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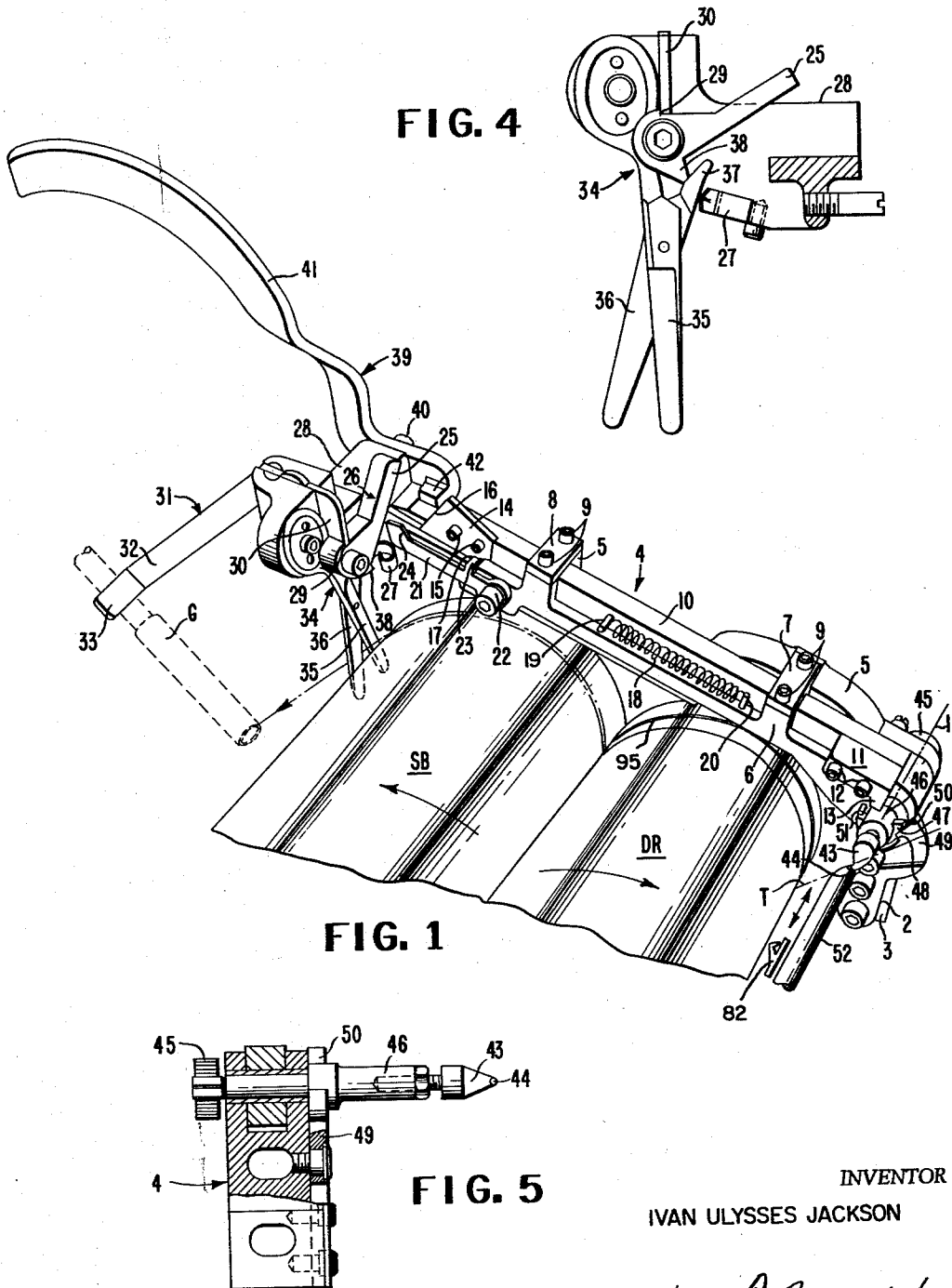
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3,097,804

