

Jan. 31, 1933.

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1,895,741

WINDING MACHINE

Filed April 26, 1930 5 Sheets-Sheet 1

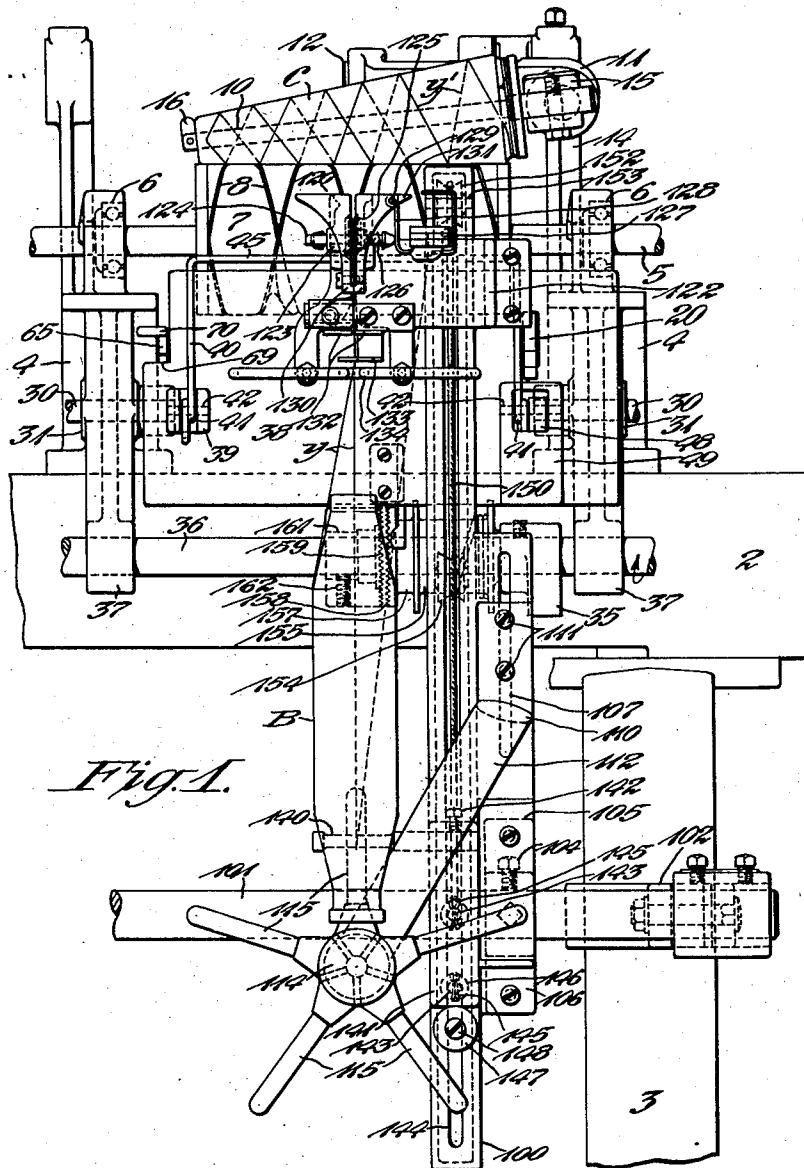


Fig. 1.

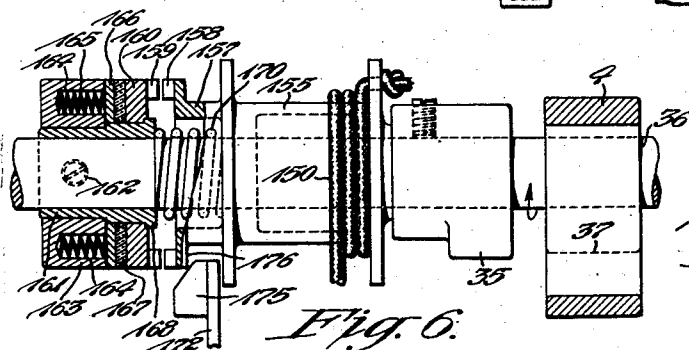


Fig. 6.

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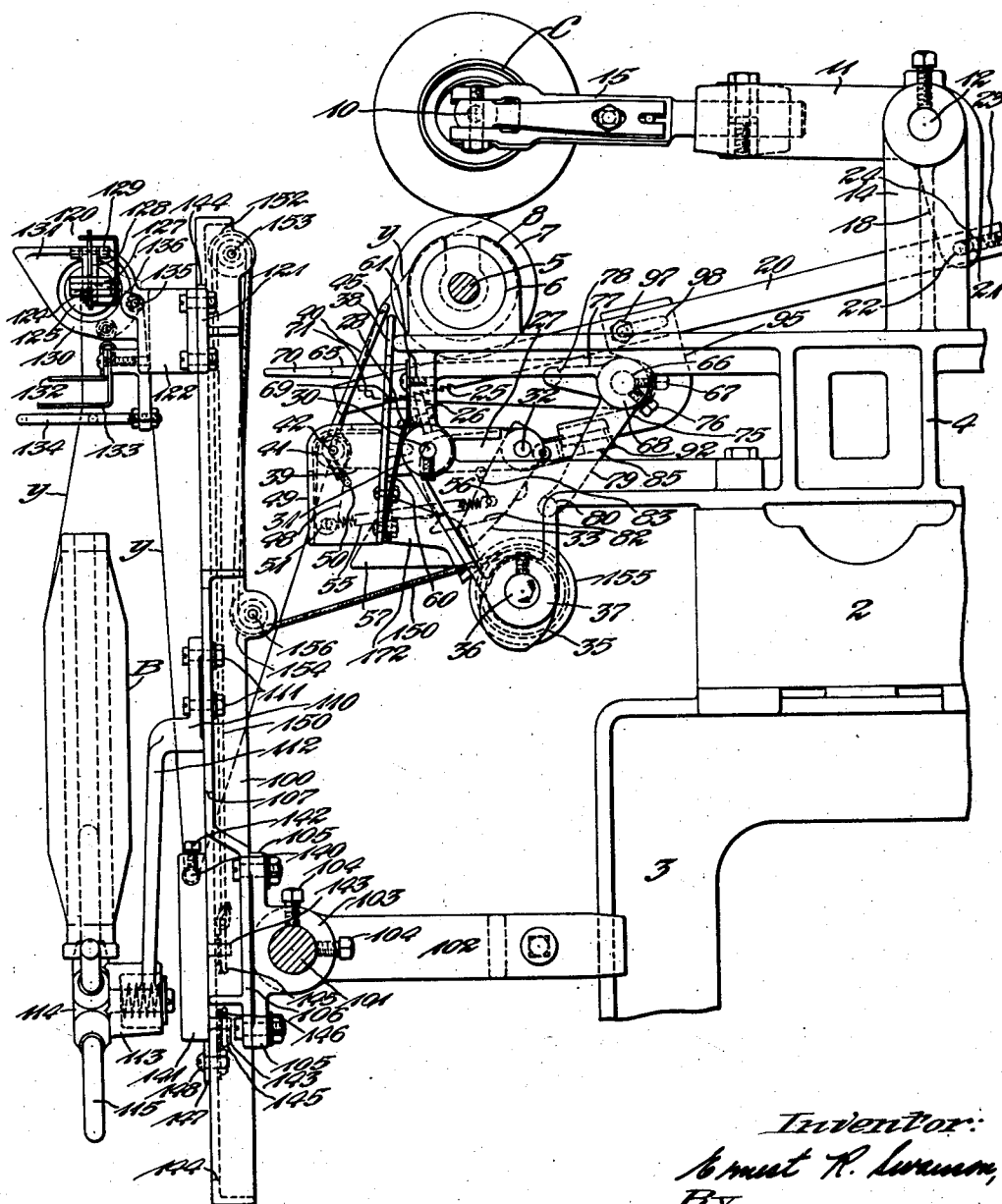
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WINDING MACHINE

