# United States Patent

**Schroeder**

[15] **3,690,576**

[45] **Sept. 12, 1972**


[54] **TEXTILE THREAD WINDER WITH TENSION COMPENSATING DEVICE**


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[52] **U.S. Cl.** .....**242/18 DD,** 242/43

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

[58] **Field of Search**.....242/18 DD, 43, 43 A, 35.5 R



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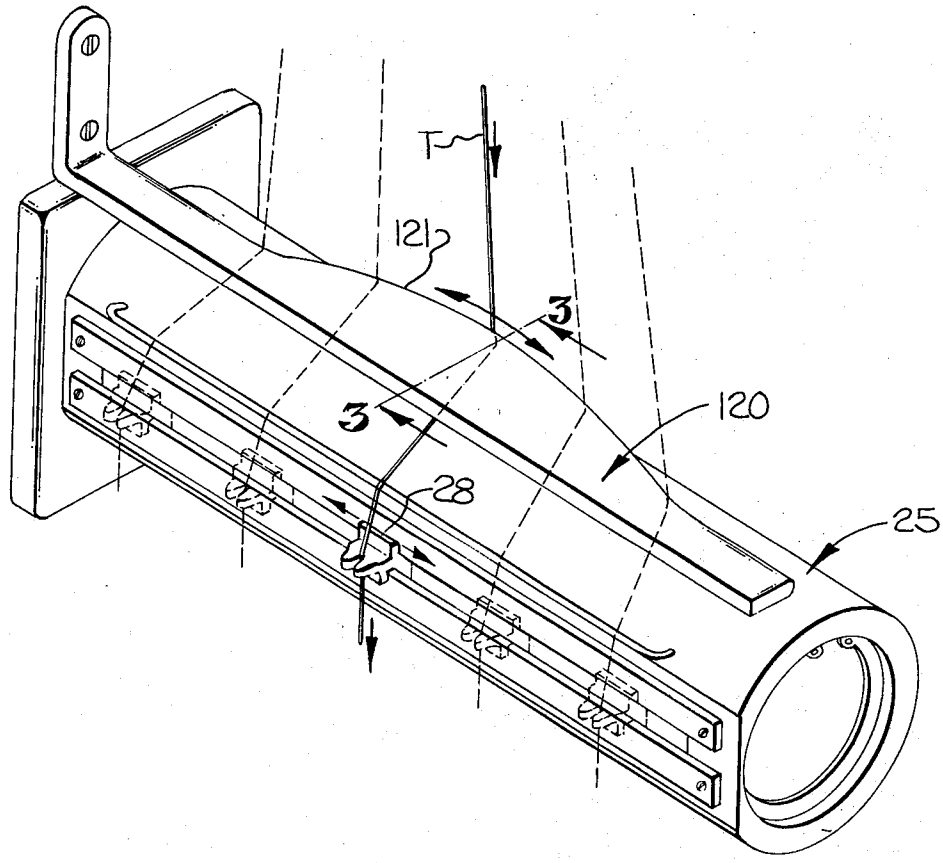
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[57] **ABSTRACT**

A textile thread winder with a device for compensating for variations in tension in thread being wound due to increases and decreases in the length of the path of travel of the thread from a thread source to a package roll caused by traversing action of a traversing mechanism. The textile thread winding apparatus has a driven rotating drive roll, at least one freely rotatable package roll positioned on one side of the drive roll for engagement therewith to be driven thereby for winding of thread and mounted for linear movement away from the drive roll as the thread package builds thereon, and a thread traversing mechanism positioned on the other side of the drive roll for receiving the thread from a source and guiding the thread around the drive roll to the package roll while traversing the thread longitudinally of the drive roll. Preferably, the winding apparatus includes mechanisms for maintaining a predetermined pressure relationship between the drive roll and the package roll.