TRANSFER TAIL WINDING DEVICE

Filed Jan. 23, 1962

2 Sheets-Sheet 1



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FIG. 3

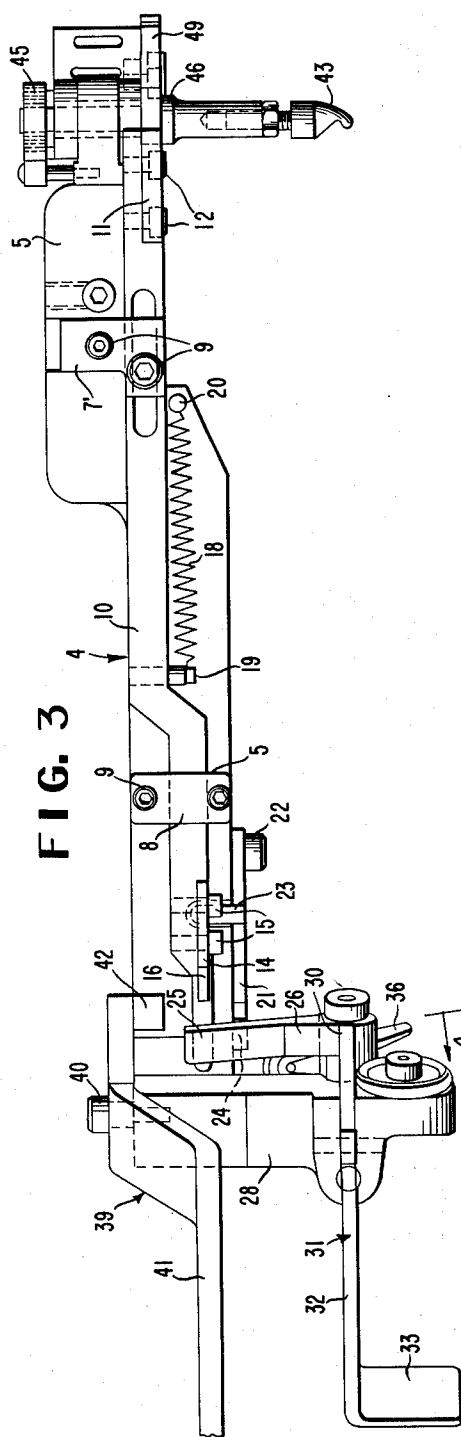
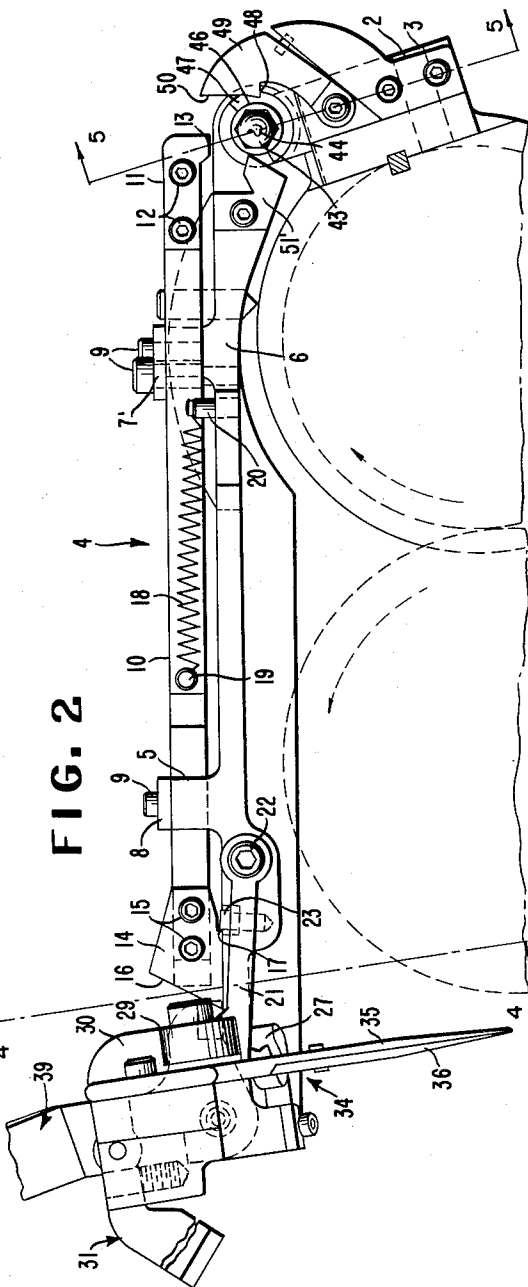