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*Fig. 2.*



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WINDING MACHINE

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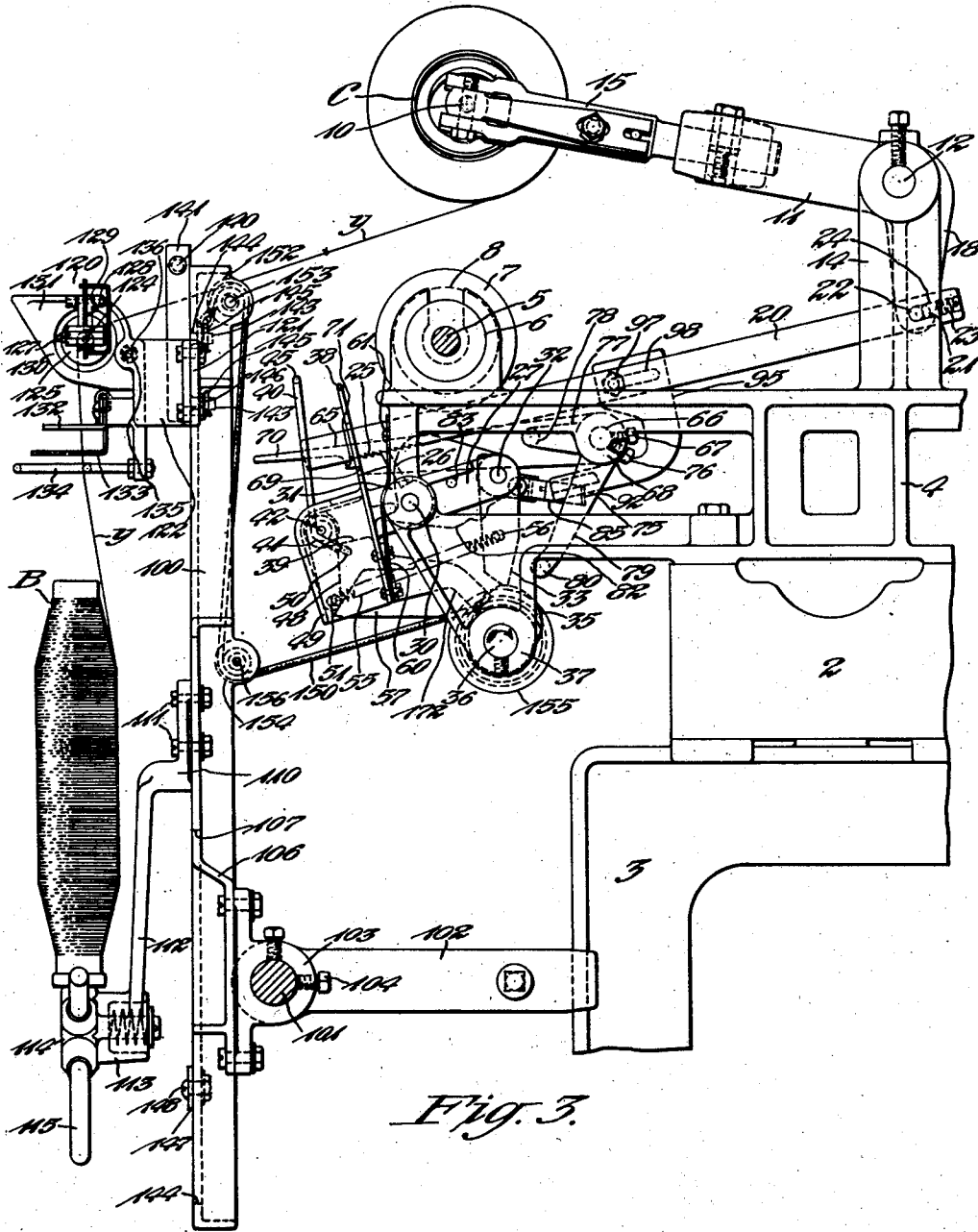


Fig. 3.

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WINDING MACHINE

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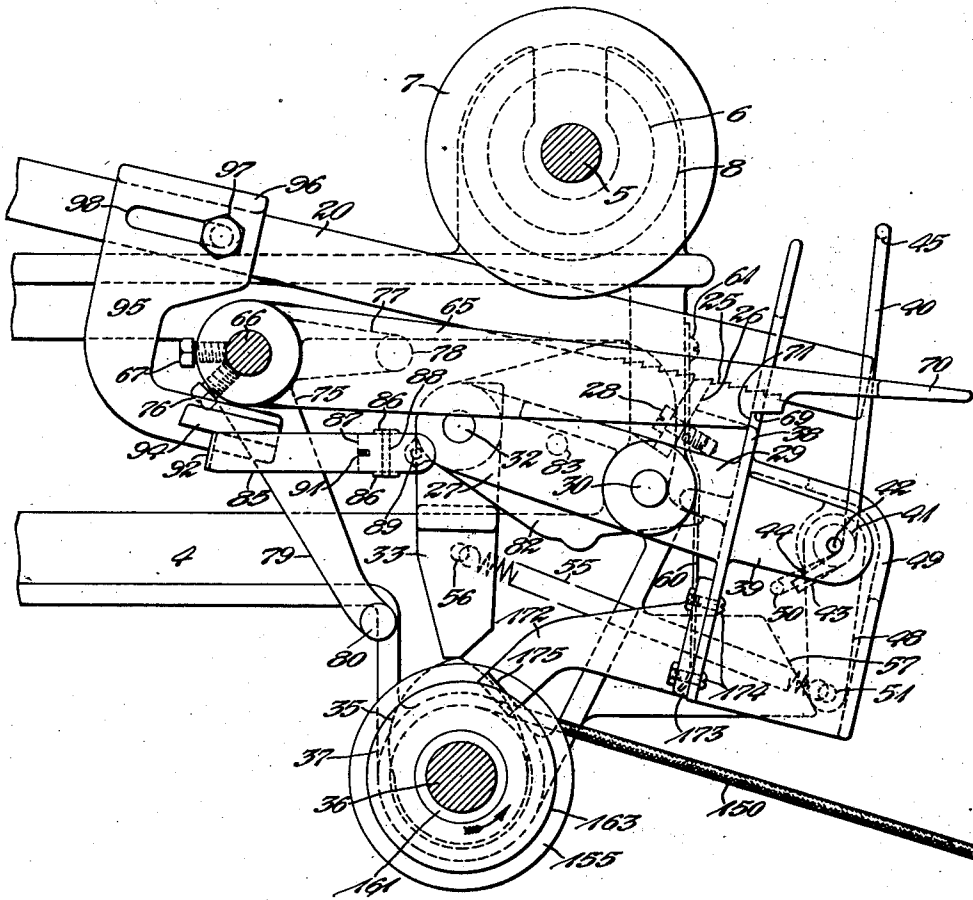


Fig. 4.