**2 Claims, 8 Drawing Figures**



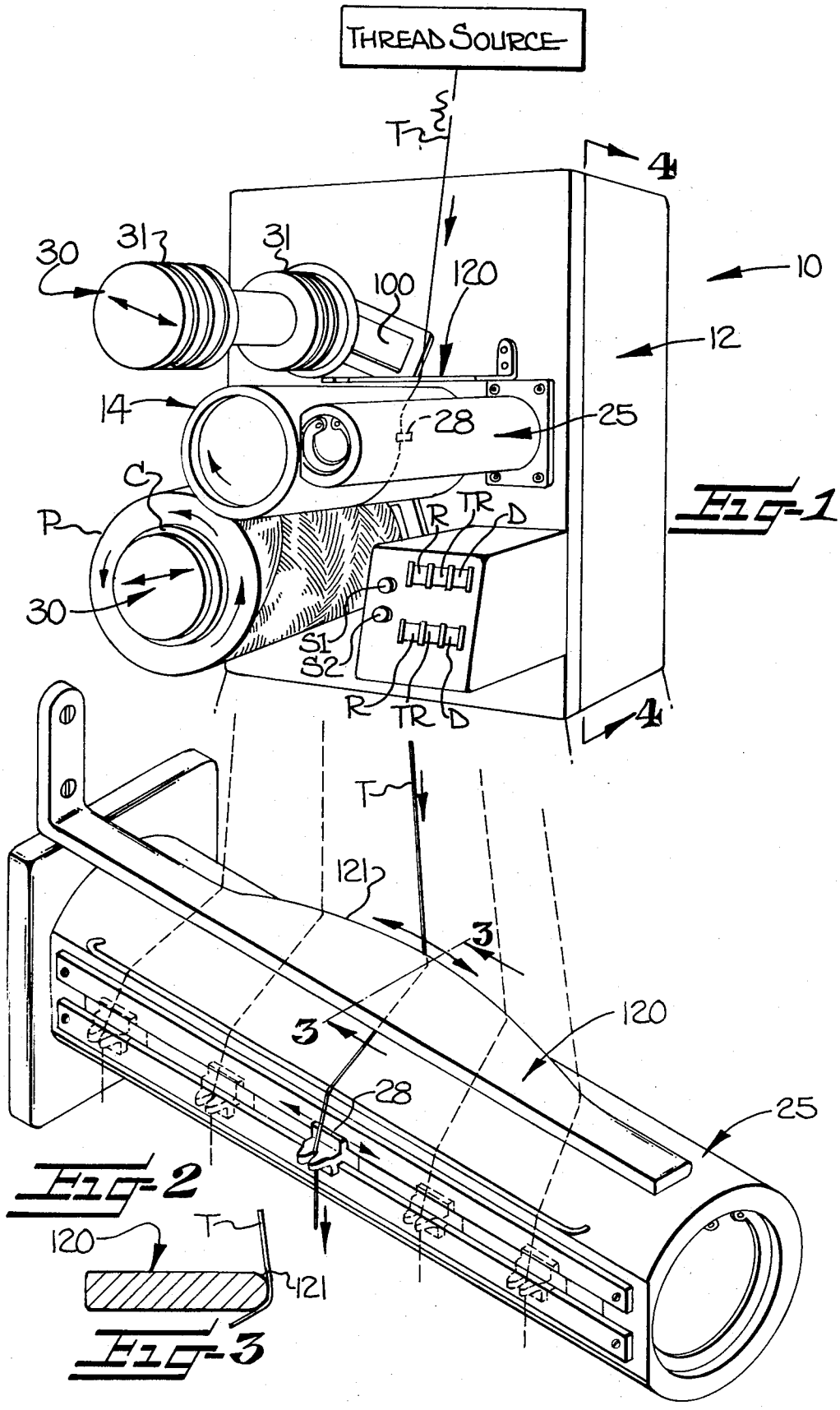



Fig-1

Fig-2

Fig-3

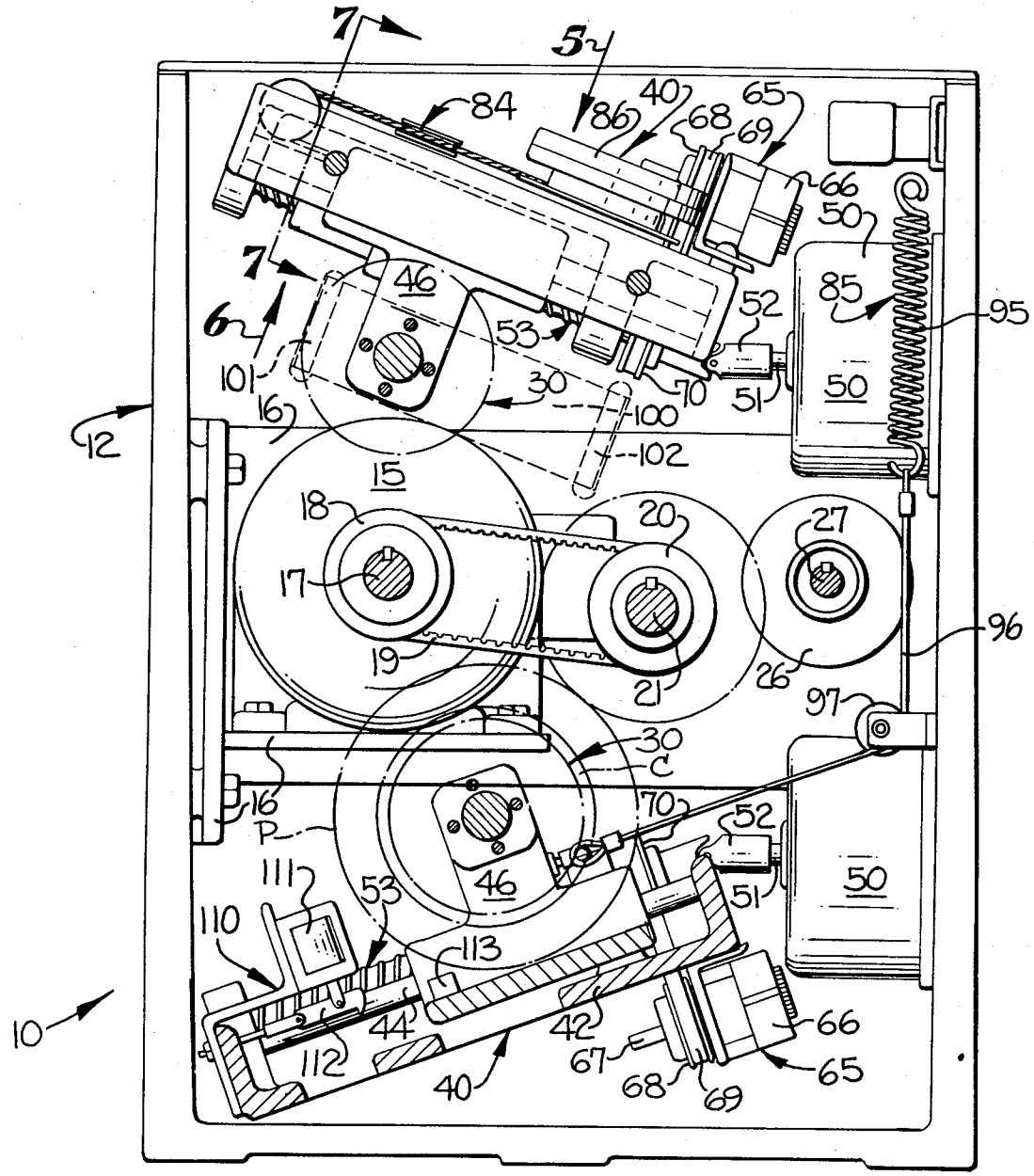

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26
96
97
30
C
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110
113
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Fig-4

