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Hermanns

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[54] **WINDING AND CHANGEOVER DEVICE**

[75] Inventor: **Peter Hermanns,** Stommeln near Cologne, Germany

[73] Assignee: **FMN Schuster & Co.,** Hurth-Efferen, Germany

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[51] **Int. Cl.** **B65h 54/32;** B65h 54/38

[58] **Field of Search** .... 242/43.1, 43, 26, 18.1, 242/18 R, 18 DD, 18 CS

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Primary Examiner—Stanley N. Gilreath
Attorney, Agent, or Firm—Markva & Smith

[57] **ABSTRACT**

An apparatus for winding thread onto a spool is provided to form a thread package. The apparatus comprises a reverse thread roller rotatably mounted in a casing and a thread guide mechanism including a thread guide element mounted for back and forth movement by means of a reverse thread roller. The stroke of the thread guide element is varied by a mechanism in response to a variation in the diameter of the yarn package being produced on the spool. Control means is used to control the overall stroke length of the thread guide element in a predetermined manner to dispose the thread on the thread package at the edge thereof in a predetermined pattern. The stroke varying means or mechanism and the control means are mounted in the same casing with the reverse thread roller.

22 Claims, 13 Drawing Figures

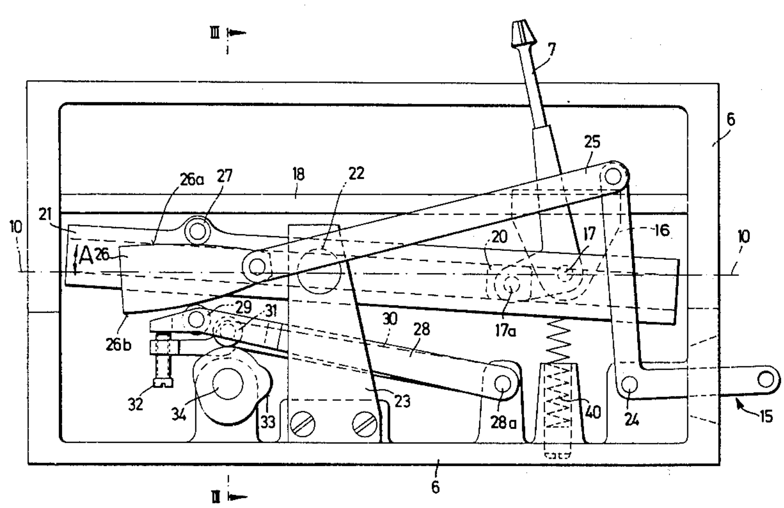
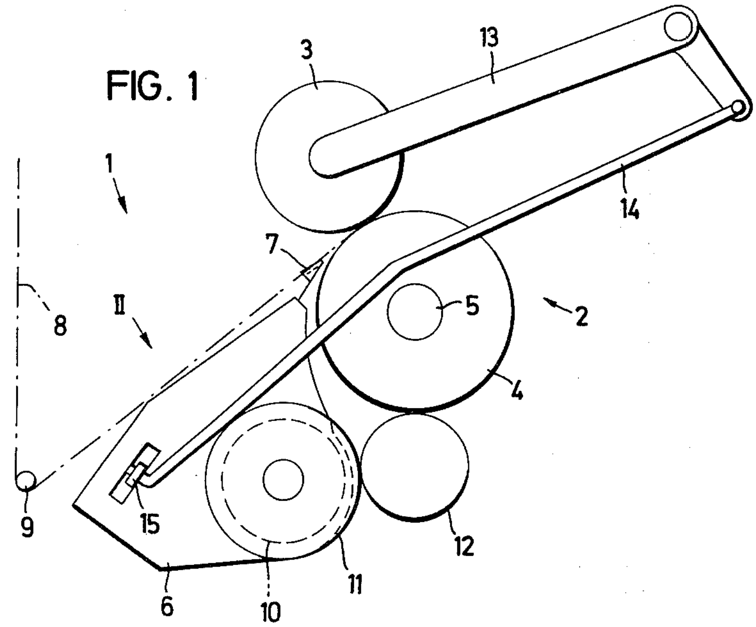


FIG. 1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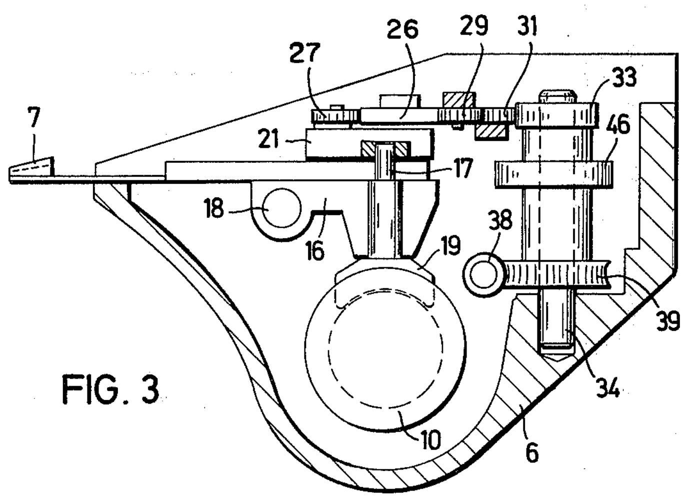
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FIG. 3