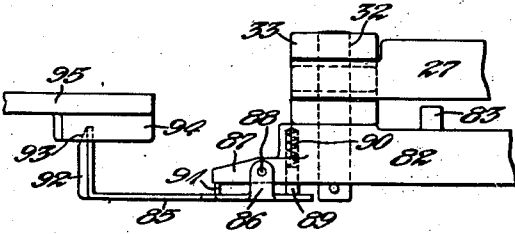


Fig. 5.

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WINDING MACHINE

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5 Sheets-Sheet 5

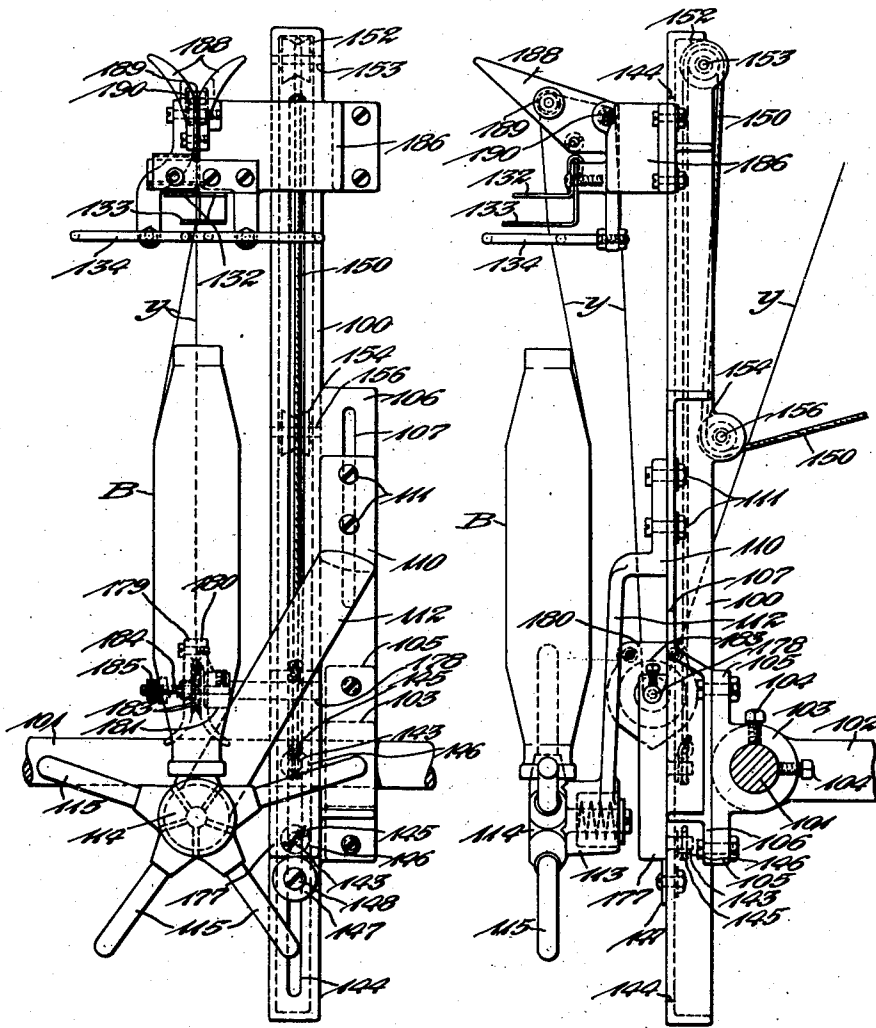


Fig. 7.

Fig. 8.

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## UNITED STATES PATENT OFFICE

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## WINDING MACHINE

Application filed April 26, 1930. Serial No. 447,588.

This invention relates to improvements in winding machines for winding cops, cones, coils, and other forms of packages from yarn, thread and other strand materials.

5 In the following specification and claims the term "package" is used in a general sense to indicate any form of product produced on the machine, and the term "yarn" is employed to designate broadly all sorts of materials, whether textile or otherwise.

10 One object of the present invention is to provide a winding machine having improved starting- and stopping-mechanism which, in addition to controlling the winding operation, also regulates the point of delivery of the yarn with respect to the package being wound.

15 Another object of the invention is to provide means for directing the yarn from the bobbin or other source of supply to the package being wound with its delivery point arranged to be shifted toward and away from the package in accordance with certain requirements.

20 Another object of the invention is to provide automatically-operated means for maintaining the delivery point of the yarn remote from the package during the winding operation and for shifting it into adjacent relationship therewith when the winding operation is arrested, whereby to render it more convenient to piece up the material or attach the end of the strand to the package.

25 Another object of the invention is to provide guiding-means across or over which the yarn from the supply leads with means operated automatically from the starting- and stopping-mechanism of the machine to position the guiding-means adjacent the package being wound before the winding is started and to shift said guiding-means to a point remote from the package as the winding operation is commenced, thereafter returning it to first position when the winding operation is arrested.

30 Another object of the invention is to provide a winding machine wherein the supply package, the tension-device and the parts through or over which the yarn feeds in delivering to the winding-mechanism may be

located in close association with the package to facilitate threading the yarn therethrough, while at the same time maintaining the delivery point of the yarn from the supply in position remote from the package.

55 Another object of the invention is to provide means for shifting the delivery point of the yarn toward and away from the package which is operated automatically from a going element of the machine without attention on the part of the operator.

Another object of the invention is to provide an improved stopping-mechanism for arresting the operation of the machine.

60 Further objects of the improvement are set forth in the following specification which describes a preferred form of construction of the invention, by way of example as illustrated in the accompanying drawings. In the drawings:

70 Fig. 1 is a front elevation of one unit of a winding machine, illustrating the present invention as applied to use therewith;

Fig. 2 is an end view of the same, showing the parts of the winding-mechanism in normal position during the winding of a package.

75 Fig. 3 is a similar view, showing the parts of the winding-mechanism in position after the package has been removed from contact with the drive-roll to arrest the winding operation;

80 Fig. 4 is an enlarged side elevation of the stopping-mechanism of the machine, viewed in the opposite direction from that in Fig. 3;

85 Fig. 5 is a plan view in detail of a portion of the sizing-stop;

90 Fig. 6 is an enlarged detailed view of the clutch and drum which are operated automatically to wind up a cord to shift the yarn-guiding device to alter the position of the delivery point of the yarn;

95 Fig. 7 is a front view of a modified form of the invention, showing it as adapted to shift the tension-device toward and away from the winding-mechanism; and

Fig. 8 is a side view of this modified form of construction.

