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Ritter

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[54] **TRANSFER TAIL TRACTION MECHANISM**

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[51] **Int. Cl.** **B65h 54/02**

[58] **Field of Search** ..... 242/18 A, 18 PW

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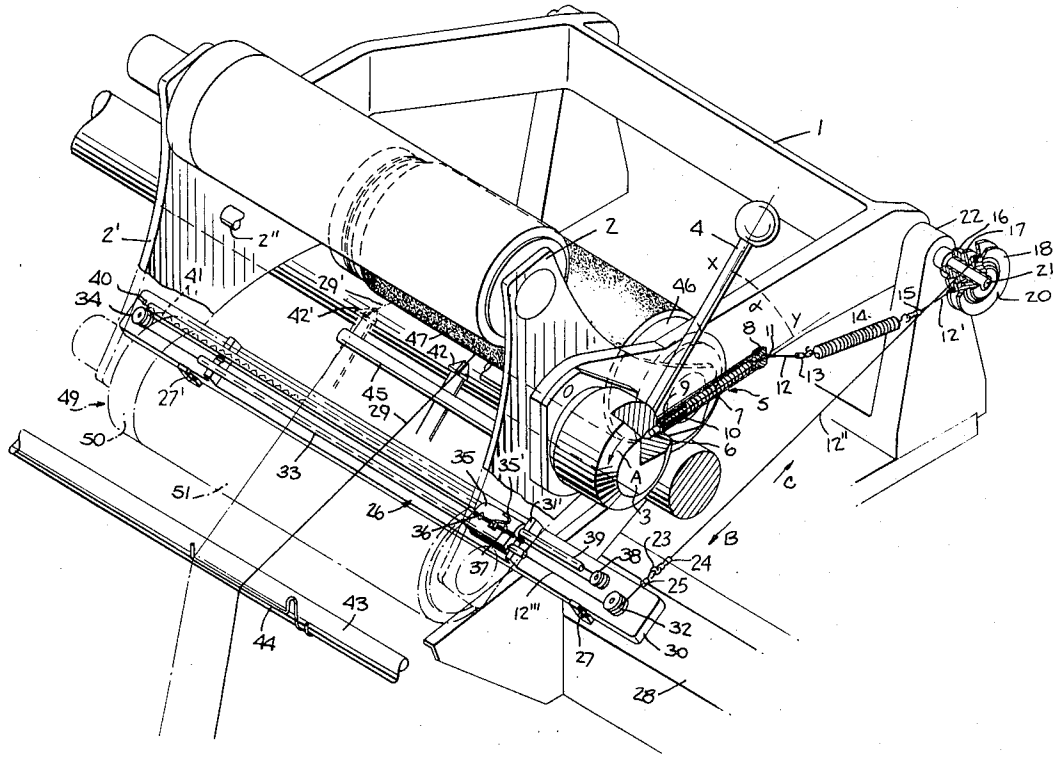
[57] **ABSTRACT**

Apparatus for automatic formation of a transfer tail on a continuous delivery winding device including a bobbin changer wherein an oscillating thread guiding device traverses the normal winding zone of a winding spool and shifts the yarn during bobbin change to the transfer tail zone at one end of the new or empty spool.