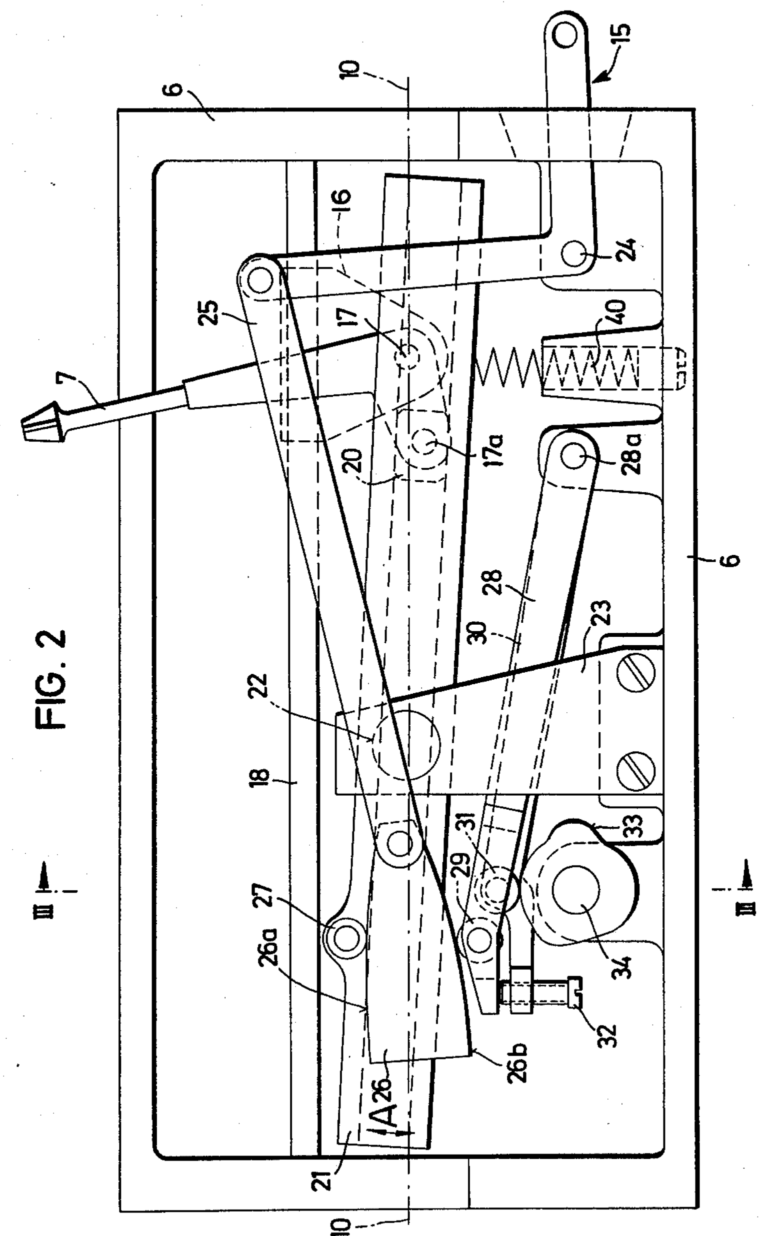
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FIG. 2

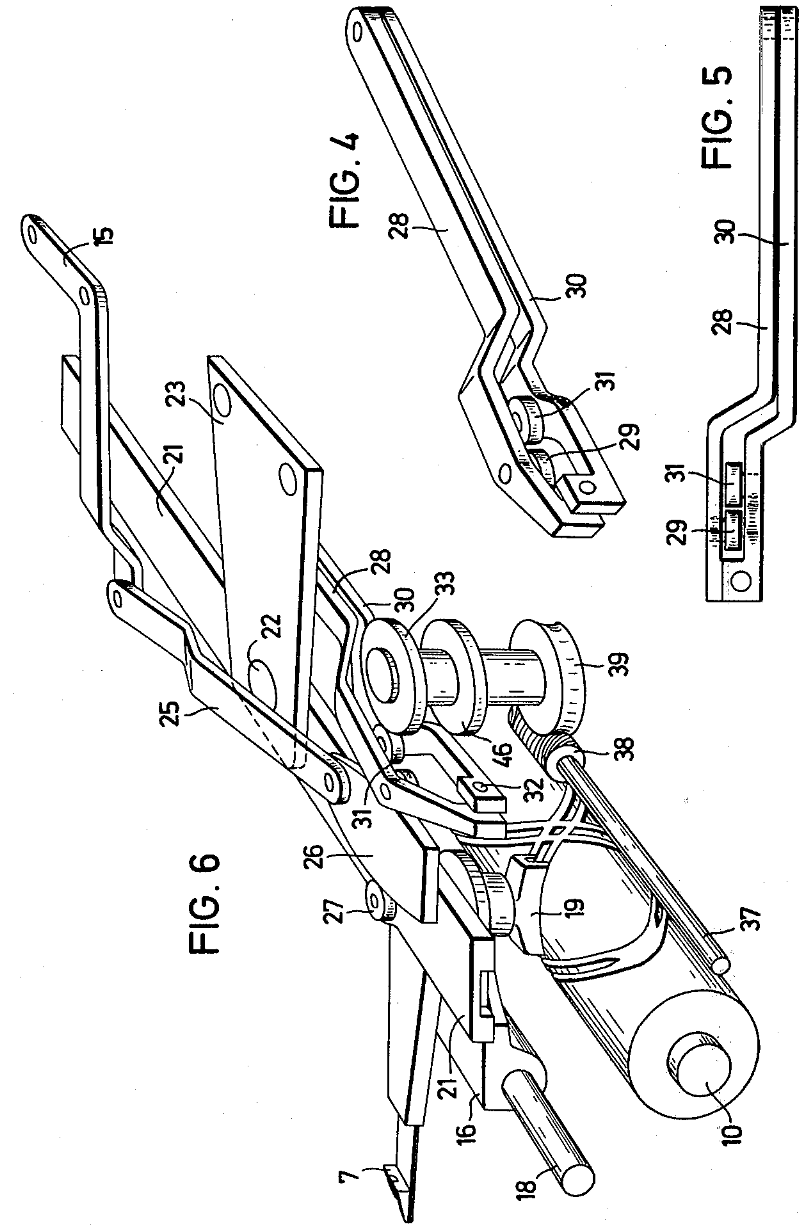

FIG. 4

FIG. 5

FIG. 6

FIG. 7

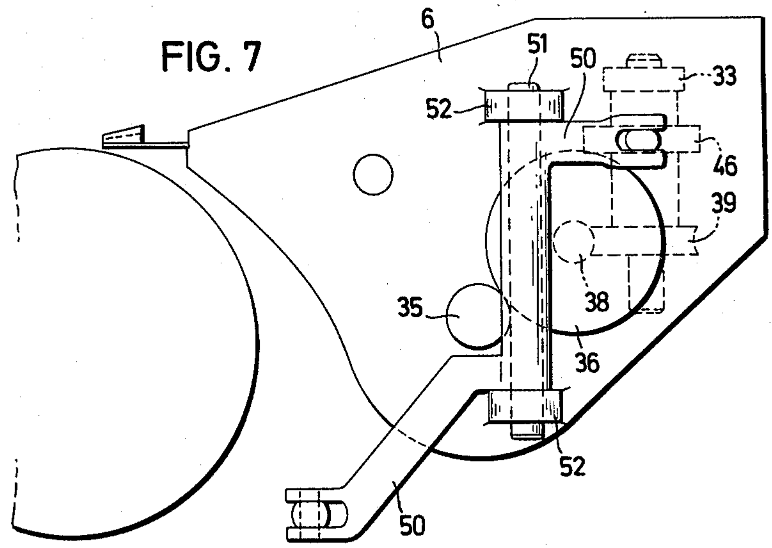
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FIG. 8