100 In practically all types of winding machines the supply for the yarn, whether a

spool, bobbin, skein or other form of package, must be located relatively remote from the package being wound, and usually the supply is placed below the machine. It is of advantage, in fact quite necessary as will later appear, to have a considerable length of yarn between its point of delivery from the supply and the point where it is taken up by the winding, but where the supply bobbin is placed at some distance from the winding-mechanism it is inconvenient of access to the operator and necessitates reaching or stooping to piece up the ends or to doff and replenish the supply. Even though the supply bobbin itself is placed near the package being wound the yarn must be carried to a point remote from the winding-mechanism before it can be led to the package, and this also necessitates reaching or stooping on the part of the operator to place the yarn in or around the guiding-means from which it leads to the package.

To overcome the inconvenience of locating the supply bobbin at a distance from the winding-mechanism the present invention contemplates a device whereby the supply may be located in close association with the winding-mechanism and the yarn carried over or through a guiding-means which maintains the delivery point at proper distance from the package being wound; the delivery point of the yarn being automatically controlled to shift it away from the winding-mechanism as the winding is started and to replace it in position adjacent the winding-mechanism when the operation of the machine is arrested so as to facilitate the piecing up of broken ends and the attaching of the yarn to the package being wound. The accompanying drawings illustrate a winding machine of the character shown and described in United States Letters Patent No. 1,749,355, to F. A. Reece, dated March 4, 1930; but it is to be understood that the present invention is applicable to other types of winding-mechanisms and may be applied to use with machines of other character concerned with the transfer of yarn or like material from one process to another in various branches of the textile and similar arts.

Referring to the present drawings, the winding-mechanism herein illustrated may be one of a plurality of similar units mounted on a horizontal table or bed 2 which is supported from standards or legs 3. Rising from the bed or table 2 are brackets or frame-members 4 which carry bearings for the rotating drive-shaft 5 and other parts of the winding-mechanism. As herein shown the drive-shaft 5 is journaled in ball-bearings 6 carried on the brackets 4 and extends horizontally throughout the length of the gang machine to serve as a drive for all of the units thereof. The shaft 5 carries a series of drums or drive-rolls 7, only one of which is shown in the

present drawings; it being understood that a separate roll is provided for each winding unit.

The drive-roll 7 serves as the means for rotating the package by contact with its surface and, in accordance with the invention of the patent hereinabove referred to, the roll 7 is also constituted as a means for traversing the yarn longitudinally of the package to deposit it in helical coils forming the layers which build up the yarn mass. For this purpose the roll 7, which may be termed a traverse-roll, is provided on its peripheral surface with a yarn receiving and guiding groove 8 consisting of crossing and connecting helices extending in opposite directions. That is to say, the groove 8 in the surface of the transverse-roll 7 extends from one end of the roll to the other in any suitable number of helices and then returns in the opposite direction with an equal number of helices crossing the first ones. Means are provided for retaining the yarn in that portion of the groove in which it is traveling to prevent it from being diverted into the opposite helix of the groove, all as fully set forth and illustrated in the patent hereinabove referred to.

As before indicated, the product of the machine may be a package of any preferred form, the usual shape being cylindrical or conical. The yarn is wound on a suitable receiver or core such as a paper tube or a wooden or fiber mandrel. As illustrated in the present drawings the machine is adapted for winding conical packages and for this purpose a cone-tube or receiver C is rotatably mounted on a dead-spindle 10. To provide that the axis of the package may recede from the drive- or traverse-roll 7 during the growth in the winding the winding-spindle 10 is carried at the end of a swinging arm 11 pivoted on a horizontal stud 12 which is supported in a hub at the upper end of an upright 14 formed as a part of the frame-member or bracket 4. The arm 11 is constructed in two parts, with an outer extension 15 arranged to swivel in a bearing at the end of the main arm to adapt the winding-spindle 10 to assume an inclined position with respect to the surface of the roll 7. The wooden tube or yarn-receiver C is held on the winding-spindle 10 by means of a latch 16 at its outer end.

In machines of the present type the drive- or traverse-roll 7 is rotated continuously and to arrest the winding operation the package is removed from contact with the roll through the operation of stopping-mechanism arranged as next described. Means are usually provided for actuating the stopping-mechanism automatically when the yarn breaks or its supply is exhausted, and also when the package reaches a predetermined diameter. The arm 11 carrying the winding-spindle 10 has a downwardly extending leg

18, to the end of which is pivotally connected a bar or slide 20. The rearward end of the bar 20 is formed with a slot 21 engaged by a pin 22 fast in the end of the leg 18, and a spring 23 held in a bore in the end of the bar acts on a plunger 24 bearing against the pin 22. Through this arrangement the connection between the bar 20 and the arm 11 is cushioned to allow a slight play between the parts. The bar 20 extends forwardly and downwardly and at its free end has a series of ratchet teeth 25 on its underside. The teeth 25 are adapted to engage the beveled edge of a dog or pawl 26 constructed in the form of a blade and fastened to a two-armed lever 27 by means of a screw 28. It will be understood that as the package being wound increases in diameter the arm 11 is swung upwardly and during this movement the bar 20 will be slid forwardly across the blade or pawl 26, whereby the ratchet-teeth 25 on the bar are successively engaged thereby. To arrest the winding operation the bar 20 is drawn forward by rocking the pawl 26 under the swinging action of the lever 27.

Referring particularly to Fig. 4 of the drawings, the lever 27 is pivoted on studs 30 carried in hubs or bearings 31 formed on the frame-members 4. Pivoted to the free end of the lever 27 at 32 is a yoke-shaped dog 33, the lower-end of which is adapted to make contact with a cam-shaped bunter 35 held fast on a shaft 36 and continuously rotated in the direction indicated by the arrow. The shaft 36 is journaled in bearings 37 in the frame-members 4 and may be connected by gearing or otherwise to be driven with or from the traverse-roll shaft 5 at a much slower rate of speed.

The lever 27 is substantially U-shaped, having opposite forwardly-extending arms 29 connected by a plate 38 which normally stands in substantially vertical position, as illustrated in Fig. 2, and serves as a thread-guard with its upper end in front of the traverse-roll 7. Referring to Fig. 1 of the drawings, ears 39 project forwardly from the plate 38 to provide bearings for a wire thread-bail 40 of inverted U-shape. The ends of the legs of the wire bail 40 are bent around at 41 to form bearings encircling pins 42 driven through the sides of the lugs 39. Extending from one of the legs of the bail is a tail-piece 43 which is adapted to strike against a shoulder 44, see Fig. 4, between the lugs to act as a stop to limit the forward tilting action of the bail. The thread-bail 40 has a cross-bar 45 over which the yarn  $\gamma$  leads to the grooves 8 in the traverse-roll 7 as illustrated in Fig. 2, and when the strand breaks or its supply is exhausted the bar tilts forward under the action of a lever 48.