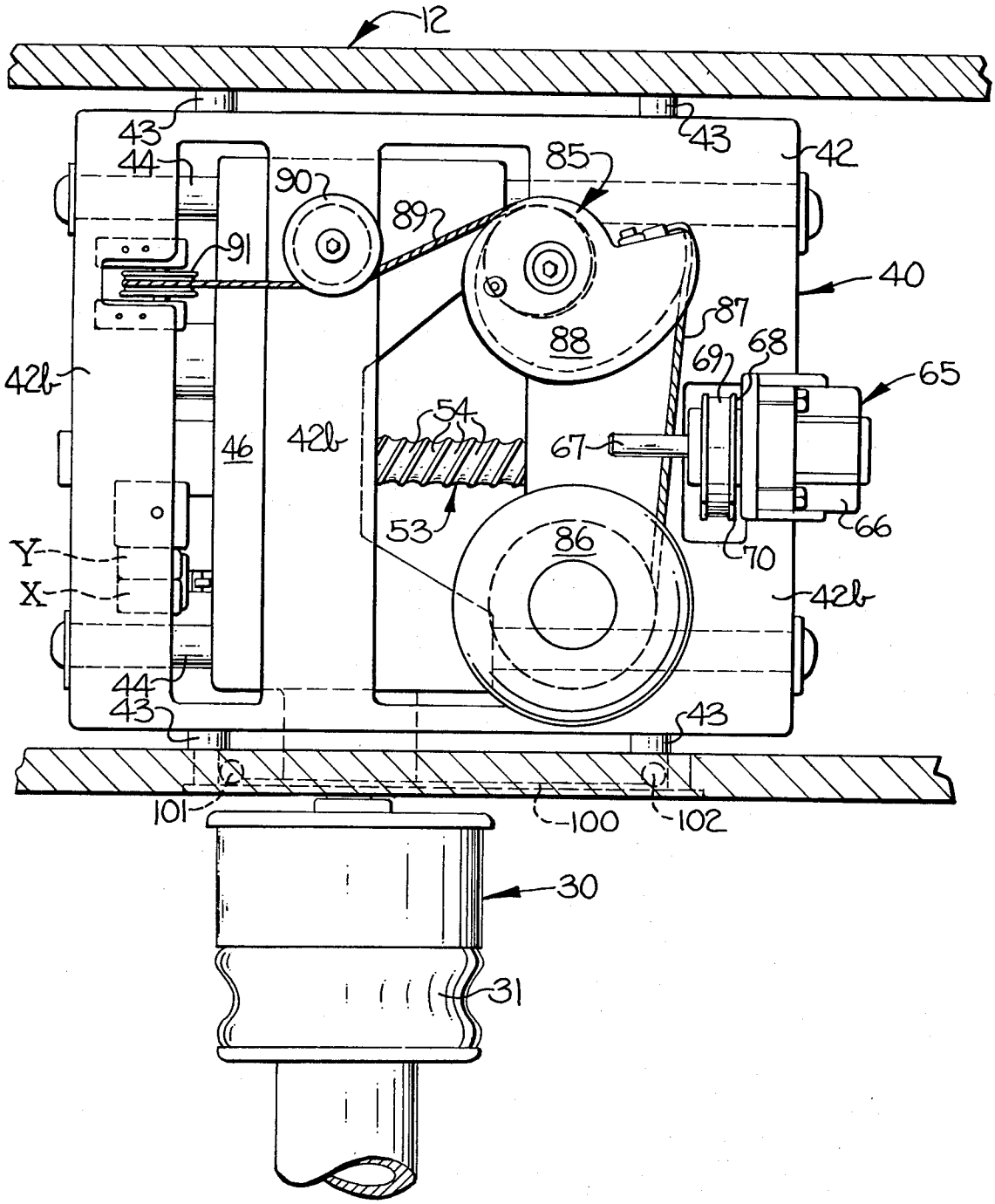

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89
85
42
43
91
40
87
88
69
68
65
42b
54
46
42b
67
66
53
86
70
Y
X
42b
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43
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101
100
102
30
31