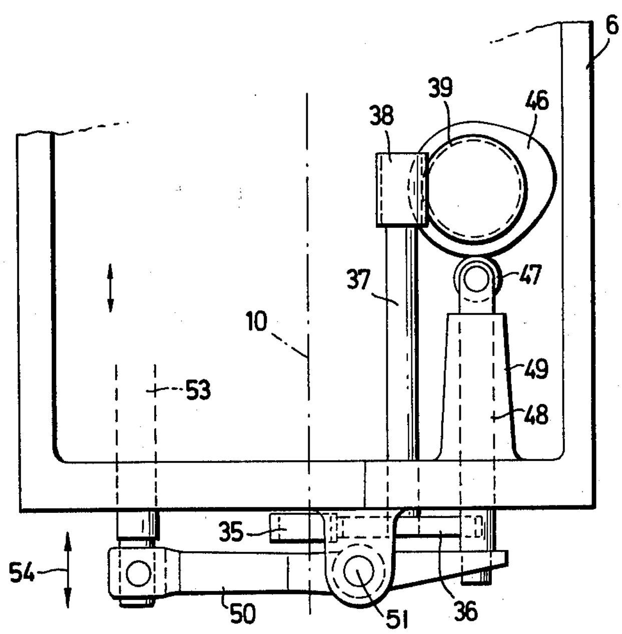
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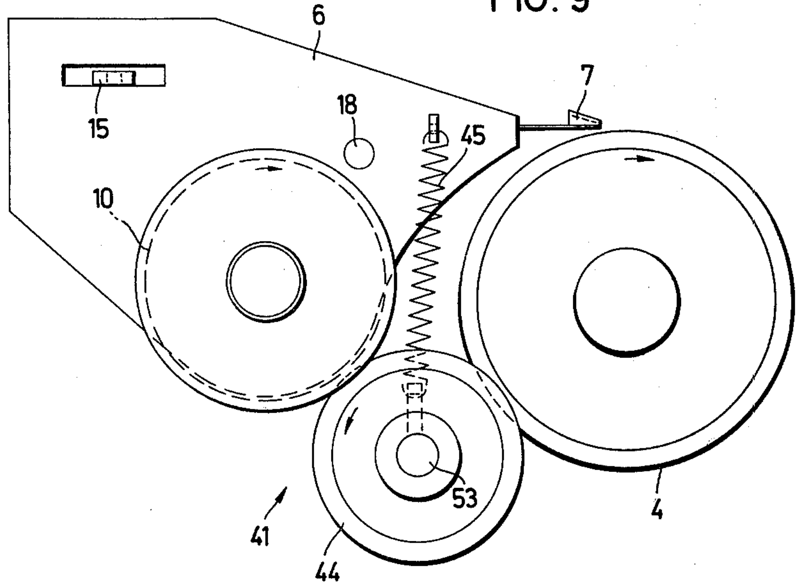
FIG. 9