The lever 48 is pivoted on the pin 42 adjacent the right-hand leg of the thread-bail 40, see Fig. 1, being enclosed and protected

by a box-like casing 49 projecting from the front of the plate or thread-guard 38. The right-hand leg of the thread-bail 40 has an extension 50 bent around in an elbow to adapt it to strike against the rearward edge of the lever 48, whereby when the lower end of the lever is swung to the right, as viewed in Fig. 2, it will rock the upper end of the thread-bail outwardly, this motion being permitted when the upper cross-bar 45 of the bail is released by the breakage or running out of the yarn  $\gamma$ . The lower end of the lever 48 carries a pin 51, to which is connected a spring 55 having its opposite end anchored to the dog 33 at 56. The spring 55 is normally without tension, forming a link or connection between the lever 48 and the dog 33 whereby to maintain the latter normally lifted away from contact with the bunter-cam 35. When, however, the thread-bail 40 is released from the tension of the yarn  $\gamma$  it allows the lever 48 to rock, whereby the dog 33 drops from its own weight into position to be engaged by the bunter-cam 35. On the other hand, the spring 55 provides a connection between the dog 33 and the lever 48 which is yieldable so that the lever 48 may be moved independently of the dog while the latter is being operated upon by the bunter in the manner as later more fully explained. The cam 35 acts on the dog 33 to rock the lever 27 and its pawl 26 whereby to slide the bar 20 to raise the package off from the drive-roll 7 to arrest the winding operation. As the forward end of the lever 27 is rocked downwardly the lower end of the lever 48 is brought against an inclined abutment 57 on the side of the bracket 4. This latter engagement swings the lever 48 to stretch the spring 55 whereby the tension of the latter will cause the dog 33 to be swung forwardly as soon as it is released from the bunter-cam 35.

A flat leaf-spring 60, fastened to the end of the frame-member 4 at 61, extends downwardly across the hub 31 with its lower curled end bearing against the thread-guard or plate 38 to maintain the yoke-shaped or two-armed lever 27 normally in substantially horizontal position as shown in Fig. 2 of the drawings. When the forward end of the lever 27 is rocked downwardly under the lifting action of the dog 33 on its rearward end, see Fig. 4, it is locked in this position by means of a latching engagement with a starting-lever 65. The starting-lever 65 is secured fast to a rod or rock-shaft 66 by means of a set-screw 67. The shaft 66 is rockable in bearing-hubs 68 on the opposite frame-members 4. The starting-lever 65 reaches forwardly at the left-hand side of the winding-mechanism with its bottom edge riding across a recessed edge 69 on the plate or thread-guard 38, see Fig. 1. The forward end of the starting-lever 65 is formed with a

handle 70 projecting outwardly beyond the thread-guard 38, and inwardly therefrom is a notched detent-shoulder 71 adapted to lock against the edge 69 of the plate 38 in the manner shown in Fig. 4 of the drawings. The starting-lever 65 is connected through the rock-shaft 66 to operate a bell-crank lever 75 whose hub is held fast on the shaft 66 by means of a set-screw 76. The upper arm 77 of the lever 75 is formed at its end with a lug 78 adapted to be thrown upwardly against the rack-bar 20 to release the teeth of the latter from the pawl 26 whereby to allow the bar to slide rearwardly to lower the package into contact with the drive-roll 7. The longer, downwardly-extending arm 79 of the lever 75 is formed with a lug or abutment 80 adapted to strike against the edge of a pivoted weight 82, one of the elements of the sizing-stop of the machine, to return this part to first position in the manner as later explained.

The sizing-stop, that is the means for arresting the winding operation when the package reaches the desired size, is constructed as next described. The sector-shaped weight 82 is rockable on the pin 32 at the end of the lever 27, see Fig. 5, being disposed at one side of the yoke of the dog 33. Projecting from the side of the weight 82 is a pin 83 normally bearing against the side of the dog 33 to adapt it to rock the latter down into position to be engaged by the bunter-cam 35 when the weight drops. The weight 82 is normally maintained suspended in the position illustrated in Fig. 4 through the means of a laterally movable latch 85 which extends rearwardly from its pivot. Referring particularly to Fig. 5, the latch 85 is formed with ears 86 which straddle a lug 87 projecting from the hub of the weight 82 with a pin 88 inserted therethrough to pivot the latch to the weight. A plunger 89 held in a lateral bore in the side of the weight 82 is urged outwardly by a spring 90 to bear against the rear end or tail-piece of the latch 85 whereby to hold it in alinement with the weight. A finger 91 is bent over from the side of the latch 85 to bear against the lug 87 to limit the swinging movement of the latch under the action of the spring-plunger 89. The opposite free end of the latch 85 is bent at right angles to form a detent-catch 92 or latch proper which is normally engaged beneath the underside of a ledge 94 projecting from the side of an arm 95 fastened to the rack-bar 20. The upper part of the arm 95 fits against the side of the bar 20 and is provided with a lip 96 overhanging the top of the bar. The arm 95 is secured to the bar 20 by means of a bolt 97 passing through a slot 98 in the arm. By loosening the bolt 97 the arm 95 may be slid along the bar 20 to adjust its ledge 94 with respect to the detent 92 on the latch 85 so as to time

the sizing-stop to arrest the winding operation when the package reaches any desired diameter. It will be understood that as the bar 20 slides outwardly across the dog 26 with the rising of the arm 11, as caused by the growth in the winding, the ledge 94 on the arm 95 will eventually ride off from the end of the latch 85. This action releases the weight 82 to allow it to drop whereby its pin 83 acts against the dog 33 to swing the latter into position to be engaged by the bunter-cam 35. It is to be particularly noted that the outer end of the detent 92 of the latch 85 is beveled off at 93 whereby to adapt it to slide down across the edge of the ledge 94 when the weight 82 is returned to first position, the latch 85 swinging on its pivot 88 to permit this latching operation. The operation of these parts will be more fully explained in connection with the method of operation of the complete stopping-mechanism of the machine.

The supply-holder for the bobbins, spools or packages from which the yarn is delivered to the winding is mounted on a vertical frame or bracket 100 which also supports the tension-device and the movable yarn-guiding means for shifting the point of delivery of the strand with respect to the package being wound. A bracket 100 is provided for each of the winding units and as a convenient means of support therefor a horizontal rod 101 is mounted in arms 102 clamped to the legs 3 of the gang machine. The bracket 100 comprises a member 103 having a hub held fast on the rod 101 by set-screws 104 or other suitable means and provided with arms 105 bolted to a flange 106 projecting from the side of the vertical bracket 100. An upper extension of the flange 106 is formed with a slot 107 which serves as a mounting for the supply-holder. The supply-holder may be of any suitable type and, as herein shown, consists of a bracket 110 fastened to the flange 106 by means of bolts 111 passing through the slot 107. Through this arrangement the bracket 110 may be adjusted vertically to locate the bobbin or other supply package carried thereon in proper relation to the tension-device, indicated generally at 120, which is carried at the upper end of the frame or bracket 100.

The supply-holder bracket 110 has a depending arm 112 terminating in a hub 113, on which is rotatably mounted a spoked member 114. The member 114 carries a plurality of radial spindles 115 on which the bobbins B are held, a bobbin being placed on one spindle while another is delivering and then turned up into delivery position when the first bobbin runs out, whereby to expedite the doffing of the empty supplies and their replacement with fresh bobbins. This part of the machine is constructed and arranged in accordance with the invention disclosed in

United States application for Letters Patent Serial No. 424,709, filed January 30, 1930, and therefore needs no further explanation herein. It is to be noted, however, that with the present arrangement the supply-bobbin is located closely adjacent the winding-mechanism, being elevated on the machine instead of supported below as is the usual arrangement. In this location the supply-holder is within convenient reach for doffing and renewing the bobbin, or for piecing up the end of the yarn therefrom, so that the operator is not required to stretch or stoop in tending the machine.