8 Claims, 2 Drawing Figures



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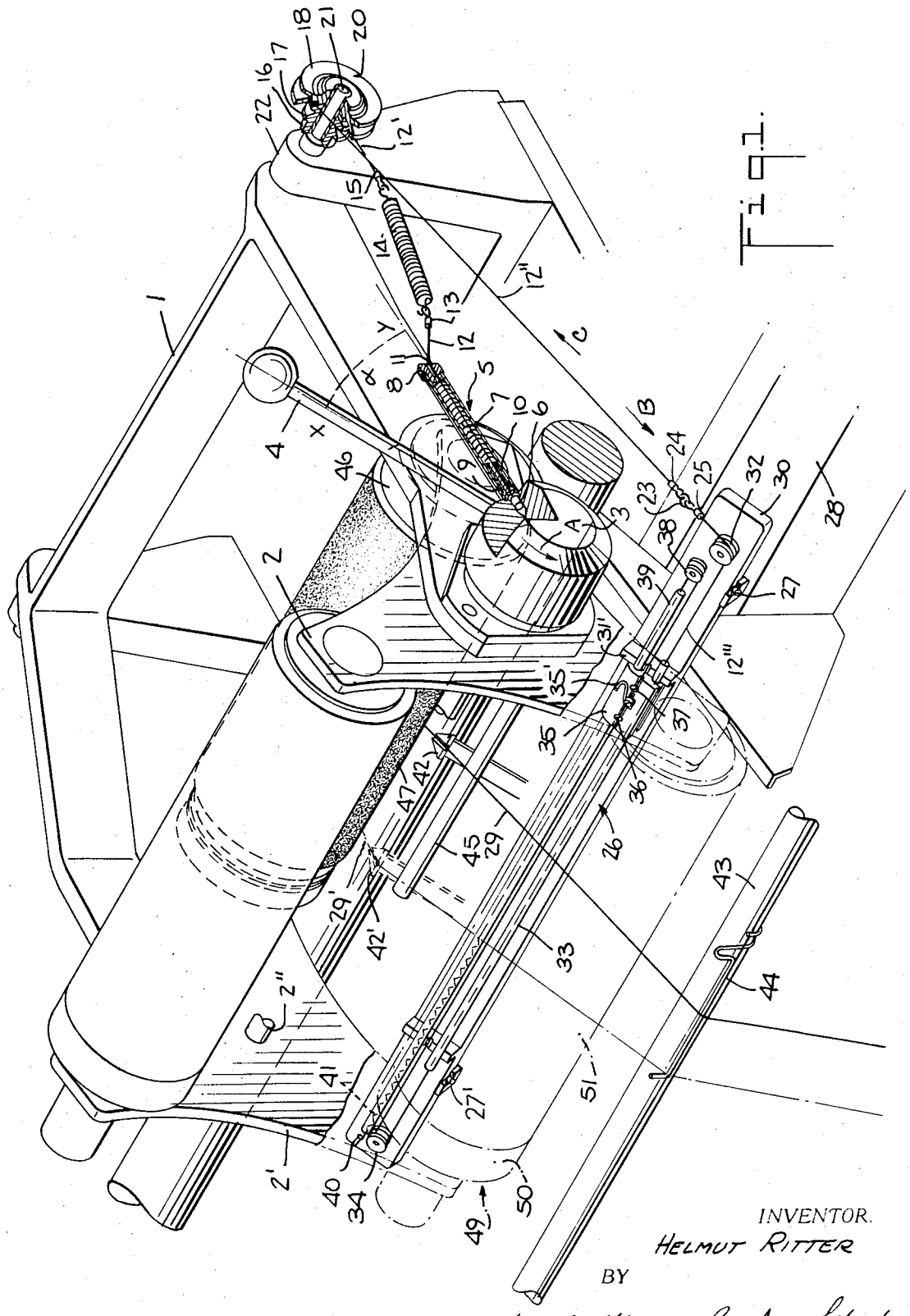

Fig. 1.