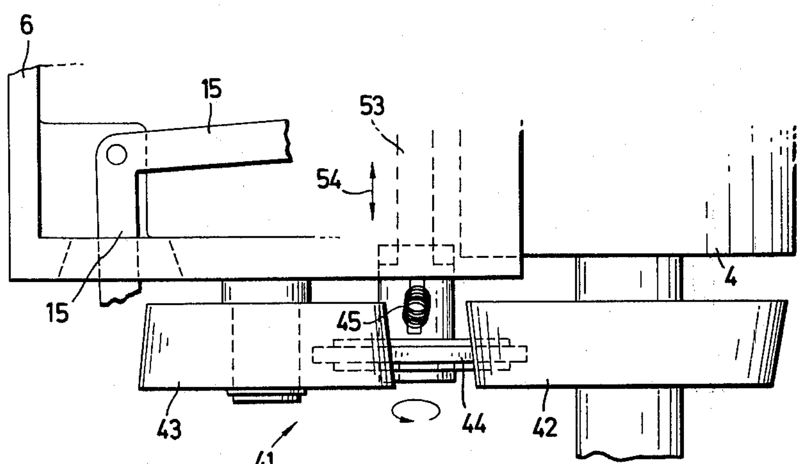


FIG. 10

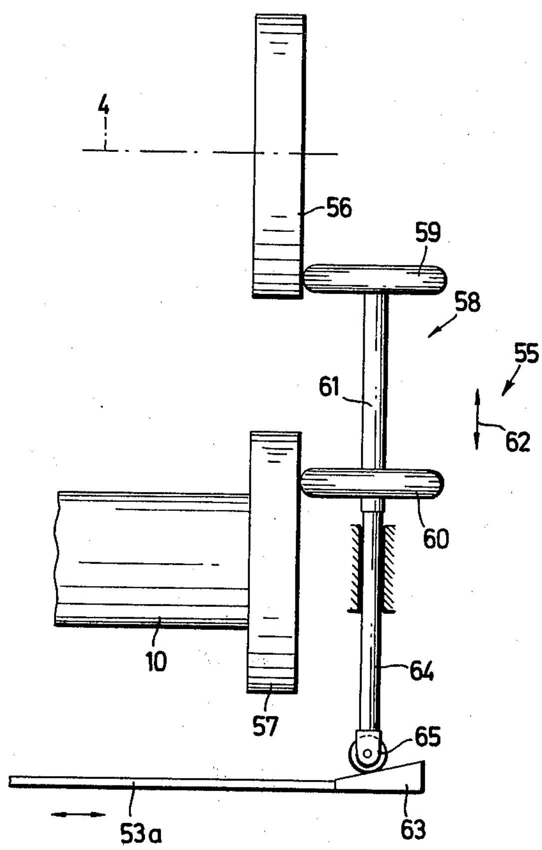


FIG. 11

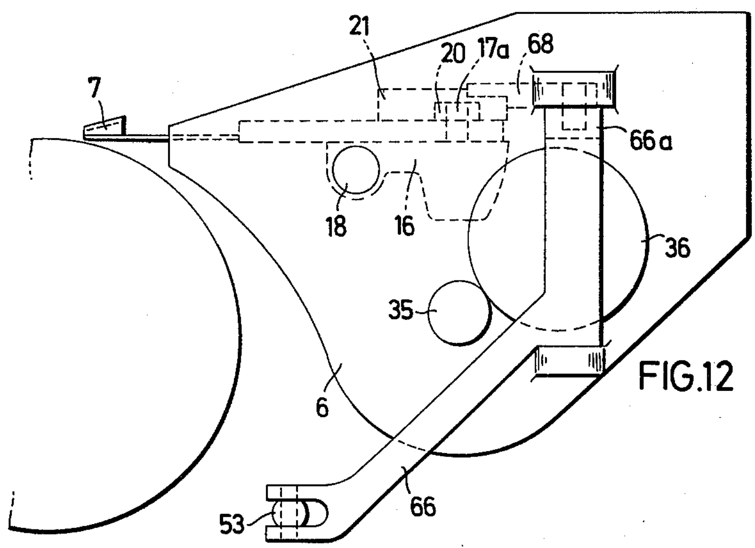

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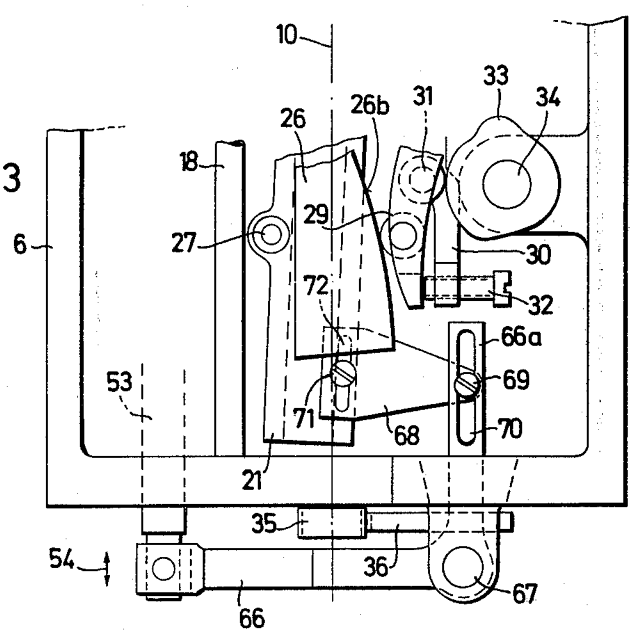
FIG.12

FIG.13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WINDING AND CHANGEOVER DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to a winding and changeover device for producing rolls from yarns, particularly from synthetic, texturized thread.

In order to be able to produce rolls of yarn having a varying construction, a method is known in winding devices, quick traverse winders and the like wherein the thread-guide is driven by a reverse-thread roller including a device for shortening the oscillating thread-guide which may be embodied in a thread spool having a conical structure at the ends. A further method is known of using an edge-transfer device for altering the changeover stroke length of the thread guide. That is, the thread guide element swings outwardly past the point where the runner changes direction in contact with the spiral groove of the reverse-thread roller. Control of the amount of outward swing of the thread guide element thereby controls the overall stroke length of the thread guide element with respect to the thread package. Thus, the changeover stroke length constitutes this amount of outward swing of the thread guide as stated. The altering of the changeover stroke length prevents the occurrence of sharp, hard edges on the thread package thereby preventing a condition which considerably impairs unwinding of the thread.

In such texturizing devices, the yarns to be treated are fed to the texturizing units in the form of cops or cylindrical spools; the yarns are then drawn off, passed to the twisting and fixing devices, and again wound into rolls in the finished condition by means of winding units. Attempts have been made to pass on these rolls, as spools ready for sale, for further processing. Such attempts have failed, however, for several reasons. In the first place, texturizing machines are generally so constructed that a plurality of texturizing units or spindles are combined in a row into a unit. In such a construction, the rewinding units are centrally driven and controlled. These known rewinding units extend over the entire row of texturizing units and include control rods from which corresponding transmission members lead to the thread-guide changeover and transfer devices. The transmission members are located along the sides of the texturizing machine with their bearing and support points being mostly provided on the chassis of the texturizing devices. Difficulties arise here because the overlapping procedures for stroke shortening and edge transfer and the like give rise to a complex kinetic system whose individual moving parts can only be inserted and mounted with difficulty and in remote locations between compact mechanical groups of the texturizing machinery. Superimposition of tolerances of a large number of components leads to fluctuations in the operation of the thread package and the changeover units. These fluctuations are difficult to correct and compensate for thus making it impossible to obtain uniform construction and quality of the thread packages.

Centrally driven rewinding units are incapable of rewinding at a speed equal to that at which the thread passes through the texturizing zone. This limitation is caused by the slowness and inflexibility of the thread guide control devices used on the known rewinding units. Consequently, the inertia of the winding device prevents fully economical utilization of the texturizing machine. The tendency with texturizing-processes and devices is increasingly to provide very high texturizing

speeds. However, this capability has not been exploited in prior art equipment due to the construction of the known winding and changeover devices.

In addition, spools or threaded packages produced by the rewinding units of prior art texturizing machines often do not meet the requirements of manufacturers. The properties of shape and unwinding behaviour do not meet the technical demands of further processing. There have also been considerable drawbacks and defects in spools or threaded packages taken up directly by the texturizing machines, including the fact that the cylindrically wound rolls with straight ends easily "bloom out" at higher diameters, i.e., slip at the side surfaces. A cylindrical spool construction with conical ends can not be employed in a satisfactory manner with conventional devices at the desired high speeds. Usually, rimlike and very hard edges form at the ends of the cylindrical surface, leading to unacceptable difficulties when drawing thread off such spools in further processing. Such difficulties include an increase in thread tension thereby producing tugs and other defects. As a rule, such thread packages are unusable and must be rewound.