Any suitable type of tension-device may be employed on the winding machine and the present drawings illustrate a disk-tension of conventional arrangement. Fastened to a lateral ear or flange 121 on the side of the frame 100 is a bracket 122 provided with bearings 123 for a horizontal pin or spindle 124, on which are mounted a pair of tension-disks 125. The tension-disks 125 are of the usual concavo-convex form arranged with their abutting faces in line with the axis of the bobbin B to adapt the yarn *y* to draw therebetween. One of the disks 125 is held from lateral displacement and the other is acted upon by a helical spring 126 on the spindle 124 to press it toward the relatively fixed disk. Suitable weights 127, carried on a lever 128 which is pivoted to the tension bracket at 129, act to slide the spindle 124 to hold the spring against the side of the tension-disk to maintain the disks in yielding contact with the yarn drawing through the device.

The tension-bracket 122 is formed with circular flanges 130, see Fig. 2, projecting outwardly in curved ears 131 which form a guideway for directing the yarn into position between the tension-disks. Mounted on the tension-bracket 122 below the tension-device is a slub-catcher 132 for cleaning the yarn, and below this is a guide 133 through which the yarn draws to maintain it in line with the opening in the slub-catcher. A wire guide 134 beneath the guide 133 is provided to facilitate the operation of threading the yarn into the guide 133 and through the slub-catcher 132. Extending between the flanges 130 of the tension-bracket 122 is a stud or pin 135 on which is mounted a roller 136, preferably of porcelain or other wear-resisting material. The yarn *y* draws through the tension-device and around the porcelain roller 136 and is thence directed downwardly while the machine is operating to locate its delivery point at a suitable distance away from the winding-means.

Referring to Figs. 1, 2 and 3, the yarn *y* draws under a rod or pin 140 which is arranged to slide up and down on the upright bracket or frame 100 to locate the delivery point of the yarn adjacent the winding-mech-

anism when the winding operation is arrested and remote from the package during the winding. For this purpose the yarn-guiding means or pin 140 is mounted on a weight or slide 141 adapted to be raised and lowered on the frame 100. The slide 141 consists of a plate or block having a hole in its upper end in which the pin 140 is secured by means of a set-screw 142. Projecting rearwardly from the slide 141 are studs 143 fitted to slide in a vertical slot 144 which extends from top to bottom of the frame 100. The studs 143 have washers 146 overlapping the sides of the slot 144 on the rearward side of the frame 100, with cotter-pins 145 for holding the slide against the front face of the frame. Through this arrangement the frame 100 forms a track-way with the slide 141 arranged to be moved up and down thereon. The downward movement of the slide 141 is limited by contact of its lower edge with a washer 147 held in place by a bolt 148 extending through the slot 144, the stop for the slide may be adjusted vertically in the slot to regulate the lowermost position of the slide on its track-way.

The slide 141 is raised on the frame 100 to carry the guiding-device or pin 140 into elevated position adjacent the tension-device and the winding mechanism through the means of a cord 150 which is wound upon a drum 155 carried on the shaft 36. The cord 150 is attached to the cotter-pin 145 which passes through the upper stud 143 and leads around a sheave or pulley 152 pivoted on a pin 153 at the top of the frame 100. The cord 150 passes down around a similar sheave 154 journaled on a pin 156 and thence draws to the drum 155 with its end passed through a hole in the flange thereof and knotted to secure it thereto, see Fig. 6. The wind-up drum 155 is operated automatically from the starting- and stopping-mechanism of the machine to lower the slide 141 when the winding-mechanism starts to operate, and to return the slide to its upper position when the winding operation is arrested. The automatic means for controlling the operation of the wind-up drum 155 is organized as next described.

Referring particularly to Fig. 6 of the drawings, the drum 155 is normally free rotatively with respect to the continuously rotated shaft 36 and is connected thereto by means of a clutch mechanism at one end. One end of the drum 155 has its hub bearing against the side of the bunter-cam 35 which is held fast on the shaft 36, and its opposite end has an overhanging rim 157 provided on its side with ratchet teeth 158. The ratchet teeth 158 are adapted to engage similar teeth 159 on a ratchet-disk 160 which is freely rotatable on a sleeve 161 secured fast to the shaft 36 by means of a set-screw 162. The sleeve 161 carries a hub or collar 163 held

fast therewith by means of the set-screw 162 which passes through both elements. In the hub 163 are pockets 164 holding helical springs 165 which bear against a disk or washer 166 rotatable on the sleeve 161. Between the washer 166 and the ratchet-disk 160 is a friction disk or washer 167, preferably constructed of fiber, leather or some similar material. The springs 165 act to urge the washer 166 toward the disk 160 to provide frictional contact of the friction disk 167 thereagainst, whereby the ratchet-disk 160 is normally driven by and with the sleeve 161 and hub 163; it being noted that the thrust against the ratchet disk 160 is taken by a shoulder 168 at the end of the sleeve 161. Bearing against this end of the sleeve 161 is a helical spring 170 coiled around the shaft 36 with its opposite end bearing against the hub of the drum 155. Normally, the spring 170 maintains the drum 155 slid to the right as viewed in Fig. 6, with its hub bearing against the hub of the bunter-cam 35. The drum 155 is slid to the left against the tension of the spring 170 to engage its ratchet teeth 158 with the teeth 159 on the disk 160 and through this connection the drum may be frictionally driven from the hub 163.

The shifting of the drum 155 to clutch it with the friction drive is effected by means of a clutch-lever 172 operated from the stopping-mechanism of the machine. Referring to Fig. 4, the clutch-lever 172 is of elbow-shape, having a flanged end 173 secured to the back of the plate or thread-guard 38 by means of screws 174. The free end of the clutch-lever 172 has an offset toe 175 which is beveled on its edge to adapt it to ride against a radial shoulder 176 on the flange 157 of the drum 155 whereby to shift the drum to engage its teeth 158 with the teeth 159 on the ratchet-disk 160. This engagement is effected when the lever 27 is rocked into the position illustrated in Fig. 4 to arrest the winding operation, the drum 155 being thereby clutched to the disk 160 which is frictionally driven from the hub 163 to turn the drum to wind up the cord 150. As the cord 150 is wound onto the drum 155 the slide 141 is raised to the top of the frame or trackway 100 where its movement is arrested as the stud 143 comes against the end of the slot 144. At this juncture the ratchet on the drum 155 will still remain engaged with the ratchet-disk 160, but the friction clutch between the disk and the hub 163 will allow slippage so that the drum will come to rest. The ratchet-clutch is disengaged to permit the drum 155 to turn to unwind the cord 150 when the clutch lever 172 is thrown back into first position at the start of the winding operation, the operation of these parts being more fully explained hereinafter.