FIG-5

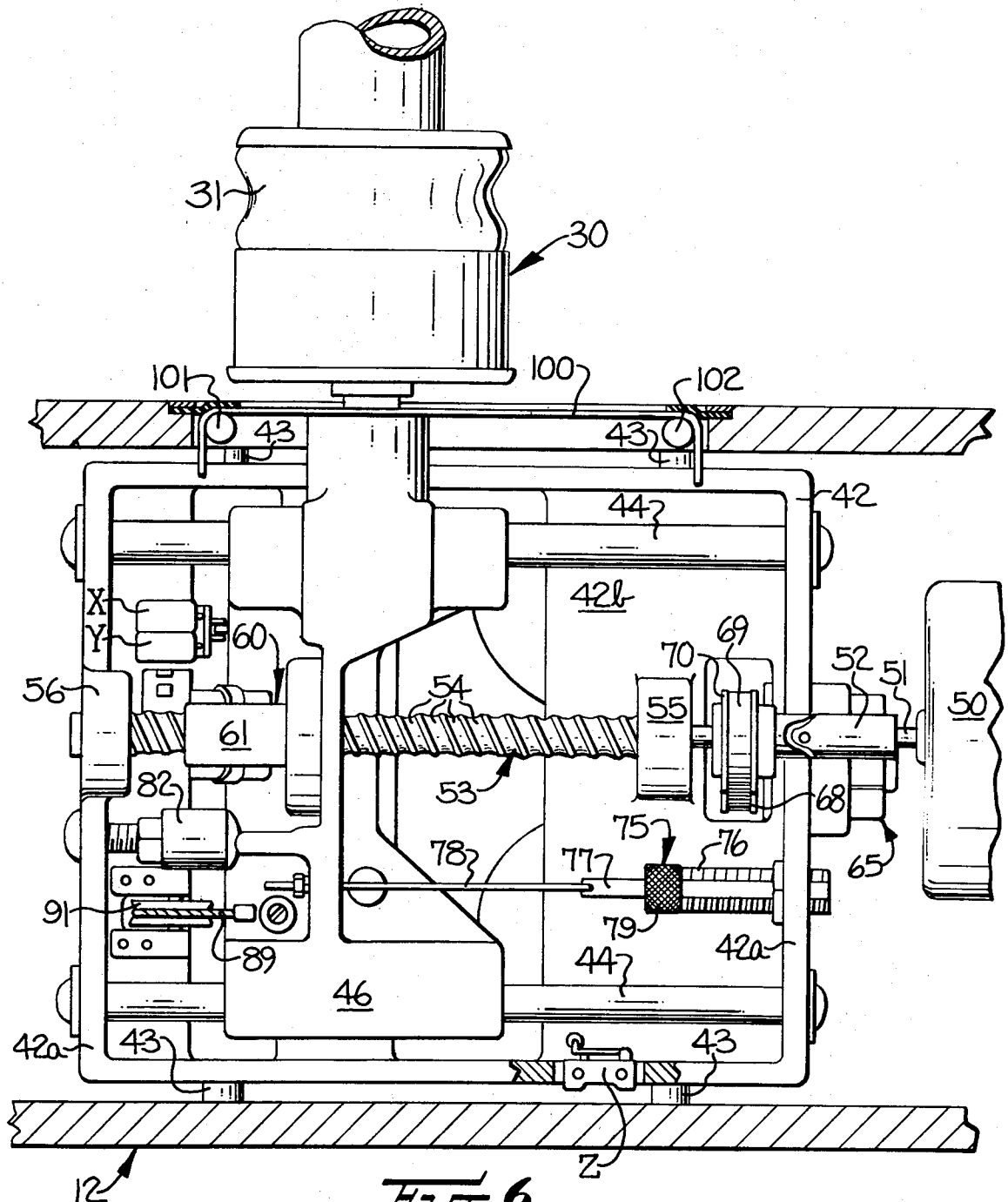

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42b
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65
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42a
44
46
42a
43
43
12
Z

Fig-6

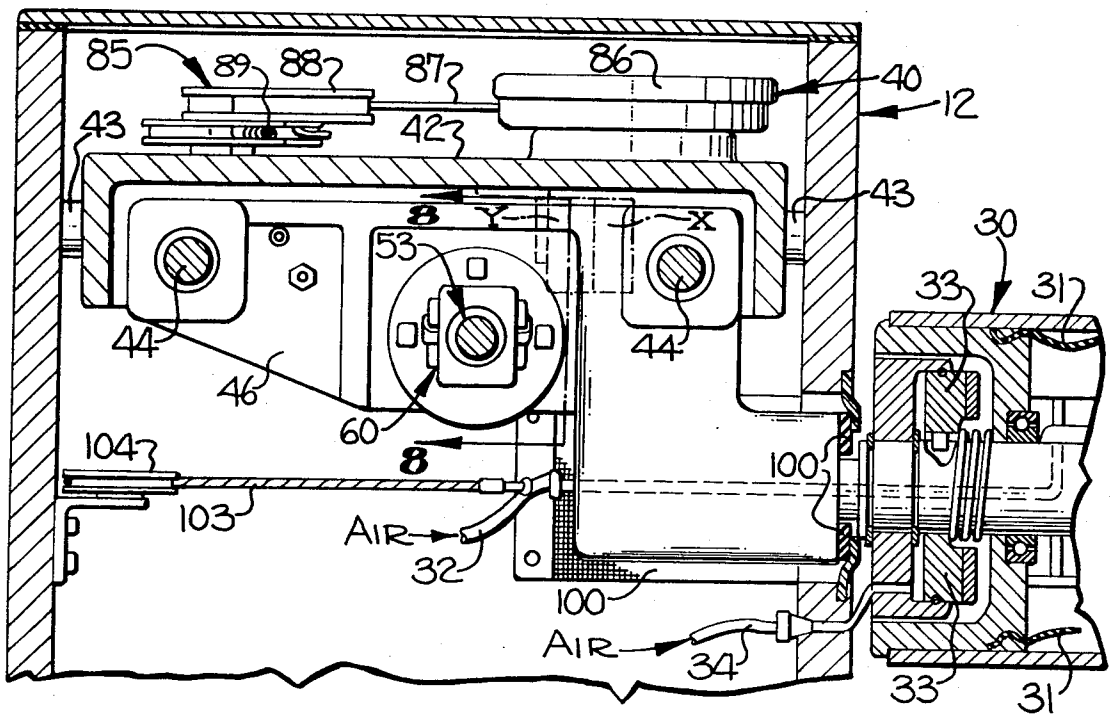

85
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8
Y
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46
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8
104
103
100
AIR
32
100
AIR
34
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Fig-7

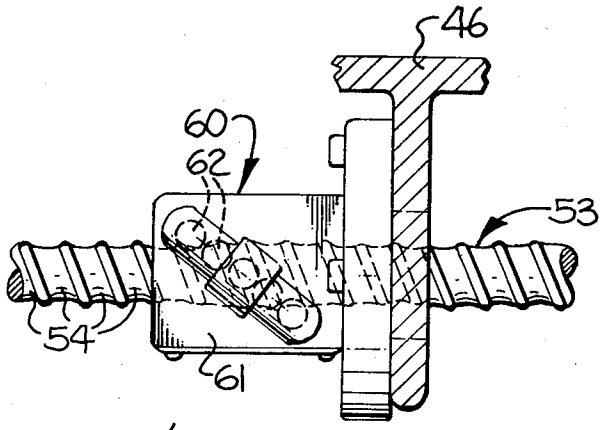

46
60
62
53
54
61

Fig-8

# TEXTILE THREAD WINDER WITH TENSION COMPENSATING DEVICE

This invention relates to the combination of a specific textile thread winding apparatus and means for compensating for variations in tension in the thread being wound due to increases and decreases in the length of the path of travel of the thread from a thread source to a package roll caused by traversing action of a traversing mechanism.

In textile thread or yarn winding apparatus, there have been problems in variation in tension of the thread or yarn being wound due to increases or decreases in the length of the path of travel of the thread or yarn from a source to a package roll caused by traversing action of a traversing mechanism in the apparatus. This problem is particularly acute in textile thread winding apparatus having a driven rotating drive roll and at least one freely rotatable package roll positioned on one side of the drive roll for engagement therewith to be driven thereby for the winding of thread and mounted for linear movement away from the drive roll as the package builds thereon and, preferably, having means for maintaining a predetermined pressure relationship between the drive roll and the package roll. In this type of winding apparatus, the thread is received by a traversing mechanism positioned on the other side of the drive roll for receiving the thread from a source and guiding the thread around the drive roll to the package roll while traversing the thread longitudinally of the drive roll.