Previous winding units often produce deviations in the winding which periodically result in wild or disordered winding commonly referred to as image windings caused by frictional drive of the thread package. Such image windings are quite disadvantageous so far as further processing is concerned. That is, thread tension is often increased by image windings to the point that the yarn tears or stretches thereby seriously impairing the capacity of the material for taking dye and also rendering the use of thread packages containing such wiindings difficult, if not impossible.

SUMMARY OF THE INVENTION

The present invention is directed to an apparatus for producing rolls or thread packages from yarns such as synthetic texturized threads. A thread-guide changeover and transfer unit includes a reverse-thread roller, a device for stroke reduction of an oscillatable thread-guide, and a device for changing the changeover stroke length of the thread guide. The drive of the reverse-thread roller is derived from a driven friction roller. The control device for stroke reduction and the control device for edge transfer of the thread guide are mounted and rigidly housed in a casing containing the reverse-thread roller. The device for minimizing deviations in the windings in the thread package can also be arranged in the reverse-thread roller housing and can form a common constructive unit with the control devices for stroke reduction and edge transfer.

The previously mentioned drawbacks of prior art equipment are removed by the apparatus of the present invention. The necessary uniformity of function and product result is achieved in the winding and changeover device, making possible the precise shape of the roll produced, the quality of the roll also being improved. In the enclosed casing of the reverse-thread roller, the changeover apparatus contains the the necessary components for the complicated kinetic system. The drive parts are fixed once and for all so far as their positions are concerned and in their fixed operating relationship to each other. In this way, tolerances can be kept to a minimum. Because all these drive parts are housed in an enclosed unit, the entire winding unit is simple and reliable. The transmission members are no longer subject to dirt and dust. No thread or the like can pass into the rotating parts. Susceptibility to breakdown is considerably reduced. These features contribute to obtaining a roll of yarn having a high uniformity of shape, construction and quality, in the plurality of texturizing machines arranged in rows. Further advantages result from the fact that operating personnel are not endangered while manually inserting the thread. The enclosed constructive unit of the present winding and changeover device can be simply and rapidly mounted as a unit on the texturizing machine or the like so that assembly is considerably simplified. Also, the unit as a whole can be delivered to the workshop.

All of these advantages contribute to the fact that the enclosed winding and changeover device can be driven at high speeds. The thread-guide can execute at least 400 to 500 alternating strokes per minute, compared to 120 to 150 strokes in the case of centrally-controlled texturizing machines. Even at very high thread speeds of about 400 meters per minute, the precision of shape and quality of the roll to be formed is assured. Said roll can be passed directly on for further processing.

In the construction of the winding changeover device according to the present invention, in which the guide rail containing the slide of the thread guide is pivotally mounted, and control of the degree of pivoting of the guide rail is derived from the variation in spool diameter by means of rods, there is preferably provided a first control cam for the guide rail to be additionally actuable by a second control cam, e.g., a cam disc, whose drive is derived from the reverse thread roller. In this way the device for stroke reduction is simply and effectively coupled to the device for edge-transfer. In such a case an adjusting device for the basic stroke length is advantageously provided between the two control cams. This adjusting device can include a double arm, with the spacing between the arms being adjustable by means such as a screw. In this coupling of stroke reduction with edge-transfer, the periodic occurrence and seriousness of winding deviations in the roll is considerably reduced.

The present device for minimizing winding deviations advantageously employs a regulating drive by means of which the r.p.m. ratio between the friction roller and the reverse-thread roller can be varied. In this case the control member for such variation is suitably coupled to the cam for edge-transfer, this control member also receiving its drive directly from the reverse-thread roller. In this way the occurrence of deviated windings can be prevented by simple means, this being otherwise effected by disturbing the r.p.m. of the reverse-thread roller driving the thread-guide changeover device, likewise initiated directly form the texturizing machine.

An additional feature of the present invention lies in the provision for control of the regulating drive to be derived from the movement of the guide-rail. In this instance care is taken that during winding of a spool the stroke length is generally reduced because of the biconical construction, resulting in a general reduction in thread speed, which means that the thread tension constantly decreases. By means of this control feature according to the invention, such a decrease in thread tension is compensated for by the fact that the stroke speed is increased by raising the r.p.m. of the reverse-thread roller to a degree corresponding to the decrease in the stroke speed of the thread-guide occasioned by stroke shortening. By means of this drive regulating mechanism of the device for minimizing winding deviations from the movement of the guide rail, the said device is influenced in the same direction as the guide-rail. The movement of the guide-rail is initiated by the edge-transfer cam, and is influenced by variations in the angular position of the guide rail in dependence on the spool construction. The regulating drive of the said device is installed in such a way that, when the stroke is shortened, the r.p.m. of the reverse-thread roller increases.

The mechanism for controlling the regulating drive from the movement of the guide rail includes a rod leading to the regulating drive and flexibly connected to the guide-rail by a lug.

In the normal spooling process it is usually desirable to build up the thread roll with a slightly decreasing thread tension. Thus, as regards speed, no compensation of the speeds to zero can occur. In order to be able to provide regulation at this point, provision is made according to a further feature of the invention for the connecting lug to be adjustably arranged on the corresponding rod portion of the regulating drive for the device for minimizing winding deviations. This adjustment can, for example, be effected by a guide, e.g., a slot or the like. In order to bring about a determined characteristic thread course, the lug can be guided on the connecting point to the rod of the regulating drive of the said device by means of a cam. The lug can also be adjustably connected to the guide-rail; this connection can likewise be effected by a slot or cam arrangement.

The desired reduction in thread tension can be supplemented by corresponding selection of the conicalness of the drive pulleys of the regulating drive of the device for minimizing winding deviations.