FIG. 2



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TRANSFER TAIL WINDING DEVICE

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This invention relates generally to the field of textile windup apparatus and more specifically to means for controlling the application of a transfer tail to a yarn package in an improved manner at high rotational speeds.

As commonly understood in the textile art, a transfer tail is a portion of the first yarn wound on a yarn support, which is so disposed as to be positively secured during the winding of the remainder of yarn package, yet freely available for tying directly to the outer end of the yarn on another yarn package. The purpose of providing a transfer tail is to enable an uninterrupted flow of yarn to be maintained from a depleted yarn package to a full package adjacent thereto, as in a creel or other yarn package holder on which both yarn packages are supported.

Many methods and devices for winding transfer tails on rotating yarn supports are described in the art. While these methods and devices may be satisfactory for applying transfer tails at normal winding speeds, i.e. up to several hundred yards per minute, they are generally unsuitable for this purpose at higher speeds such as 1,000 yards per minute and higher. When winding at these high speeds it becomes very difficult to wind a satisfactory tail and control the length with any accuracy; consequently the prior art devices and methods have been found unsatisfactory in such applications. It has been found desirable to accurately control the length of the transfer tails since the building up of excessively long tails results in waste of yarn and inefficient handling of the packages. Furthermore the building up of a large bundle at the end of the yarn support is particularly undesirable when using a surface driven bobbin since the yarn bunch pushes the drive roller away from the bobbin and sufficient contact to properly drive the bobbin cannot be maintained.

It is an object of this invention to provide improved means for winding transfer tails on rotating yarn supports.

Another object is to provide a means for winding transfer tails on yarn supports rotating at high speeds.

A further object is to provide a means for accurately controlling the length of the transfer tail at high winding speeds.

Other objects will become apparent from the description and discussion to follow, taken with the drawings in which:

FIGURE 1 is a partial perspective view of a textile yarn windup apparatus embodying features of this invention, certain parts being shown only partially.

FIGURE 2 is a side elevation of an assembly of this invention showing position of rolls,

FIGURE 3 is a plan view of the assembly of FIGURE 2 embodying features of this invention,

FIGURE 4 is a sectional view of this assembly taken on line 4-4 of FIGURE 2 showing cutter device, and

FIGURE 5 is a sectional view taken on line 5-5 of FIGURE 2.

The objects of this invention are achieved by an apparatus or assembly generally providing for first cutting a running yarn line, winding a transfer tail, and after winding a transfer tail of predetermined length, shifting the yarn line to form the main yarn package.

These objects are accomplished by an apparatus more specifically comprising a means, such as a sucker gun, for collecting and disposing of a moving yarn line as it is forwarded from a yarn source, means for holding the

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moving yarn line away from the traverse mechanism for a given desired interval, means for cutting the yarn after it has been wrapped around the yarn support, means for deflecting or releasing the yarn to the traverse after the desired time interval, and means for controlling the length of the time interval between cutting and deflection of the thread to the traverse.