While tension compensating devices have been proposed for other types of thread winders, no tension compensating devices have been proposed for thread winders of the specific type disclosed therein.

Accordingly, it is the object of this invention to provide a tension compensating device for the specific thread winder disclosed herein.

According to this invention, the above object may be accomplished by providing the following combination. Textile thread winding apparatus having a driven rotating drive roll, at least one freely rotatable package roll positioned on one side of the drive roll for engagement therewith to be driven thereby for the winding of thread and mounted for linear movement away from the drive roll as the package builds thereon, and a thread traversing mechanism positioned on the other side of the drive roll for receiving the thread from a source and guiding the thread around the drive roll to the package roll while traversing the thread longitudinally of the drive roll. Means for compensating for variations in tension in the thread being wound due to increases and decreases in the length of the path of travel of the thread from the thread source to the package roll caused by the traversing action of the traversing mechanism.

In the preferred embodiment of this invention, the textile thread winding apparatus includes a carriage mechanism having a stationary portion and a movable portion carried by the stationary portion for reciprocating linear movement and being secured to and carrying the package roll for reciprocating linear movement therewith. There is also included means for maintaining a desired predetermined pressure relationship between the driven roll and the package roll and for linearly driving the package roll. This means comprises a variable torque reversible motor, a screw shaft connected to and rotated by the torque motor and a nut secured to the movable carriage portion and receiving the screw shaft therethrough for converting rotary movement of the screw shaft into linear movement of the movable carriage portion and the package roll carried thereby.



Additionally, in the preferred embodiment of this invention, the tension compensating means comprises a deflector plate mounted adjacent to and in advance of the traversing mechanism and has an outwardly bowed surface positioned in the path of travel of the thread to deflect the thread in such a manner as to equalize the length of its path of travel while it is being traversed by the traversing mechanism so as to compensate for variations in tension of the thread prior to reaching the traversing mechanism.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which

FIG. **1** is a perspective view of the winding apparatus and tension compensating means of this invention and showing a single thread being wound on one package roll thereof;

FIG. **2** is an enlarged perspective view of a portion of the apparatus of FIG. **1** illustrating the traversing mechanism and the tension compensating means;

FIG. **3** is a cross-sectional view through the tension compensating means of FIG. **2** taken generally along the line **3—3** of FIG. **2**;

FIG. **4** is a slightly enlarged vertical sectional view taken substantially along the line **4—4** in FIG. **1**;

FIG. **5** is an enlarged sectional detail of the top of the upper carriage assembly of the winding apparatus and taken generally at the arrow **5** of FIG. **4**;

FIG. **6** is an enlarged sectional detail of the bottom of the carriage assembly of FIG. **5** and taken generally at the arrow **6** of FIG. **4**;

FIG. **7** is a sectional view taken through the carriage assembly of FIGS. **5** and **6** and taken generally along the line **7—7** of FIG. **4**; and

FIG. **8** is a sectional detail showing the ball screw and ball nut mechanism and taken generally along the line **8—8** of FIG. **7**.

Referring now to the drawings, the specific form of winding apparatus in combination with a tension compensating means according to this invention is illustrated therein and generally referred to by the reference numeral **10**. The thread winder **10** illustrated in the drawings is adapted to wind thread T received from a thread source into wound packages P, as illustrated in FIG. **1**.

The winding apparatus **10** comprises a stationary, enclosed housing **12** of generally modular construction so that the winding apparatus **10** may be positioned individually or in banks or groups of such winders in a textile operation.

A generally cylindrical drive roll **14** is mounted for rotation on the housing **12** in a fixed position and extends generally horizontally outwardly therefrom, as may be seen in FIG. **1**. The drive roll **14** may be constructed of a suitable smooth metal material or otherwise and is driven by a motor **15** mounted within the housing **12** on one wall of the housing by means of mounting plates **16**, as shown in FIG. **4**. The motor **15** includes an outwardly extending shaft **17** which carries

a suitable pulley **18** for receiving an endless belt **19**. The endless belt **19** also passes around a pulley **20** carried by a rotatable shaft **21** which is suitably mounted in a fixed rotatable position in the housing **12** and extends outwardly therefrom and is connected with the drive roll **14** so that the motor **15** may rotate the drive roll **14** in the direction of the arrows in FIG. **1** through the above-described belt and pulley arrangement. The portion of the housing **12** through which the shaft **21** passes for connection with the drive roll **14** is suitably sealed, for the reasons to be discussed below.

The winding apparatus **10** further includes a traverse mechanism **25** mounted on the housing **12** and extending outwardly therefrom generally parallel with the drive roll **14** and on one side thereof, as shown in FIG. **1**, for receiving the threat T from a thread source and for guiding the thread around the drive roll **14** to a package roll (described hereinafter), while reciprocating or traversing back and forth along a path of travel which is generally parallel with the longitudinal axis of the drive roll **14** for traversing the thread T, as indicated in phantom lines, onto the package P being wound by the apparatus **10**. This traverse mechanism **25** includes a motor **26** suitably mounted within the housing **12** and having a drive shaft **27** extending therefrom and operatively connected with element **28** of the traverse mechanism **25** for operating same. The shaft **27** and traverse mechanism **25** also include suitable means for sealing the portion of the housing **12** through which the shaft **27** passes, for reasons to be discussed below. The detailed construction of the traverse mechanism **25** has not been illustrated in the drawings and inasmuch as these traverse mechanisms are conventional and well understood by those with ordinary skill in the art, further explanation herein is not necessary.

The winding apparatus **10** of this invention, as illustrated in the drawings, further includes a pair of freely rotatable, linearly movable package rolls **30** for carrying thread package cores C to form a wound package thereon. The package rolls **30** extend generally horizontally outwardly from the housing **12** and are generally parallel with the drive roll **14** on the other side thereof from the traverse mechanism **25** to be driven by the drive roll **14**, in a manner described below. The package rolls **30** receive thread T from the traverse mechanism **25** for simultaneous or alternative winding on package cores C on both or one of the package rolls **30**.