BRIEF DESCRIPTION OF DRAWINGS

The preferred embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIG. **1** shows a diagrammatic side view of the arrangement of a winding and changeover device according to the invention, driven by a friction roller;

FIG. **2** is a diagrammatic plan view of the casing of the winding and changeover device in FIG. **1** with the drive parts mounted therein, as viewed in the direction of arrow II in FIG. **1**;

FIG. **3** is a cross-sectional view taken along line III—III of FIG. **2**;

FIGS. **4** and **5** show a perspective view and a side view respectively of a detail of the drive;

FIG. **6** is a perspective view of the essential drive parts arranged in the changeover casing, the casing and the drive for the device for minimizing winding deviations being omitted;

FIGS. **7** and **8** are a diagrammatic side view and a plan view, respectively, in detail, of the drive parts for minimizing deviations in the winding, located in and on the casing of the winding and changeover device;

FIGS. **9** and **10** are a diagrammatic side view and a plan view, respectively, in detail, of components of the device for minimizing winding deviations on the other side of the casing of the winding and changeover device;

FIG. **11** shows diagrammatically another embodiment of the regulating drive for altering the r.p.m. ratio between the friction roller and the reverse-thread roller; and

FIGS. 12 and 13 show diagrammatically, in another embodiment, detailed side and plan views respectively of the drive components for minimizing deviations in the winding, the drive being derived from the guide-rail.

DESCRIPTION OF SPECIFIC EMBODIMENTS

More specifically, referring to FIGS. 1 through 3, a winding and changeover device, generally designated 1, constitutes an apparatus for winding textile threads and operates in conjunction with a spool unit, generally designated 2. The spool unit 2 includes a spool core 3 on which a thread package is wound. The spool core 3 is driven by friction roller 4 that is mounted on a shaft 5 connected to suitable drive means (not shown). If the spool unit 2 is to be used on a texturizing machine, the drive of shaft 5 and the friction roller 4 may be derived from the drive mechanism of the texturizing machine. The winding and changeover device 1 includes a casing or housing 6 and an oscillating thread guide 7 mounted and driven in the casing 6. Thread guide 7 leads a thread 8 over a turning roller 9 to the spool core 3. Thread guide 7 is moved to and fro in a known way by a reverse-thread roller 10. Reverse-thread roller 10 is driven by the friction roller 4 via wheels 11 and 12. The general construction of the spool unit 2 and the drive mechanism for the reverse-thread roller 10 is well known in the prior art.

As the diameter of the roll or thread package produced on the spool core 3 increases, it is often desired to shorten the stroke of the stroke of the thread guide 7 during the to and fro movement. When the shortening of the stroke is accomplished, the thread package is provided with conical or otherwise shaped side or end surfaces. A crank 13 actuates a push rod 14 which acts to pivot a further crank 15 when the diameter of the thread package on the spool core 3 increases. Thread guide 7 is rotatably mounted on a carrier 16 by pin 17 as shown in FIG. 2. Carrier 16 slides to and fro on a stationary guide rod 18. A runner 19 is connected to pin 17 and slidably engages the reverse-thread grooves of the reverse-thread roller 10. A slide piece 20 is located on another pin 17a and can slide to and fro in a guide rail 21. Guide rail 21 is mounted pivotally at projection 22 that is rotatably disposed in an opening on thrust block 23. The longitudinal axis of the reverse-thread roller 10 is only depicted in FIG. 2 in order to provide a clearer view.

Crank 15 is mounted to pivot around a pin 24. Deviation of crank 15 effects an axial displacement of cam 26 via the connecting rod 25. The cam 26 has a cam surface or edge 26a that cooperates with a roller 27 mounted on the guide rail 21. Pivotal movement of guide rail 21 around pivot projection 22 is influenced by the cam surface 26a of cam 26 as shown by the double headed arrow A in FIG. 2. Consequently, the pivotal movement of thread guide 7 is directly affected resulting in stroke shortening of the to and fro movement of the thread guide 7. The amount of stroke shortening depends upon the increase in the diameter of the thread package.

As known in the prior art, the thread guide stroke length is the distance traveled by the thread guide 7 as it travels between the ends of the reverse-thread roller 10. By varying the thread guides stroke length of thread guide 7 in a predetermined manner, it is known to cause the straggered positioning of the turning points of the thread being wound at the edge of the thread package. The device for altering the thread guide stroke length is referred to as the edge transfer device and has a support arm 28, as shown in detail in FIGS. 4 and 5. The arm 28 is pivotally mounted at point 28*a* and is equipped with a roller 29. The edge transfer device has a further arm 30 that carries a roller 31 and is mounted to pivot around pin 28*a*. The arms 28 and 30 can be spaced with respect to each other by a set screw 32 constituting an adjusting device. The roller 29 of arm 28 bears on cam surface 26*b* of cam 26 and roller 31 of arm 30 cooperates with a control cam disc 33 which is secured to a shaft 34. Shaft 34 is mounted in casing 6 of the changeover device and is driven from the reverse-thread roller 10 by means of gear wheels 35 and 36, shaft 37 and a worm gear 38. As shown in detail in FIGS. 7 and 8, the worm gear 38 meshes with a worm wheel 39 which is also secured on shaft 34. Thus, control cam disc 33 is rotated continuously while the reverse thread roller 10 rotates.

The position of both rollers 27 and 29 is altered by means of an axial displacement of cam 26. Roller 29 cannot, however, deviate at first; it is thus only possible for roller 27 to change position. Roller 27 is rigidly connected to guide rail 21. Consequently, when the position of roller 27 is changed, guide rail 21 is pivotally moved around point projection 22 to alter its angular position with respect to the shaft or longitudinal axis of the reverse-thread roller 10. When the angular position of guide rail 21 is changed, the path of travel of slide piece 20 is changed as it moves back and forth within guide rail 21. Thus, the positioning of thread guide 7 is changed. That is, when the thread guide 7 is moving axially, its stroke can be increased or decreased.

Control cam 33 is the edge transfer cam. When cam 33 is rotated, the position of roller 29 is moved via roller 31 on the support arm 30. That is, guide rail 21 has an additional slight oscillating motion imparted to it when the position of cam 26 is altered via the changing position of roller 29. This oscillating movement causes the stroke length of thread guide 7 to be altered by an amount depending on the profile of control cam 33. By means of said screw 32, the basic stroke length can be corrected to a predetermined position of the edge transfer control cam 33 and a predetermined outset position of crank 15. A compression spring 40 acts on guide rail 21 thereby imparting to the guide rail 21 a torque to the left or in a counterclockwise direction so that all the rollers and other lever components bear on one another.