As a modified form of the present inven-

tion, Figs. 7 and 8 of the drawings illustrate a slide 177 having the tension-device mounted thereon to adapt it to be shifted from an elevated position to a point therebelow in delivering the yarn to the winding-mechanism. This latter form of construction has certain advantages as removing the tension-device from proximity with the winding means during the winding operation so that it is not so liable to catch the lint and fly thrown off from the yarn as it is being wound. As illustrated in Figs. 7 and 8 the slide 177 carries a stud 178, on which are mounted opposite plates or flanges 179 and 180 supported from a hub 181. The tension-disks 183 are held on a reduced portion of the stud 178 between the plates 179 and 180 and are pressed together by means of a helical spring 184 held by a nut 185 screwed onto the end of the stud.

A bracket 186 near the top of the frame 100 carries the slub-catcher 182, guides 183 and 134 of the same arrangement as previously described. A pair of spaced horn-shaped threading-guides 188 are also mounted on the bracket 186 for directing the yarn across a pin or roller 189, whence it leads over a roller 190 and down through the shiftable tension-device.

The method of operation of the machine embodying the present invention is as next explained. Referring to Figs. 1 and 2 of the drawings, to prepare the machine for winding, a supply bobbin B is placed on one of the spindles 115 of the supply-holder and turned up into vertical position. The yarn *y* is drawn off from the bobbin, led through the thread-guides 134 and 133, thence passed through the slub-catcher 132 and drawn between the guards or ears 131 which direct it between the tension-disks 125.

When the winding operation is arrested the slide 141 is suspended at the upper end of the guideway or frame 100 as illustrated in Fig. 3, and in threading up the machine the yarn *y* is drawn rearwardly from the tension-device under the guiding-pin or stud 140 to attach its end to the yarn-receiver or cone-tube C which has previously been mounted on the spindle 10 and secured in place by turning up the latch 16, see Fig. 1.

To start the winding operation the handle 70 is lifted to cause the upper arm 77 of the bell-crank lever 75 to be raised to raise the rack-bar 20 to free its teeth 25 from the dog or pawl 26. As the rack-bar 20 is released from this latter engagement the weight of the arm 11 and its associated parts will rock the spindle 10 downwardly to place the surface of the yarn-receiver C in contact with the continuously rotating drive- or traverse-roll 7. As this contact is accomplished the roll 7 starts rotation of the yarn-receiver C whereby to wind the yarn thereon. As the yarn commences to wind onto the receiver C it is

picked up by the groove 8 in the roll 7 and thereby caused to be traversed back and forth longitudinally of the receiver to deposit it in helical coils thereon as indicated at  $y'$  in Fig. 1.

Prior to the starting of the machine the dog 33 has been carried out of range of the bunter-cam 35 under the action of the spring 55 in the manner as hereinafter explained. Upon the lifting of the starting-lever 65 its detent-shoulder 71 is released from the edge of the plate 38, see Fig. 4, so that the lever 27 is allowed to return into horizontal position as shown in Fig. 2 under the action of the leaf-spring 60. As the lever 27 returns to first position the pawl 26 will engage the appropriate tooth 25 on the rack-bar 20 whereby to set the stopping-mechanism for operation in the manner as later explained. Meanwhile, the return motion of the lever 27 swings the clutch-lever 172 away from the flange 176 on the wind-up drum 155 whereby the spring 170 acts to slide the latter to disengage its teeth 158 from the teeth 159 on the ratchet-disk or clutch-member 160.

This release of the drum 155 takes place immediately the starting-lever 65 is lifted to start the winding operation and allows the drum 155 to pay out the cord 150 to lower the slide 141 on its trackway on the frame or bracket 100. It has been stated that the yarn  $y$  is carried to the yarn-receiver C, or to the package being wound, beneath the guide-pin 140 when the winding machine is threaded up and, consequently, as the slide 141 descends on its trackway it will form a loop in the yarn as indicated in Fig. 2, the strand passing from the tension-device 120 over the porcelain roll 136 and down under the pin 140, whence it draws upwardly across the bar 45 of the thread-bail 40. From the thread-bail 40 the strand draws across the periphery of the traverse-roll 7 to feed through the helical groove 8 thereof whereby it is traversed longitudinally of the package being wound. It will be noted that the shifting or displacement of the delivery point of the yarn through the operation of the slide 141, controlled from the drum 155, is entirely automatic so as to require no attention on the part of the operator. With the parts of the machine in the position as illustrated in Fig. 2 the yarn feeds through the tension-device 120 and thence is drawn downwardly around the guiding-pin 140 to stretch it out in a loop which provides a considerable length of yarn between this last delivery point and the package being wound.

When the yarn breaks or its supply is exhausted the winding operation is arrested automatically through the operation of the stopping-mechanism as next explained. The breakage of the strand or the running out of the yarn releases the thread-bail 40 to allow the lever 48 to swing to the right as

viewed in Fig. 2. The release of the lever 48 permits the dog 33, connected thereto by the spring 55, to drop down into vertical position whereby its end will be engaged with the eccentric periphery of the bunter-cam 35 as the latter rotates with the shaft 36. The effect of this engagement is to cause the dog 33 to be forced upwardly in the manner as indicated in Fig. 3 to tilt the rearward end of the lever 27 upwardly and rock its forward end downwardly. This rocking action of the lever 27 causes the pawl 26 carried thereby to draw the rack-bar 20 forwardly whereby to swing the arm 11 upwardly to raise the package off from the drive-roll 7 as shown in Fig. 3. As the forward end of the lever 27 is rocked downwardly the lower end of the lever 48 rides against the inclined face 57, which, as previously described, is formed as a part of the fixed frame-member 4, and thereby the lever 48 is swung outwardly to stretch the spring 55 connected to the dog 33. As the spring 55 is placed under tension it acts to draw the dog 33 to the right, as viewed in Fig. 4, immediately the lower end of the latter is released from the bunter-cam 35 so as to prevent further movement of the dog from the cam. Previous to the release of the dog 33 the starting-lever 65, which rides across the edge 69 of the plate 38, drops under the action of gravity to engage its detent-shoulder 71 with the plate in the manner as illustrated in Fig. 4 to hold the lever 27 from returning to first position. The parts of the stopping-mechanism are thus locked to retain the rack-bar 20 in forward position to maintain the package lifted off from the drive-roll 7 until it is desired to again start the winding operation.

As the lever 27 is rocked into the position illustrated in Figs. 3 and 4 to effect the stopping of the machine the clutch-lever 172 carried thereby is moved to shift the wind-up drum 155 to engage its clutch to cause it to be rotated from the shaft 36. Referring to Fig. 6, the beveled toe 175 of the clutch-lever 172 is carried against the flange 176 to slide the drum 155 to the left against the tension of the spring 170. Through this action the teeth 158 on the drum are brought into engagement with the teeth 159 on the ratchet-disk 160. It has been explained that the ratchet- or clutch-disk 160 is driven frictionally through the medium of the washers 166 and 167 connecting it with the continuously rotating hub 163 carried by the sleeve 161. Consequently, as the drum 155 is connected to the clutch-disk 160 it will be rotated therefrom in the direction indicated by the arrow in Fig. 6 whereby to wind the cord 150 on its barrel.