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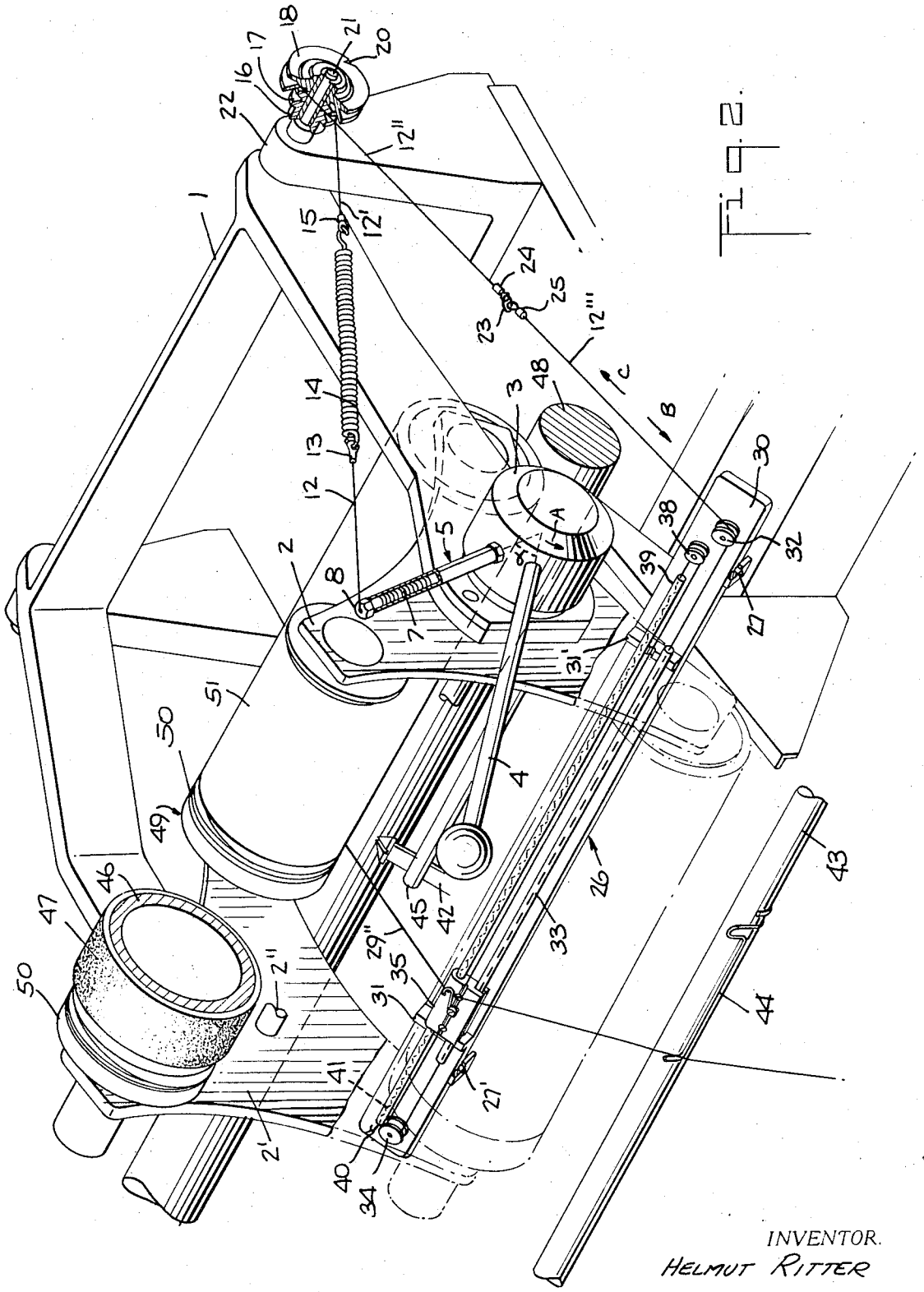

Fig. 2

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TRANSFER TAIL TRACTION MECHANISM

This invention relates to apparatus useful in winding threads or yarns (hereinafter yarns) on bobbins and the like, and more particularly, to such apparatus capable of automatically forming a transfer tail on the bobbin or other winding device during continuous delivery at winding speeds of the order of 1,000 meters per minute or more.

In apparatus of the type presently known for bobbin changing, it is usual to immobilize one or more bobbins by separating them from their driving means while the changeover takes place, thus interrupting the winding operation. However, since in some textile machines such as false-twist machines, for example, the yarn is continuously advanced, it is desirable that the winding procedure also be continuous in order that the two operations may proceed in synchronous order. For this purpose, the formation of a transfer tail on the empty bobbins or take-up tubes when they are ready for spool changing is necessary. This is presently done by drawing off a length of yarn needed for the transition from the full to the empty bobbin by hand or by means of a suction device or the like, and placing some reserve windings on the empty bobbin body, the yarn end being fixed by means of an adhesive surface structure of the take-up tube, such as flocking, roughness or indentations, for example. These processes are highly time consuming and generally lead to substantial losses of material. Apparatus are also known wherein the transfer tail formation of the yarn is effected on star or cylinder-shaped support bodies placed in advance of or subsequent to the take-up tube, in the machine direction, and connected either by an elastic coupling with the delivery mechanism or the drive mechanism of the take-up tube.