The stroke of thread guide 7 is shortened in dependence on the thread package diameter as discussed hereinabove. The transfer of the thread at the edges of the thread package is brought about by an additional action of the guide rail 21 on the thread guide 7. The drive for these functions is derived from the reverse-thread roller 10 by means of the control cam 33. In order to obtain different spool or thread package constructions, the cam 26 can be exchanged for a differently shaped cam. For different edge transfer values, control cam 33 can be replaced by differently shaped cam discs so that any desired construction of the thread package can be obtained.

The device for minimizing deviations in the winding can also be provided in an apparatus of the present invention. Deviations is the winding are minimized substantially by a regulating drive mechanism, generally designated **41**, as shown in detail in FIGS. **9** and **10**. The regulating drive mechanism **41** alters the r.p.m. ratio between the friction roller **4** and the reverse-thread roller **10**. Drive mechanism **41** includes two drive pulleys **42** and **43** having circumferential surfaces that are conically shaped in opposite directions with respect to each other. Conical pulley **42** is secured to friction roller **4**. Conical pulley **43** is secured to the reverse-thread roller **10**. A friction roller **44** is disposed between the conical pulleys **42** and **43** and is kept in contact therewith by a tension spring **45**.

As shown in FIGS. **6** through **8**, a control member or cam disc **46** secured to shaft **34** effects axial movement of friction wheel **44**. A push rod **48** is longitudinally movably mounted in block **49**. A cam follower rotatably mounted on the end of push rod **48** is in frictional contact with the outer circumference of the cam disc **46**. Therefore, as cam disc **46** rotates, the push rod **48** is moved back and forth along its longitudinal axis. Push rod **48** is connected to a double armed lever **50** which pivots around pin **51**. Pin **51** is mounted in bearing points **52**. The double armed lever **50** actuates a further push rod **53** which executes a stroke axially with respect to the reverse thread roller **10**. Friction wheel **44** is rotatably attached to the other end of push rod **53** and is thereby moved axially in the direction designated by the double headed arrow **54**.

Axial displacement of friction wheel **44** imparts a fluctuating r.p.m. to the reverse-thread roller **10** depending on the configuration of control member **46** when the friction roller is at a constant r.p.m. The fluctuating r.p.m. is necessary to avoid image windings on the spool being produced. The magnitude of the fluctuations in r.p.m. can be controlled by the conicity of both conical pulleys **42** and **43** and by the height or configuration of the cam surface on the control cam member **46**. The traction spring **45** permits an axial stroke movement of push rod **53**. Control cam **33** for the edge transfer and control cam member **46** may be rigidly connected together and both rigidly connected to the worm wheel **39**. The entire unit can be mounted on the shaft **34**. The circuit of the kinetic movements is completed by the drive of control cam **33** and control cam member **46** from reverse-thread roller **10** via worm gear, worm wheel and the gear wheels **35** and **36**.

Another embodiment of a regulating drive is shown in FIG. **11**. The regulating drive, generally designated **55**, includes a friction disc **56** connected to friction roller **4** and a friction disc **57** connected to the reverse-thread roller **10**. A friction wheel unit, generally designated **58**, includes friction wheels **59** and **60** connected with a shank **61**. Friction wheels **59** and **60** engage on different radii of friction discs **56** and **57**, respectively. The friction wheel unit **58** is moved by the control cam member **46** in the direction shown by the double headed arrow **62**. The push rod **53***a* includes an inclined surface **63** which is kept in contact with the roller **65** located at the end of shaft **64** by a spring bias. The back and forth movement of the inclined surface **63** due to the rotation of the control cam **46** effectuates the movement of the friction wheel unit **58**. When friction wheel unit **58** is shifted, the r.p.m. ratio between friction roller 4 and reverse-thread roller **10** is changed in the manner of regulating drive **41** thereby minimizing deviations in the winding producing the thread package.

The transmission members shown in the examples of FIGS. **7** through **11** are provided partly inside and partly outside the casing **6**. However, there is no difficulty in arranging the transmission members **50** and **53** entirely within casing **6** with the thrust block for the double armed lever also being transferred inside the casing **6**. Push rod **53** can also be placed inside casing **6**. The regulating drives **41** or **55** are appropriately mounted outside casing **6** so that friction wheels or the like may easily be changed. When parts are outside casing **6**, they are covered by a protective cap connected to the casing. In either case, a constructive unit is formed with all bearing points located on the common casing in an arrangement which allows for tolerances between components.

In the embodiment of FIGS. **12** and **13**, push rod **53** effects the axial movement of friction wheel **44** at one end thereof when actuated at the other end thereof by guide rail **21** in the direction of the arrow **54**. Lever **66** is pivotally mounted around the shaft **67**. A free arm **66***a* of lever **66** is flexibly connected to guide rail **21** by a lug **68**. A pin **69** secured to lug **68** is disposed in the slot **70** so that the lug **68** is movably located on the free arm **66***a*. A. pin **71** located on guide rail **21** is also adjustable within the slot **72**. The slots **70** and **72** may be curved to any required shape desired.

Friction wheel **44** makes the same movement as guide rail **21** when connected to the push rod **53** that is moved by the lever **66** connected to guide rail **21**. The movement of guide rail **21** is initiated by the edge transfer curve and has a further movement superimposed thereon by the cam surface **26***b* as a result of the change in angular position of guide rail **21** in dependence on the construction of the thread package being formed. The desired reduction in thread tension may be set via the adjustability of lug **68** at pins **69** and **71**.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the forms hereinbefore described being merely preferred embodiments thereof.