The package rolls **30** are disposed above and below each other, as shown in FIG. **1**, and are linearly movable away from the drive roll **14** along inclined paths of travel which form upwardly extending and downwardly extending acute angles, respectively, with a horizontal plane through the drive roll **14**, as shown in FIG. **1** so that each of the package rolls **30** may be alternately or simultaneously moved into frictional, peripheral, driving engagement with the drive roll **14** for simultaneously or alternatively winding thread T on both of the package rolls **30**.

The package rolls **30** are generally of the expandable, self-contained, chuck member type which, as shown in FIG. **7**, include bladder members **31** adapted to inflate and expand by the insertion of air from air line **32** on receiving of the package cores C and air brake means **33** for precluding rotation of the package rolls **30** before, after and during an initial or final winding operation by the insertion of air into the brake means **33** from air line **34**. The specific details of the construction of these package rolls **30**, per se, are given in U.S. Pat. No. 3,517,891, issued June 30, 1970 and assigned to the assignee of the present application. Reference may be had to that patent for a complete disclosure of the operation of these package rolls.

Associated with each of the package rolls **30** is a carriage assembly, generally designated by the reference numberal **40**. These carriage assemblies are contained within the enclosed housing **12** and the carriage assembly for each of the package rolls **30** is substantially identically constructed, as may be seen in FIG. **4**. FIGS. **5** and **6** are generally top plan views of the upper carriage assembly **40** of FIG. **4** and that carriage assembly will be described in detail below. Each carriage assembly will be given, where illustrated, like reference numerals inasmuch as like components are contained in each.

Each of the carriage assemblies **40** includes a stationary portion **42** which is generally rectangular and includes downwardly extending flange portions **42*a*** around the outer periphery thereof and top plates **42*b*** as may be seen in FIGS. **4**, **5** and **6**. It is noted that the bottom carriage assembly **40**, as shown in FIG. **4**, is reversed and the flange members **42*a*** extend upwardly and the plate members **42*b*** are bottom plates. The stationary carriage portion **42** is mounted in a fixed position on the housing **12** by means of bolts **43**, as shown in FIGS. **5** and **6** particularly. The stationary carriage portion **42** includes longitudinally extending carriage rods **44** mounted in flange members **42*a***.

The carriage assemblies **40** further include movable portions **46** mounted on the stationary portion **42** and particularly the rods **44** thereof by any suitable bearings for reciprocating linear movement along the longitudinal axes of the stationary rods **44**. The movable portion **46** of the carriage assembly **40** is secured to and carries the respective package rolls **30** for linear movement therewith, as may be seen in FIGS. **5** and **6**. The package rolls **30** include suitable bearings for rotation thereof with respect to the movable carriage portions **46**. The carriage assemblies **40** are generally disposed in the inclined paths of travel which the package rolls travel. Accordingly, the carriage assemblies **40** carry the package rolls **30** along their upwardly and downwardly inclined paths of travel toward and away from the drive roll **14**.

The winding apparatus **10** further includes mechanisms contained within the housing **12** and operatively associated with each of the package rolls **30** for maintaining a desired predetermined pressure relationship between the drive roll **14** and the respective package rolls **30** and for linearly driving the respective package rolls **30**.

Each of the mechanisms comprises a reversible, variable torque motor **50** mounted within the housing **12** on one wall thereof, as shown in FIG. **4**. The torque motor **50** has an outwardly extending driven shaft **51** which is connected to one end of a universal joint **52** and the other end of the universal joint **52** is connected to and drives a ball screw shaft **53** having spiral, ball receiving grooves **54** therein. The ball screw shaft **53** is

suitably rotatably mounted in bearings **55** and **56** carried by the stationary carriage portion **42**, as may be seen in FIG. **6**. Accordingly, rotation of the torque motor **50** causes rotation of the ball screw shaft **53** through the bearings **55** and **56**.

The movable carriage portion **46** has a ball nut **60** secured thereto, as shown in FIGS. **6** and **8**. The ball nut **60** comprises a housing **61** containing a plurality of balls therein arranged in such a manner that the ball screw shaft **53** passes through the ball nut **60** and the balls **62** engage the grooves **54** so that rotary movement of the screw shaft will be converted into linear movement of the ball nut **60** and thereby cause linear movement of the movable carriage portion **46** and the respective package rolls **30** carried thereby. Accordingly, rotation of the torque motor **50** in opposite directions will cause opposite linear movement of the package rolls **30** toward and away from the drive roll **14** through the above-described connections.

Each of the mechanisms for driving the respective package rolls and for maintaining a predetermined pressure relationship includes a bi-directional damper apparatus **65** operatively connected with the ball screw shaft **53** and each comprising generally a torque brake **66** which may be of any suitable form and including an outwardly extending shaft **67** carrying a pulley **68**. The pulley **68** carries a belt **69** which also passes around a pulley **70** mounted on the ball screw shaft **53**. The bi-directional dampers **65** prohibit excessive acceleration of the movable carriage portions **46** and the respective package rolls **30** when being driven from one extreme linear position to the other. The dampers **65** also minimize any tendency toward vibration of the package rolls during the winding operation.

There is further provided a hydraulic shock absorber **75**, as shown particularly in FIG. **6**, for each of the carriage assemblies **40**. These hydraulic shock absorbers **75** each comprises a cylinder **76** secured to a flange portion **42***a* of the fixed or stationary carriage portion **42** and a piston **77** extending from the other end thereof. The piston **77** includes an extending rod **78** which is fixed to the movable carriage portion **46**. The cylinder **76** includes an adjustment knob **79**. These shock absorbers **75**, by the above arrangement, control the rate of contact between the drive roll **14** and the package rolls **30**. There are also provided bumper type shock absorbers **82** secured to the fixed carriage portions **42**, as shown in FIG. **6** and adapted to be contacted by an extension of the movable carriage portions **46** for buffing the travel of the package rolls **30** and the movable carriage portions **46** as they reach the end of their paths of travel away from the drive roll **14**.