It will be appreciated that the transition from one bobbin to another must not have any disturbing effect on the yarn, and the knotting of the two yarn ends must not consume a great deal of time. The transfer tail should, of course, be no longer than necessary for knotting because if the ends are too long, they must be wound off manually, which is additionally time consuming.

I have conceived apparatus of the class described which provides for automatic formation of a transfer tail during bobbin changing by means of the addition of such apparatus to an automatic or semi-automatic bobbin changing device such, for example, as described in copending U. S. Application Ser. No. 728,966, filed May 14, 1968, now U.S. Pat. No. 3,559,901 wherein an empty bobbin is exchanged for a full one while the drive cylinder is continuously rotating; and I have actually constructed a successfully operating and commercially desirable apparatus based on that concept.

In essence, my invention resides in the utilization of apparatus for the automatic formation of a transfer tail on a yarn winding device during continuous thread delivery characterized by a traverse device having guide means extending horizontally in parallel with the axis of a bobbin body and extending over the whole of the transfer tail zone as well as the winding zone of a take-up tube or bobbin, a carrier slidable relative to the guide means by means of a cord or rope drive mechanism, a yarn guide for receiving the advancing yarn during bobbin changing between an empty winding bobbin and a wound-up bobbin and shifting the yarn into the transfer tail zone situated selectively in one of the two peripheral end zones of the empty winding bobbin. My apparatus may conveniently be mounted for operation with an automatic or semi-automatic bobbin changer by securing same on the frame of the machine which may be easily modified, if necessary.

The guide means may comprise a pair of tubes extending horizontally and parallel to the axes of the bobbins and through which the driving cord or rope passes to shift the carrier; and the yarn guide may comprise a hook-shaped element borne by the carrier and able to pick up the advancing yarn during changeover to shift same to the transfer tail zone of the next bobbin as same comes into place for winding.

As already mentioned, the present invention finds a useful application in connection with the structure described in application Ser. No. 728,966, which is a semi-automatic device employing a manually controlled lever which annularly shifts a hub which in turn controls the position of the fully wound and empty bobbin relatively to a drive cylinder. In my present invention, the cord mechanism is connected to the lever-controlled switching hub by means of a spring box threaded into the latter with a preset tension spring supported therein and bearing against a sliding bolt receiving the ends of the cord mechanism arranged to shift the carrier when the bobbins are shifted by means of the lever. Stop means may be provided at the end zones of the traverse device to limit the movement of the carrier; and means including a compensating spring may be provided to compensate for extension of the cord mechanism after the carrier has reached a stop means and can proceed no further.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which this disclosure is based may readily be utilized as the basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings which form a part of this specification wherein:

FIG. 1 is a perspective view illustrating a winding device incorporating apparatus according to the present invention and showing the same during winding with the yarn in central and in left extreme positions; and

FIG. 2 is a perspective view of the apparatus illustrated in FIG. 1, but shown at the moment of formation of a transfer tail.

Referring now to the drawings, and more particularly to FIG. 1 thereof, there is shown a machine 1 of the semi-automatic bobbin changing type as mentioned

hereinbefore, in which two starshaped bobbin supports 2 and 2' are connected by a shaft 2'' for rotation thereabout. The bobbins extending between the extremities of the bobbin supports may be shifted by means of a lever 4 fixed to a hub 3 and operable to rotate the same in the direction indicated by the arrow A; and a spring box 5 is rigidly connected with the hub 3 by screw 6 so that its longitudinal axis Y forms an angle α with the longitudinal axis X of the lever 4. The spring box 5 actually constitutes one end of a cord or rope traction device and serves to give the cord 12 thereof a desired pretension, as well as to delay its actuation when the lever is shifted, as will be more fully described hereinafter.

The pretension of the cord 12 is actually effected by a tension spring 7 positioned within the box 5, one end of the spring being supported on a closure in the end of the box 5, the closure having an orifice 8, and the other end of which is supported by an axially moveable gliding bolt 9. The spring bears between the closure with the orifice 8 and the bolt 9 to which the cord is attached and from which it extends through the bore 11 of the closure with the orifice 8 and on to a compensating spring 14 to one end of which it is attached by means of a ring eye 13. The other end of the spring 14 is connected by means of a further ring eye 15 to a continuation of the cord 12' which extends at least part way around the pulley or sheave 17 and is anchored thereto. A second pulley or sheave 18 of larger diameter than the sheave 17 is attached to the same for rotation therewith about the shaft 21. A further extension of the cord 12'' is anchored in the slot 20 of the sheave 18 and is connected, by means of a ring coupling 23 and a ring eye 24, to a further extension thereof 12''' and its ring eye 25. The various coupling devices make possible decoupling of the respective cord parts 12, 12', 12'', 12''' with considerable ease in cases of necessity such as where assembly and disassembly are required.