It is claimed:

1. An apparatus for winding thread onto a spool to form a thread package comprising:

a. a single reverse-thread roller secured in a casing to a rotatable shaft means,

b. a single thread guide mechanism including a thread guide element mounted for back and forth movement by means of the reverse-thread roller,

c. means for varying the stroke of the thread guide element in response to a variation in the diameter of the yarn package being produced on said spool,

d. said stroke varying means including a pivotally mounted guide rail having a guide slot disposed therealong and a cam mechanism for changing the pivotal position of the guide rail,

e. said thread guide including a slide piece disposed in the guide rail slot to change the path of travel for said slide piece,

f. control means for controlling the overall stroke length of the thread guide element in a predetermined manner to dispose the thread on the thread package at the edge thereof in a predetermined pattern,

g. said control means including a control cam means rotated in response to the rotation of said shaft means,

h. said cam mechanism including a first cam surface working with a first cam follower effective to change the pivotal movement of the guide rail in response to an increase in the diameter of said package being wound and a second cam surface and

i. an adjustment device disposed between said second cam surface and said control cam means for actuating the second cam surface to adjust the overall stroke length of the thread guide.

2. An apparatus as defined in claim 1 wherein said guide rail, cam mechanism, control means and adjustment device are mounted in the casing with said reverse-thread roller.

3. An apparatus as defined in claim 1 wherein said adjustment device includes two pivotal arms spaced with respect to eachother and an adjustment member for varying the spacing between said two pivotal arms.

4. An apparatus as defined in claim 1 wherein a driven friction roller is disposed adjacent the reverse-thread roller, and a regulating drive mechanism is between the friction roller and the reverse-thread roller, said regulating drive mechanism includes a control cam means driven by the reverse-thread roller for varying the r.p.m. ratio between the friction roller and the reverse-thread roller as the diameter of the thread package increases.

5. An apparatus as defined in claim 4 wherein said regulating drive mechanism includes a friction wheel and rod components responsive to said control cam means for axially adjusting said friction wheel.

6. An apparatus as defined in claim 4 wherein said regulating drive mechanism includes two spaced apart conical drive pulleys and a friction wheel disposed therebetween, said friction wheel being shiftable axially in response to the action of said cam means.

7. An apparatus as defined in claim 4 wherein said regulating drive mechanism includes two friction discs having planar surfaces, friction wheels having peripheral surfaces being on said planar surfaces, and linking rods operatively connected to the friction wheels for effecting movement of the friction wheels with respect to the friction discs, said friction wheels being commonly shiftable by the action of said control member through said linking rods.

8. An apparatus as defined in claim 1 wherein a driven friction roller is disposed adjacent the reverse-thread roller, and a regulating drive mechanism is between the friction roller and the reverse-thread roller, the regulating drive mechanism includes means responsive to movement of the guide rail for varying the r.p.m. ratio between the friction roller and the reverse-thread roller as the diameter of the thread package increases.

9. An apparatus as defined in claim 8 wherein said guide rail movement responsive means includes a rod connected to the guide rail by a lug configuration.

10. An apparatus as defined in claim 9 wherein said lug configuration includes a guide means for adjustably positioning said lug configuration at a corresponding location on said rod.

11. An apparatus as defined in claim 9 wherein said rod is operatively connected between the regulating drive mechanism and the guide rail to cause a relative increase in stroke speed of the thread guidance when there is a reduction in stroke speed of the thread guide caused by stroke shortening.

12. An apparatus as defined in claim 9 wherein said lug configuration is movably connected to the guide rail.

13. An apparatus as defined in claim 12 wherein said rod is operatively connected between the regulating drive mechanism and the guide rail to cause a relative increase in stroke speed of the thread guidance when there is a reduction in stroke speed of the thread guide caused by stroke shortening.

14. An apparatus for winding thread onto a spool to form a thread package comprising:

a. a single reverse-thread roller secured in a casing to a rotatable shaft means,

b. a driven friction roller disposed adjacent the reverse-thread roller,

c. a single thread guide mechanism including a thread guide element mounted for back and forth movement by means of the reverse-thread roller,

d. a regulating drive mechanism between the friction roller and the reverse-thread roller,

e. said regulating drive mechanism including a control cam means driven off the shaft means carrying the reverse-thread roller for varying the r.p.m. ratio between the friction roller and the reverse thread roller as the diameter of the thread package increases,

f. means for varying the stroke of the thread guide element in response to a variation in the diameter of the yarn package being produced on said spool, and

g. control means for controlling the overall stroke length of the thread guide element in a predetermined manner to dispose the thread on the thread package at the edge thereof in a predetermined pattern.

15. An apparatus as defined in claim 14 wherein said regulating drive mechanism includes a friction wheel and rod components responsive to said control cam means for axially adjusting said friction wheel.

16. An apparatus as defined in claim 14 wherein said regulating drive mechanism includes two spaced apart conical drive pulleys and a friction wheel disposed therebetween, said friction wheel being shiftable axially in response to the action of said cam means.

17. An apparatus as defined in claim 14 wherein said regulating drive mechanism includes two friction discs having planar surfaces, friction wheels having peripheral surfaces being on said planar surfaces, and linking rods operatively connected to the friction sheels for effecting movement of the friction wheels with respect to the friction discs,

said friction wheels being commonly shiftable by the action of said control member through said linking rods.

18. An apparatus for winding thread onto a spool to form a thread package comprising:

a. a single reverse thread roller secured in a casing to a rotatable shaft means,

b. a driven friction roller disposed adjacent the reverse-thread roller,

c. a single thread guide mechanism including a thread guide element mounted for back and forth movement by means of the reverse-thread roller,

d. a regulating drive mechanism between the friction roller and the reverse-thread roller,

e. the regulating drive mechanism includes means responsive to movement of the guide rail for varying the r.p.m. ratio between the friction roller and the reverse-thread roller as the diameter of the thread package increases,

f. means for varying the stroke of the thread guide element in response to a variation in the diameter of the yarn package being produced on said spool, and

g. control means for controlling the overall stroke length of the thread guide element in a predetermined manner to dispose the thread on the thread package at the edge thereof in a predetermined pattern.

19. An apparatus as defined in claim 18 wherein said guide rail movement responsive means includes a rod connected to the guide rail by a lug configuration.

20. An apparatus as defined in claim 19 wherein said lug configuration includes a guide means for adjustably positioning said lug configuration at a corresponding location on said rod.

21. An apparatus as defined in claim 19 wherein said rod is operatively connected between the regulating drive mechanism and the guide rail to cause a relative increase in stroke speed of the thread guidance when there is a reduction in stroke speed of the thread guide caused by stroke shortening.

22. An apparatus as defined in claim 21 wherein said lug configuration is movably connected to the guide rail.

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