More specifically, the preferred form of apparatus embodying this invention comprises a movable assembly mounted in a suitable manner to a portion of the support structure 3 of the winding apparatus involved, the spin bobbin yarn traversing guide and drive roll of the winding apparatus also being partially shown in FIGURE 1. Stationary part 2 of the assembly is rigidly supported as mentioned above on support structure 3. An elongated frame unit 4 is pivotally mounted upon part 2 for rotation about axis 1 in a generally vertical plane. Frame unit 4 is formed by a main longitudinal member 5 on which is formed an auxiliary longitudinal member 6. Member 6, member 5, and links 7 and 8 which are secured in position by machine screws 9, form a longitudinally extending guideway in which slide bar 10 is slidably received for limited reciprocating movement. Slide bar 10 is provided at one end with an abutment element 11 secured thereto by machine screws 12, the abutment element having a laterally extending tip 13. At its other end slide bar 10 is provided with a cam plate 14 secured thereto by screws 15. Cam plate 14 is itself provided with a camming surface 16 and a laterally extending step 17. Slide bar 10 is urged to slide in frame unit 4 toward the pivoted end of the frame unit 4 by means of tension spring 18 connected between a pin 19 on the slide bar 10 and a pin 20 on member 6 of the frame unit 4. A sear element 21 is pivotally mounted near one end at 22 to a lateral surface of member 6 of the frame unit 4 and urged in a clockwise direction as shown in FIGURE 1 by a spring means, not shown. Sear element 21 is provided with a transversely extending projection 23 which engages with step 17 of cam plate 14 in one position of the pivotable sear element as shown in FIGURE 1. Sear or catch element 21 is provided at its other end with a projecting portion 24 which is positioned to be struck by an extending finger portion 25 of a pivoted striker element 26. Element 26 is urged toward portion 24 of sear element 21 by spring 27 and is pivotally mounted on a transversely extending bracket portion 28 at the end of member 5 of frame unit 4. Striker element 26 is provided with a notch 29 which is engaged by a catch portion 30 of pivotally mounted striker actuating lever 31 in one of its positions. Lever 31 is provided with one elongated end 32 having a transversely extending contact portion 33 adapted to be engaged by yarn sucker gun structure and moved against the bias of a spring, not shown, to function as described hereinafter.

A yarn line cutter device 34 is also operatively mounted on the bracket portion 28 at the end of frame unit 4. Cutter device consists of a stationary cutting blade 35 and a movable cutter blade 36 pivotally mounted thereon. Movable cutter blade 36 is provided with an extending lug 37 which is positioned to be engaged by a projection 38 on spring urged striker element 26 to actuate the cutter device.

A pivotally mounted lever 39 is mounted on pivot pin 40 at the end of frame unit 4 and provided at one end with a handle portion 41 and a lug 42 at the other end, the lug 42 positioned to engage the upper surface of the end of member 5 of frame unit 4 so that the frame unit may be actuated in its pivotal movement by movement of the handle portion 41. The camming surface 16 on cam plate 14 is arranged to engage the finger portion 25 of striker element 26 after portion 25 has actuated sear element 21, so that, upon movement of slide bar 10

against the action of spring 18 the cam surface will cause the striker element 26 to be pivotally returned to a position at which its notch 29 will be caught and held by catch portion 30 of lever 31.

At the pivoted end of frame unit 4 an elongated hook-guide element 43 is mounted in axial alignment with pivot axis 1 of the frame unit 4. Hook-guide element 43 is mounted for limited pivotal movement about the axis 1 against the bias of a spring 45. This element 43 is provided with a hook-like protruding end 44 which is adapted to engage and guide a running yarn line as discussed hereinafter. Hook-guide element 43 is mounted on a shaft which is connected to a bushing element 46; elements 43 and 46 and the shaft being rigidly secured in a unitary rotatable assembly which at one end thereof, not shown, is operatively engaged with spring 45. Bushing element 46 is provided with a radially projecting abutment which in one position of the spring urged rotary movement of the bushing is engaged and held by a projecting edge of pivoted catch 49 which is resiliently urged in a counterclockwise direction as viewed in FIGURE 1. Pivoted catch is also provided with an impact surface 50 which is positioned so that it is engaged by tip 13 of slide bar 10 in one limit of its spring urged movement to be moved to release pivoted catch 49 for pivotal movement of the hook-guide element 43 under the influence of its associated spring 45.