The traverse device, indicated generally by the arrow 26, is easily connected with the machine 1 by attaching the traverse bottom plate 30 to the machine part 28 in advance of the bobbin 46, shown in winding position, and parallel to the longitudinal axis thereof. Elements 27, 27' serve to fix the plate 30 on a machine part (not shown). From the ring coupling 23, the cord 12''' passes partially around a roller 32 arranged near one end of the bottom plate 30, and thence through a guide tube 33, 180 degrees around a roller 34 mounted at the other end of the plate 30 and to a carrier 35 to which the cord is connected by means of screws 36 and 37, 180 degrees around a further roller 38, through a second guide tube 39 and to the end of a spring 41 in the tube 39, the other end of which is attached to a pin 40 fixed to the bottom plate 30.

A wire 44 is bent to provide two upright portions at the ends of a horizontal part, and this wire is supported by a bar 43 extending along parallel to the axis of the bobbins and in advance thereof in the machine direction so as to guide the yarn 29 to an oscillating wind-up thread guide 42, 42' traversing within the winding zone 47 of the bobbin body 46. A holding bar 45 is positioned just in advance of the wind-up thread guide 42 and extends over the winding length of the bobbin 46 to hold the thread down when the winding procedure has been terminated and thus to position same for gripping by guide means in the form of a hook 35' connected to the carrier 35 and moveable therewith in order to form the transfer tail on the next bobbin 49 to be wound.

The bobbins are brought to rotation by means of a driving cylinder 48 against which they are pressed during wind-up; and the lateral part 50 of the bobbin 49, for example, is the transfer tail zone, the bobbin body portion therebetween, such as that indicated by the reference numeral 51, being the wind-up portion. After removal of a full bobbin, such as the bobbin 46, the same is replaced by an empty bobbin 49 (see FIG. 2). It will be understood by those persons skilled in the art, that the traverse mechanism 26 can be exchanged for one which will bring the carrier 35 in the opposite direction so that a transfer tail may be formed on either the left or right hand side of a bobbin, as desired.

In respect of the operation of the apparatus of the present invention, FIG. 1 shows the thread 29 during the winding procedure in central position, the thread 29' illustrated in broken lines in the left extreme position, and the traverse device 26 in the inactive position; and FIG. 2 illustrates the position of the respective parts at the moment of formation of a yarn reserve. In this case, the new take-up tube 49 is already in winding position, and the full bobbin 46 is ready for doffing.

The formation of the yarn reserve is effected as follows. The carrier 35 is actuated by the switch lever 4 moving in the direction of arrow A to effect the bobbin changing, and also shifting the spring box 5 to the position shown in FIG. 2 whereupon tension is placed on the cord 12, the spring 14 and the cord 12' to rotate the sheaves 17 and 18 about the shaft 21 and draw the cords 12'' and 12''' in the direction of the arrow C, thus to shift the carrier 35 to the left, as viewed, so that the yarn guide 35' moves more or less perpendicularly in respect of the direction of introduction of yarn into the machine after removal of the full bobbin 46 from contact with the driving cylinder 48 and the resulting, almost simultaneous removal of the yarn 29 from the yarn guide 42, to seize the yarn 29 held down by the bar 45 at any point within the traversing zone of the winding yarn guide 42. The yarn is shifted by the hook-shaped yarn guide 45' beyond the traverse zone and into the position indicated by the numeral 29'' (FIG. 2) and, therefore, to a position to engage the transfer tail zone 50 on the winding coil 49.

