from its vertical position into an oblique position and, on arrival on the bobbin tube depositing table 52, assumes a horizontal position.

When the bobbin tube 50 slides onto the bobbin tube depositing table 52, its tapered end abuts against a stop 53 which can be covered with a means which damps the impact of the bobbin tube. A possible springing back of the bobbin tube 50 onto the chute is easily prevented in that the bobbin tube depositing table 52 is arranged somewhat lower than the bobbin tube chute 51 so that, as can be seen from Figure 2, the discharge edge of the bobbin tube chute 51 itself forms a stop for the bobbin tube 50. A stop 54 is also arranged on the bobbin tube depositing table 52, which stop 54 has a bearing surface, inclined towards the ascending conveyor 6, for the bobbin tube 50 and prevents the bobbin tube 50 from rolling off in this direction. In the opposite direction the

bobbin tube 50 is retained by a vertical wall 55 of the bobbin tube depositing table 52 or also by the curved rods 71.

The bobbin tube 50, which in this way has been brought into a conveying position and centered on the bobbin tube depositing table 52, is then transferred to a bobbin tube carrier 61 of the circulating ascending conveyor 6. This takes place as soon as one of the bobbin tube carriers 61 abuts against the cam lever 74 and presses the latter into the position 74', whereby the bearing block 7 is rotated about its axis via the lever arm 75 and the curved rods 71 swivel in the direction of the ascending conveyor 6 into the position 71'. The curved rods 71 carry along the bobbin tube 50 and transport it via the stop 54 in a horizontal position to the bobbin tube carrier 61, which has triggered the swivelling movement of the curved rods 71 and assumes the position 61' when the bobbin tubes are transferred. In this way the bobbin tube carriers 61 are continuously supplied with bobbin tubes 50 and conveyed upwards by the ascending conveyor 6 in a horizontal position. The bobbin tube arriving at the upper end of the ascending conveyor 6 is then gripped by a gripper 8 which can be moved between the ascending conveyor 6 and the conveyor belt 2 and by which it is introduced into a bobbin tube holder 20 of the conveyor belt 2 in its conveying position. The transfer of the bobbin tubes 50 to the conveyor belt 2 takes place successively until bobbin tubes have been transferred for all the bobbin tube holders 20 of the conveyor belt 2. Then the conveyor belt 2 returns to its starting position.

The removal of a bobbin tube from the bobbin tube column 5 and its release by the base plate 45 obviously do not take place until the bobbin tube 50 has passed from the bobbin tube depositing table 52 to the bobbin tube carrier 61 of the ascending conveyor 6 and the curved rods 71 have been

caused to swivel back into their rest position by a return spring 78 which acts on the bearing block 7 via a lever arm and rotates the latter in an anticlockwise direction. This control is effected by means of a light barrier 9 which scans an end of the bobbin tube 50 projecting from the bobbin tube depositing table 52.

The described exemplary embodiment can be modified in different ways. Thus, for example, it can be provided that the bobbin tube released from the bobbin tube column by the separating device is gripped by a gripper, is brought into the conveying position and is directly introduced into a bobbin tube carrier 61 of the ascending conveyor 6. The bobbin tube chute 51 and the bobbin tube depositing table 52 with the transfer means 71 can then be dispensed with.



### Claims

1. A method of feeding conical bobbin tubes to the winding heads of a textile machine, wherein bobbin tubes nested in the form of columns are kept available at a supply station and are separated for removal, and each separated bobbin tube is brought into a conveying position and is transferred to a storage- and transport device in which the bobbin tubes are stored and transported to the winding heads of the textile machine, characterised in that this conveying position corresponds to the position required at the winding heads for the changing of the bobbins and the bobbin tubes are transferred to the storage- and transport device (2) maintaining this conveying position.
2. A method as claimed in Claim 1, characterised in that the bobbin tube is stripped from a vertically arranged bobbin tube column in the direction of its end which tapers conically downwards and is then brought from its vertical position into a horizontal position in which it is transferred to the magazine.
3. A method as claimed in Claim 1 or 2, characterised in that the transfer of the bobbin tubes to the magazine takes place successively until bobbin tubes have been transferred for all the supply locations of the magazine, whereupon the magazine returns to its starting position.
4. A device for executing the method claimed in one of Claims 1 to 3, comprising a bobbin tube magazine in which at least one bobbin tube column formed from nested, conical bobbin tubes is arranged, comprising a device for separating the bobbin tubes and means for