Due to the geometry of the upwardly extending and downwardly extending inclined paths of travel of the package rolls **30**, which form acute angles with respect to the horizontal, forces are introduced which must be cancelled if proper package roll to drive roll predetermined pressure is maintained throughout the winding operation. Accordingly, compensating mechanisms **84** and **85** are provided for the upper package roll and carriage assembly and the lower package roll and carriage assembly, respectively. The upper package roll compensating mechanism **84**, as best shown in FIG. **5**, comprises a cased roller spring **86** carried by the stationary carriage portion **42** and having a cable **87** extending therefrom and attached to a counterbalance cam **88** also mounted on the stationary carriage portion **42**. The counterbalance cam **88** includes another cable **89** extending therefrom and around guide pulleys **90** and **91** carried by stationary carriage portion **42**. The other end of the cable **89** is secured to the movable carriage portion **46**, as shown in FIG. **6**.

The counterbalance cam profile **88** is determined by combining forces due to package weight increase, forces due to gravity, forces due to the change in tangent point between package and drive rolls as the wound package diameter increases, and forces due to the drive roll to package roll pressure reduction that is necessary.

The compensating mechanism **85** for the downwardly moving lower package roll and carriage assembly **40**, as best shown in FIG. **4**, comprises a constant force extension spring **95** having one end thereof secured to the housing **12** and the other end thereof attached to a cable **96** which passes around a guide pulley **97** mounted on the housing **12** and is attached at its other end to the movable carriage portion **46** of the lower carriage assembly **40**.

As shown in FIG. **1**, the winding apparatus housing **12** has slots therein for the linear travel of the upper and lower package rolls **30** which include sealing means for sealing off the interior of the housing **12** from the exterior thereof. Each of these sealing means for each of the package rolls comprises a belt **100**, as shown particularly in FIGS. **6** and **7**, which passes around rollers **101** and **102** at each end of the slots in the housing and has its ends attached to a cable **103** which passes around pulleys **104** (only one of which is shown in FIG. **7**) to form an endless arrangement. The belt **100** is attached to and surrounds the connecting portion between the package roll **30** and the movable carriage portion **46** to move therewith as these mechanisms move in their linear path of travel. Suitable rubber seals may be mounted on the housing **12** for rubbing engagement with the belt **100** to complete the seal. Thus, the entire housing **12** is enclosed and sealed from a hostile environment that may surround the exterior of the winding apparatus **10** so as to protect the interior components of the housing **12**.

Additionally, there is provided a solenoid operated latch mechanism **110** for the lower carriage assembly **40**, as shown in FIG. **4**, comprising a solenoid **111**, a latch member **112** pivotally mounted on the stationary carriage portion **42** and connected to solenoid **111** to be controlled thereby, and a latch member **113** mounted in fixed position on the movable carriage portion **46**. The latch mechanism **110** is adapted to latch the carriage portions **42** and **46** together at the position illustrated in FIG. **4** for doffing of a wound package P.

In accordance with this invention, the above-described winding apparatus **10** is combined with and includes means for compensating for variations in tension in the thread T being wound due to increases and decreases in the length of the path of travel of the thread T from the thread source to the package roll **30** caused by the traversing action of the traversing mechanism **25**. This tension compensating means comprises a deflector plate **120** mounted on the housing **12** adjacent to and in advance of the traversing mechanism **25**, as shown in FIGS. **1** and **2**. The deflector plate **120**

has an outwardly bowed surface **121**, as may be seen in FIG. **2**, positioned in the path of travel of the thread T to deflect the thread in such a manner as to equalize the length of its path of travel while it is being traversed by said traversing mechanism (see phantom line indications of the position of the thread T during the traversing action in FIG. **2**) so as to compensate for variations in tension of the thread prior to reaching the traversing mechanism **25**. The profile of the outwardly bowed surface **121** will be determined according to the path of travel of the thread T in a particular winding apparatus, as described above, so as to equalize the length of the path of travel of the thread T regardless of the position in which it is placed by the traversing mechanism **25**.

By the above arrangement of the winding apparatus **10**, the respective variable torque, reversible motors **50** can drive the package rolls **30** linearly toward and away from the drive roll **14** for start-up and doffing of packages P BY driving the movable carriage portions **46** in the desired direction through the ball screw shaft **53** and ball nut **60** and can hold the package rolls **30** and the thread cores C thereon in frictional, peripheral, driving engagement with the drive roll **14** and maintain predetermined pressure relationships between the rolls for thread winding by driving the movable carriage portions **46** so that the linear movement of the package rolls **30** away from the drive roll **14** during buildup of a thread package P will overcome the driving forces of the torque motors **50** and cause the torque motors to stall. Since the torque motors **50** are variable torque motors, the amount of torque applied thereby can be varied as desired to obtain the desired predetermined pressure relationship between drive roll and package rolls. Also, the device **120** will compensate for variations in tension in the thread T due to increases and decreases in the length of the path of travel of the thread T from the thread source to the package roll **30** caused by the traversing action of the traversing mechanism **25** by equalizing the length of the path of travel of the thread T.

Specifically, the winding apparatus **10** may be provided with any suitable control circuit and, while the details of such a control circuit will not be given herein or specifically described, an exemplary operation will be briefly described.

The winding apparatus **10** may include a control panel **130**, as illustrated in FIG. **1**, having buttons thereon for initiating the operation thereof. The three adjacent buttons at the top of control panel **130** are for controlling the upper package roll **30** and the three adjacent buttons at the bottom of control panel **130** and for controlling the lower package roll **30**. The control circuit (not shown) includes suitable switches adapted to be operated by the movable carriage portion **46** of the carriage mechanism **40** and these switches are indicated in FIG. **6** and given the reference characters X, Y and Z.