At this point, the bobbin changing procedure has been approximately half completed, and the full bobbin 46 is in decelerating rotation winding up the yarn for a further short period of time. The empty bobbin 49 passes thereafter to the driving cylinder 48 and commences rotation. The transfer tail zone 50 of the empty coil 49 which is roughened, indented or flock-coated seizes the yarn 29', which action is favored by the decelerating bobbin 46 and automatically tears off the yarn by the change of direction of the yarn between the new take-up tube 49 and the full bobbin 46. After several turns are wound onto the reserve zone 50 of the coil 49, the switch lever 4 effecting bobbin changing is again brought into its original position. Simultaneously therewith, the carrier 35 with the hook-shaped yarn guide 35' shifts back to its original position (FIG. 1) with the cooperation of the cords 12''', 12'', 12' and

12 moving in the direction indicated by arrow B, and retracting spring 41; and the thread 29 is automatically seized by the winding guide 42 in its traversing zone, and is again led by the same towards the coil 49. It will be appreciated that the compensating spring 14 permits completion of the traverse movement of the carrier to the left as viewed, until it is stopped by contact with a stationary stop 31 and then, without undue strain on the cords, it permits further movement of the lever 4 until the spool changing procedure is completed. A second stationary stop 31' serves to limit movement of the carrier to the right, as viewed.

From the foregoing description, it will be appreciated that the apparatus of the present invention contributes to the reduction of the loss of yarn arising by reason of the formation of a transfer tail in that small amounts of yarn are fed continuously during the short switching time necessary for bobbin changeover and that thread suction or other handling devices are eliminated along with manual operations between the rotating parts of the machine, wherefore the latent danger of accident to personnel is reduced.

I believe that the construction and operation of my novel transfer tail traction mechanism will now be understood, and that the advantages of my invention will be fully appreciated by those persons skilled in the art.

What I claim is:

1. Apparatus for the automatic formation during continuous yarn delivery of a transfer tail in a transfer tail zone adjacent a winding zone on a bobbin, said apparatus having a frame-like bobbin support which is rotatable to bring bobbins mounted thereon successively into and out of engagement with a bobbin driving element, a switching hub in rotatable driving engagement with said bobbin support for rotating same to shift said bobbins relatively to said driving element, characterized by a traverse device having guide means extending across the whole of the transfer tail zone as well as the winding zone of a bobbin, a carrier mounted on and slidable relative to said guide means, cord drive means connected between said switching hub and said carrier for producing carrier movement when the switching hub is rotated, a yarn guide moveable with said carrier for receiving a yarn during bobbin changing and shifting the yarn from the winding zone into the transfer tail zone situated selectively in one of the two peripheral end zones of the empty bobbin, said cord drive means comprising a cord and a pretension spring interconnected serially between said carrier and said switching hub whereby a delayed actuation of said carrier is produced by switching rotation of said switching hub.

2. Apparatus according to claim 1, wherein said yarn guide is a hook mounted on said carrier, said guide means are tubes extending parallel to the longitudinal axis of a bobbin body, and said carrier is mounted for sliding movement on said tubes.

3. Apparatus according to claim 2, wherein the traverse device comprises two rigid stop members arranged at the end zones of the same for supporting the tubes and for limitation of the traversing movement of the carrier.

4. Apparatus according to claim 1, wherein the cord drive means for said carrier is connected to the switching hub by means of a spring box fixed in the latter with said pretension spring supported therein and against a sliding bolt for receiving the end of the cord and against a closure with a bore through which the cord passes.

5. Apparatus according to claim 4, wherein stop means are provided to limit the movement of said carrier and the drive means includes a compensating spring to allow further extension of said mechanism after said carrier movement is stopped by said stop means.

6. Apparatus according to claim 3, wherein a spring is supported in one of said tubes and extends between a pin and the drive means for moving the carrier from the transfer tail zone of the take-up tube against one of the stop members after spool changing has been terminated.

7. Apparatus according to claim 1, wherein said guide means comprises a pair of tubes extending parallel to the longitudinal axis of said bobbins and extending across the winding zone and transfer tail zone thereof, said cord being mounted to extend along a path parallel to said tubes.

8. Apparatus according to claim 7, wherein stop means are provided to limit movement of said carrier and said cord drive mechanism includes spring means wherefore, when further movement of said carrier is prevented by said stop means, said lever may be further shifted to complete bobbin changeover without over tensioning said cord drive mechanism.

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