Bushing element 46 is further provided with an abutment which is positioned to be engaged by pin 51 mounted at one end of frame unit 4 as the frame unit is pivoted upwardly by handle 41. This action returns bushing 46 and the attached hook-guide element 43 against spring pressure to the position in which bushing 46 is caught and held by pivoted catch 49.

Rod-like element 52 is a yarn guide bar mounted on stationary support structure, not shown, and functions to hold the yarn out of reach of the moving yarn traverse guide 82 of the windup mechanism prior to actuation of the assembly of this invention.

A portion of yarn sucker gun structure and a portion of the running yarn line as initially strung up prior to the actuation of the assembly of this invention is shown in FIGURE 1.

The procedure for forming transfer tails with the device of this invention and the operation of this device is as follows:

The yarn line T is picked up from the yarn source by means of a sucker gun G. By manipulation of the sucker gun the yarn is passed downwardly between guide bar 52 and the drive roll DR. The guide bar 52 serves to hold the yarn out of reach of the traverse guide 82. The yarn line is then carried under the drive roll, up between the drive roll DR and spin bobbin SB which are relatively laterally translatable in conventional manner, and then over and around the bobbin for approximately one and one-half turns. Holding the sucker gun stationary, the yarn is manually moved longitudinally along the guide bar 52 by means of a hand-held hook so that it passes off the rounded end of the guide bar into engagement with end 44 of the hook guide 43. By means of the sucker gun the yarn is then passed between the cutting blades 35 and 36 of the cutter device 34 and the lever 31 is depressed by contact of the sucker gun G with contact portion 33. This action of the lever 31 releases lever portion 30 from notch in element 26, which allows spring 27 to actuate element 26 to move the cutting element 36 and cut the yarn line between the bobbin and the sucker gun, permitting it to begin winding on the end of the bobbin. As the cutting device 34 is then actuated, portion 25 of striker element 26 is resiliently urged to move downwardly into contact with pivoted sear element 21 releasing cam plate 14 which allows slide bar 10 to travel towards latch element 49 as a result of the action of tension spring 18. This movement causes tip 13 of abutment element 11 to strike latch element 49 with sufficient force

to release rotatable bushing 46 and hook-guide element 43 which is then rotated approximately 120° in a clockwise direction by spring 45. The rotation of the hook-guide element 43 and end 44 releases the yarn line for engagement by the moving yarn traverse guide 82, to commence winding the main yarn package on the bobbin.

When the transfer tail has been formed it is necessary to immediately change the position of the yarn cutting and controlling device from the proximity of the bobbin so that it will not interfere with the winding of the yarn. To accomplish this the assembly is raised upwardly by means of handle 41, the assembly being pivoted about the axis 1 as discussed previously. The amount of movement is about 120° as determined by an adjustable stop which is not shown. When the assembly is raised, tip 13 of abutment element 11 is forced against latch 49 which is in turn forced against stationary part 2. Continued upward movement of the assembly forces slide bar 10 and its cam plate 14 toward part 25 of striker element 26. The camming surface 16 of cam plate 14 raises the part 25 of striker element 26 pivoting element 26 the lever portion 30 of lever 31 catches in the notch 29 on element 26. During this movement the projection 38 on element 26 forces lug 37 of the movable cutting blade 36 back against spring 27 to reset the cutting device in the open position. When the assembly has reached its ultimate raised position, pin 51 has rotated bushing 46 to a point where latch 49 engages the bushing 46 to hold it and the hook-guide element 43 to the starting or string-up position. When the assembly is lowered to place the cutting device in the starting or string-up position spring 18 pulls slide bar 10 and its cam plate 14 from beneath the portion 25 of striker element 26 until the cam plate step 17 is caught and held by projection 23 on sear element 21. In this position the assembly is prepared for a repeat of the cycle.

The length of the transfer tail is governed by the time interval between the cutting of the thread and the release of the thread by the hook-guide element 43 to the yarn traverse guide. This time interval may be most readily altered by changes in the tension on spring 18. With the device shown, a time interval of the order of $\frac{1}{20}$ second may be readily achieved.