Referring particularly to FIG. **1**, when both package rolls **30** are in the retracted or doff position which is the linear position at the extreme end of the path of travel away from the drive roll **14**, an operator will press the "START" button **S1** on the control panel and adjust the speeds of the drive roll **14** and the traverse mechanism **25** from any suitable adjustments to the drive motors thereof. Empty package cores C are then placed on the package rolls **30**.

The operator then depresses the "READY" button R for one or both of the package rolls **30**. This energizes the latch solenoid **111** for the lower carriage assembly **40** to disengage the latch mechanism **110** and initiates operation of the torque motors **50** to move the package rolls **30** from the doff positions toward the drive roll **14**. Also, air pressure from the package roll brake means **33** will be removed to allow rotation of the package rolls **30** and air pressure will be applied to the bladder members **31** for expanding the same and holding the cores C in fixed positions on the package rolls **30**.

As the package rolls **30** reach the half-way point of their path of travel toward the drive roll **14**, switch Z will be actuated by the movable carriage portion **46** to reduce the voltage on the upper torque motor only to slow down the travel of the downwardly moving upper package roll **30**. When the package rolls **30** reach the drive roll **14**, they will frictionally engage the drive roll **14** and accelerate to the desired winding speed.

The operator then depresses the "THREAD RUN" button TR, as shown in FIG. **1**, for the desired package roll **30** upon which a winding operation is to be performed. Operation of this button will switch the voltage to the torque motor **50** to that preselected for the winding operation and will deenergize the latch solenoid **111** to allow the latch member **112** to drop back down into its lower position for again engaging the latch member **113** when the lower carriage portion **46** has again reached the doff position.

The wound package of thread then begins building on the cores C on the package rolls **30** which moves the package rolls **30** against the predetermined torque exerted by the motors **50** to stall the torque motors and maintain the predetermined pressure relationships therebetween. The voltage applied to the torque motors **50** may be varied during this winding operation to produce a variable torque, as desired.

As the packages P build on the package rolls **30** and the package rolls **30** reach the half-way point of their travel away from the drive roll **14**, the switch Z will be engaged and reset.

After the package P has been completely formed and doffing is desired, the operator depresses the "DOFF" button D, as shown in FIG. **1**, for the desired package roll and the torque motor voltage reverses polarity and drives the desired package roll **30** away from engagement with the drive roll **14** toward the doff position at the extreme end of its path of travel. When the package rolls **30** reach the doff position, switches X and Y are actuated which remove power from the torque motors **50** and allow the lower carriage to latch into position by the latch mechanism **110**.

With the package rolls **30** in the doff position, suitable timers are initiated following which the air pressure to the package roll brake mechanism **33** will be supplied to brake the package rolls **30** and cause the same to stop rotating and air pressure will be removed from the bladders **31** to allow the the wound packages P to be removed from the package rolls **30**. The above operation may then be repeated for one or both of the package rolls **30**.

Thus, it may be seen that this invention has provided a winding apparatus including mechanisms for com-

pensating for variations in tension in the thread being wound and for satisfactorily and easily maintaining a desired predetermined pressure relationship between drive and package rolls for consistency in the winding operations thereof. In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

That which is claimed is:

1. The combination of:

textile thread winding apparatus having a driven rotating drive roll, at least one freely rotatable package roll positioned on one side of said drive roll for engagement therewith to be driven thereby for the winding of thread and mounted for linear movement away from said drive roll as the thread package builds thereon, a thread traversing mechanism positioned on the other side of said drive roll for receiving the thread from a source and guiding the thread around said drive roll to said package roll while traversing the thread longitudinally of said drive roll, carriage means including a stationary portion and a movable portion carried by said stationary portion for reciprocating linear movement and being secured to and carrying said package roll for reciprocating linear movement therewith, and means for maintaining a desired predetermined pressure relationship between said drive roll and said package roll and for linearly driving said package roll and comprising a variable torque reversible motor, a screw shaft connected to and rotated by said torque motor and a nut secured to said movable carriage portion and receiving said screw shaft therethrough for converting rotary movement of said screw shaft into linear movement of said movable carriage portion and package roll carried thereby; and

means for compensating for variations in tension in the thread being wound due to increases and decreases in the length of the path of travel of the thread from the thread source to said package roll caused by the traversing action of said traversing mechanism.

2. The combination of:

textile thread winding apparatus having a driven rotating drive roll, at least one freely rotatable package roll positioned on one side of said drive roll for engagement therewith to be driven thereby for the winding of thread and mounted for linear movement away from said drive roll as the thread package builds thereon, a thread traversing mechanism positioned on the other side of said drive roll for receiving the thread from a source and guiding the thread around said drive roll to said package roll while traversing the thread longitudinally of said drive roll, carriage means including a stationary portion and a movable portion carried by said stationary portion for reciprocating linear movement and being secured to and carrying said package roll for reciprocating linear movement therewith, and means for maintaining a desired predetermined pressure relationship between said drive roll and said package roll and for linearly driving said package roll and comprising a variable torque reversible motor, a screw shaft connected to and rotated by said torque motor and a nut secured to said movable carriage portion and receiving said screw shaft therethrough for converting rotary movement of said screw shaft into linear movement of said movable carriage portion and package roll carried thereby; and

means for compensating for variations in tension in the thread being wound due to increases and decreases in the length of the path of travel of the thread from the thread source to said package roll caused by the traversing action of said traversing mechanism, said tension compensating means comprising a deflector plate mounted adjacent to and in advance of said traversing mechanism and having an outwardly bowed surface positioned in the path of travel of the thread to deflect the thread in such a manner as to equalize the length of its path of travel while it is being traversed by said traversing mechanism so as to compensate for the variations in tension of the thread prior to reaching said traversing mechanism.

* * * * *

# UNITED STATES PATENT OFFICE

# CERTIFICATE OF CORRECTION

Patent No. 3,690,576 Dated September 12, 1972

Inventor(s) George F. Schroeder

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 16, "threat" should be-thread --; Column 7, line 27, after "46" insert ---and the package rolls 30 in a direction toward the drive roll 14.

Signed and sealed this 13th day of February 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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