transferring the individual bobbin tubes from their column-like position into a conveying position, comprising a device for storing and transporting the bobbin tubes to the winding heads of the textile machine, and comprising means for transferring the bobbin tube into the storage- and transport device, characterised in that the storage- and transport device consists of the conveyor belt (2) which extends along all the winding heads, the means for transferring the bobbin tubes into their conveying position consist of a curved bobbin tube chute (51) which is arranged following the bobbin tube magazine (4), and that the means for transferring the bobbin tube into the storage- and transport device comprise an ascending conveyor (6) which maintains the conveying position of the bobbin tubes.

5. A device as claimed in Claim 4, characterised in that the bobbin tube magazine (4) is followed by the bobbin tube chute (51) which is of curved formation and which terminates at a horizontally arranged bobbin tube depositing table (52).
6. A device as claimed in Claim 5, characterised in that the bobbin tube depositing table (52) is assigned transfer means (71) for transferring a bobbin tube (50) to an ascending conveyor (6) which is followed by a gripper (8) which transfers the bobbin tube (50) to the conveyor belt (2).
7. A device as claimed in one of Claims 4 to 6, characterised in that the bobbin tube depositing table (52) is assigned stops (53, 54, 55) which fix the position of the bobbin tube (50).



8. A device as claimed in Claim 7, characterised in that the rear stop (53), considered in the sliding direction of the bobbin tube (50), is provided with means which damp the impact of the bobbin tube.
9. A device as claimed in Claim 7, characterised in that the front stop, considered in the sliding direction of the bobbin tube (50), is formed by the bobbin tube chute (51).
10. A device as claimed in Claim 6, characterised in that the transfer means are in the form of swivelling curved rods (71).
11. A device as claimed in Claim 10, characterised in that the curved rods (71) are secured in a bearing block (7) which is mounted so as to be rotatable.
12. A device as claimed in Claim 11, characterised in that a lever arm (75), to which a cam lever (74) is articulated, is attached to the bearing block (7).
13. A device as claimed in Claim 12, characterised in that the swivelling movement of the curved rods (71) in the direction of the ascending conveyor (6) can be produced by a bobbin tube carrier (61) of the ascending conveyor (6), which carrier acts on the cam lever (4).
14. A device as claimed in Claim 13, characterised in that the bobbin tube (50) located on the bobbin tube depositing table (52) is transferred to the same bobbin tube carrier (61) which actuates the cam lever (74).
15. A device as claimed in one of Claims 10 to 14, characterised in that the curved rods (71) can be adjusted in the bearing block (7) transversely to the running direction of the ascending conveyor (6).



16. A device as claimed in one of Claims 5 to 15, characterised in that the bobbin tube depositing table (52) is assigned a light barrier (9) which scans the bobbin tube (50).
17. A device as claimed in Claim 5, characterised in that a bobbin tube column (5) is arranged above the bobbin tube chute (51) and the conically tapering ends of the nested bobbin tubes are directed towards the bobbin tube chute (51).
18. A device as claimed in Claim 17, characterised in that a bobbin tube stripper (49) can be advanced towards the respective last bobbin tube (50) of the bobbin tube column (5), which bobbin tube stripper (49) can be pressed towards the edge of the conically expanding end of the bobbin tube, and strips the bobbin tube, in the direction of the bobbin tube chute (51), from the last but one bobbin tube of the bobbin tube column (5), which last but one bobbin tube is retained by clamping jaws (48, 481).