This apparatus is particularly suitable for use with a print roll type of wind up, as shown, where the yarn is traversed on the drive roll other than directly on the bobbin. Where a drive roll is used to rotate the bobbin it is desirable that the drive roll have a shallow groove such as shown at 95 in FIGURE 1 near the end so that the drive roll is not pushed away from the bobbin by the formation of the transfer tail, the transfer tail being wound on the bobbin at a point just opposite the groove in the drive roll.

In accordance with the patent laws a preferred embodiment of my invention has been disclosed in detail. Numerous changes and modifications within the spirit of the invention will occur to those skilled in the art and all such are considered to fall within the scope of the following claims.

I claim:

1. In combination with a high speed yarn windup apparatus comprising a fixed supporting structure, a rotary drive roll operatively mounted on said structure, a rotatable bobbin having a first portion for supporting a main yarn package and a second portion for supporting a yarn transfer tail, said bobbin operatively mounted in said structure in driven engagement with said drive roll, and a yarn traversing guide movably mounted on said structure in operative relationship with said drive roll and said bobbin for controlling winding of the main yarn package on the bobbin; a yarn transfer tail forming and controlling assembly mounted on said supporting structure, said assembly comprising a movable yarn guide means operative in one position to guide a moving yarn line in a path aligned with the second portion of said bob-

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bin, a yarn cutting means positioned adjacent said bobbin in operative relationship to a moving yarn line guided into alignment with the second portion of said bobbin by said yarn guide means, means for actuating said cutting means, means cooperating with said cutting means and said yarn guide means and operative in response to actuation of said cutting means for moving said yarn guide means to another position operative from said one position to guide a moving yarn line out of alignment with the second portion of said bobbin and into engagement with said yarn traversing guide, after a predetermined time period, for windup on the first portion of said bobbin.

2. An improved high speed yarn control and windup apparatus comprising, in combination, a rotary drive roll, a driven rotatable bobbin in cooperation therewith, a yarn traversing guide operatively associated with said bobbin to form a yarn package thereon, a movable yarn guiding and deflecting means constructed and arranged, in a first position, to direct a rapidly running yarn line into alignment with one portion of said bobbin, a yarn cutting means cooperating with said guiding and deflecting means and positioned in operative association with a rapidly running yarn line in alignment with said one portion of said bobbin, means for actuating the cutting means to sever the yarn line adjacent said bobbin to commence high speed windup of the yarn on said one portion of said bobbin to form a transfer tail, and means cooperating with said cutting means and said yarn guiding and deflecting means and operative in response to actuation of the cutting means for moving said guiding and deflecting means from said first position to a second position to direct the running yarn line into operative engagement with said yarn traversing guide and to a different portion of said bobbin after a predetermined time period, to form a yarn package on said different portion of said bobbin.

3. A yarn package transfer tail controlling assembly adapted for use in combination with a high speed yarn windup apparatus, said apparatus comprising a supporting structure, a rotary drive roll operatively mounted on said structure, a rotatable spin bobbin having a main yarn package portion and a transfer tail portion and operatively mounted on said structure and in driven engagement with said drive roll, a portable yarn handling device, and a yarn traversing device mounted on said structure in operative association with said drive roll and said bobbin; said assembly comprising, in combination, a movable frame unit adapted to be pivotally mounted on supporting structure of a high speed yarn windup apparatus, said frame unit mounted for movement between a first position adjacent a bobbin rotatably mounted in the windup apparatus, and a second position spaced away from the bobbin, said assembly further comprising a yarn cutter device mounted on said movable frame unit and a movable yarn line guide and deflector unit mounted on said frame unit, said yarn line guide and deflector unit mounted for movement between a first position in which a running yarn line engaged therewith is guided in a path which is aligned with the transfer tail portion of a bobbin on the associated windup apparatus and clear of the yarn traversing device of an associated yarn windup apparatus, and a second position in which the running yarn line engaged therewith is laterally displaced to permit engagement with the yarn traversing device and windup on the main yarn package portion of the bobbin, a first means mounted on said frame unit and operatively associated with said yarn cutter device to actuate the same, a second means mounted on said frame unit and positioned thereon to cooperate with said cutter device and said yarn line guide and deflector unit and operative in response to actuation of said cutter device, when said frame unit is in its first position, to move said yarn line guide and deflector unit from said first to said second position a predetermined desired time interval after actuation of the cutter device so that the yarn line transfer tail length is accurately controlled at a predetermined value.

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4. A yarn package transfer tail controlling assembly adapted for use in combination with a yarn windup apparatus, said apparatus comprising a supporting structure, a rotary drive roll operatively mounted on said structure, a rotatable spin bobbin having a main yarn package portion and a transfer tail portion and operatively mounted on said structure and in driven engagement with said drive roll, a portable yarn handling device, and a yarn traversing device mounted on said structure in operative association with said drive roll and said bobbin; said assembly comprising, in combination, a movable frame unit adapted to be pivotally mounted on supporting structure of a yarn windup apparatus, said frame unit mounted for movement between a first position adjacent a bobbin rotatably mounted in the windup apparatus, and a second position spaced away from the bobbin, said assembly further comprising a yarn cutter device mounted on said movable frame unit, said yarn cutter device having a first cutter element movable relative to and in cooperation with a second cutter element, a movable yarn line guide and deflector unit mounted on said frame unit, said yarn line guide and deflector unit mounted for movement between a first position in which a running yarn line engaged therewith is guided in a path which is aligned with the transfer tail portion of a bobbin on the associated windup apparatus and clear of the yarn traversing device of an associated yarn windup apparatus, and a second position in which the running yarn line engaged therewith is laterally displaced to permit engagement with the yarn traversing device and windup on the main yarn package portion of the bobbin, a resilient means engaging and urging one of said cutter elements into cutting position with respect to the other, a releasable catch means associated with said one cutter element to releasably hold said one cutter element out of the cutting position against the urging of said resilient means, a movable member of predetermined mass mounted in said frame unit in alignment with said yarn guide and deflector unit, a spring element of predetermined characteristics engaged with said member urging the same into engagement with said yarn line guide and deflector unit for moving said guide and deflector unit from its first to its second position a predetermined desired time interval after actuation of the yarn cutter device, a releasable catch element in operative association with said member of predetermined mass to releasably engage said member and hold it against the urging of said spring a predetermined distance from engagement with said guide and deflector unit, said releasable catch element constructed and arranged to be released in response to actuation of the cutter device, when said frame unit is in its first position, to permit the spring to move the member of predetermined mass into engagement with said guide and deflector unit, the mass of said member, the characteristics of said spring, and said predetermined distance selected to determine the magnitude of the said desired time interval.

5. The assembly of claim 4 which further comprises a fixed abutment mounted on said supporting structure and constructed and arranged for engagement with said member of predetermined mass, said fixed abutment cooperating with said frame unit to slidably move the member back into releasable engagement with said releasable catch element in response to pivotal movement of the frame unit from its first to its second position; the member of predetermined mass constructed and arranged to engage and move said guide and deflector unit to its first position and starting condition in response to movement of the frame unit to its second position; the member of predetermined mass further constructed and arranged to cooperate with said releasable catch means to reset said cutter device in its open starting condition responsive to movement of the frame unit from its first to its second position; and the releasable catch element further constructed and arranged to releasably engage and hold the member of predetermined mass in its starting condition

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in response to movement of the frame unit from its second position back to its first position; pivotal movement of the frame unit from its first to its second position and back to the first position operative to return the elements of said assembly to their operative starting positions and condition for repeating the yarn cutting and deflecting cycle of operation.

6. The assembly of claim 5 in which said releasable catch means associated with said first cutter element comprises an actuating lever pivotally mounted on said frame unit and associated with said cutter device to releasably hold the first cutter element out of the cutting position

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against the urging of said resilient means, said lever adapted for pressure engagement with the structure of a portable yarn handling device to release the first cutter element to the cutting position in response to pressure engagement by the handling device with a contact portion of the lever.

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