As the cord 150 is wound onto the drum 155 it draws the slide 141 to the top of the frame 100 where its upper stud 143 brings up against the end of the slot 144 to act as a stop. As the slide 141 is raised on the frame

100 it carries the pin 140 into the position above the tension-device 120 so that the yarn *y* may be readily placed thereunder in piecing up the end or connecting it with the package being wound. For this reason the operator is not required to stoop or reach downwardly in threading up the machine.

As the slide 141 comes to a stop at the top of the frame or bracket 100 the rotation of the drum 155 is arrested as provided for by the slippage between the friction washer 167 and the parts of the clutch engaging therewith. Very little power is required to raise the slide 141 on its trackway and hence the slipping of the clutch as the rotation of the drum 155 is arrested will not cause material wear on parts.

The arrestment of the winding operation when the package reaches the desired size is effected by the actuation of the stopping-mechanism from the sizing-stop previously described. Referring to Fig. 4, the arm 95 is adjusted along the rack-bar 20 so that the ledge 94 on its lower end will ride off from the detent 92 of the latch 85 when the package reaches the predetermined size. As the latch 85 is released from the ledge 94 it allows the weight 82 to drop, whereby its pin 83 swings the dog 33 down into position to be engaged and acted upon by the hunter-cam 35. The engagement of the dog 33 with the hunter-cam 35 then effects the stopping of the machine in precisely the same manner as above described as the various instrumentalities perform their several functions; the drum 155 being clutched to the shaft 36 to cause it to wind up the cord 150 to raise the slide 141 to the top of the frame 100.

In returning the parts of the sizing-stop to first position after the action of the stopping-mechanism the lifting of the starting-lever 65 rocks the bell-crank lever 75 to cause the lug 80 on its arm 79 to swing the weight 82 upwardly to again engage the latch 85 with the ledge 94 on the arm 95 in the manner as previously explained.

In the modified form of the invention as illustrated in Figs. 7 and 8 the operation of the parts is substantially the same as above described. That is to say, under the action of the stopping-mechanism the drum 155 is clutched to the shaft 36 to cause it to wind up the cord 150 to raise the slide 177 to the top of the frame 100. On the other hand, upon starting the machine the clutch is released to free the drum 155 to cause it to pay out the cord 150 to lower the slide 177 to the position illustrated in Figs. 7 and 8. The raising of the slide shifts the tension-device 180 upwardly into accessible location when the winding operation is arrested, whereby to facilitate the threading of the yarn into place therein; and the lowering of the tension-device carries the delivery point of the yarn

away from the package being wound as the winding operation is started.

It will be observed from the foregoing that the present invention provides an improved construction of stopping-mechanism for winding machines having means associated therewith and operated automatically therefrom to adjust the point of delivery of the yarn with respect to the package being wound. Through this arrangement the supply bobbin from which the yarn delivers and the slub-catcher, tension-device and other parts through which the yarn must be threaded are placed within convenient reach to relieve the operator from the necessity for stooping and reaching in tending the machine. For this reason the machine can be tended with less effort and fatigue on the part of the operator and with a saving of time which results in greatly increased production.

As the winding operation is started the delivery point of the yarn, that is, the point from which the yarn feeds to the winding is shifted away from the package so as to provide a considerable length of yarn between the supply and the package. It has been pointed out that it is desirable to have the delivery point located remote from the point of winding, one advantage being that when a break occurs near the supply, as is usually the case, the broken end will not run into the winding before the rotation of the package is arrested. For this reason the broken end may be more readily recovered. As another advantage the provision of a relatively long length of free yarn between the delivery point and the traverse-mechanism tends to prevent the strand from jumping out or being dislodged from the groove 8 in the traverse-roll 7. The extended length of yarn also provides for easier action during the traverse of the yarn, since it is not required to make an abrupt bend in the strand at the delivery point when the direction of its traverse is reversed.

While the present device is herein shown and described as applied to a certain type of winding machine and embodied in a preferred form of construction, it is to be understood that various modifications may be made in the design and arrangement of its mechanism without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, a supply from which the yarn delivers to the package, means engaging the yarn between the supply and the package, and means to move the yarn-engaging means to a position remote from the package during the winding and return it to position adjacent the package when the winding operation is arrested.

2. In a winding machine, the combination 13

of a yarn-receiver, means for rotating said receiver, means for traversing yarn on the receiver to wind a package, means for guiding the yarn to the traversing-means, means for maintaining said guiding-means at a point remote from the traversing-means during the winding, and mechanically operated means for shifting the guiding means to position it adjacent the traversing-means when the winding operation is arrested.

3. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, means for holding a supply of yarn in position adjacent the package being wound, guiding-means for the yarn intermediate the supply and the traversing-means, means for maintaining said guiding-means at a point remote from the package during the winding, and means for moving the guiding-means into close relationship with the package when the winding is arrested.

4. In a winding machine, the combination of a yarn-receiver, means for rotating the same, means for traversing yarn to wind a package on the receiver, means for holding a supply in position to deliver its yarn to the winding, guiding-means engaging the yarn at a point between the supply and the package, and means for moving said guiding-means away from the package when the winding operation is commenced and returning it to a position adjacent the package when the winding operation is arrested.

5. In a winding machine, the combination of a yarn-receiver, means for rotating said receiver, means for traversing yarn on the receiver to wind a package, means for guiding the yarn from the supply to the package, means for maintaining said guiding-means remote from the package during the winding, stopping-means for arresting the rotation of the yarn-receiver, and means operated from the stopping-means to move the guiding-means into adjacent relationship with the package when the winding operation is arrested.

6. In a winding machine, the combination of a yarn-receiver, means for rotating said receiver, means for traversing yarn on the receiver to wind a package, means for holding a supply of yarn in position adjacent the package being wound, guiding-means for the yarn arranged to move toward and away from the package, and automatically-operated means for shifting said guiding-means away from the package as the winding operation is started and returning it into position adjacent the package when the winding operation is arrested.

7. In a winding machine, the combination of means for rotatably supporting a package, means for rotating the package, means for traversing yarn on the package, means for holding a supply of yarn adjacent the wind-

ing-means, guiding-means for the yarn arranged between the supply and the winding-means, and means operated from a going element of the winding-means to shift the guiding-means away from the package when the winding operation is started and return it to position adjacent the package when the winding operation is arrested.

8. In a winding machine, the combination of a yarn-receiver, means for rotating the receiver, means for traversing yarn on the receiver to wind a package, stopping-means for arresting the winding operation, means for holding a supply of yarn to deliver it to the package being wound, guiding-means for directing the yarn from the supply to the package, means for displacing said guiding-means with respect to the package, and means actuated by the stopping-means to operate the last-named means to shift the guiding-means away from the package when the winding operation is started and return it to position adjacent the package when the winding operation is arrested.

9. In a winding machine, the combination of a yarn-receiver, means for rotating the receiver, means for traversing yarn on the receiver to wind a package, stopping-means for arresting the winding operation, means for holding a supply of yarn, guiding-means for directing the yarn from the supply to the package arranged to move toward and away therefrom, means operated from the machine to move the guiding-means, and a clutch operated from the stopping-means to energize the last-named means whereby to move the guiding-means away from the package when the winding operation is started and return it to position adjacent the package when the winding operation is arrested.

10. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, means for holding a supply to deliver its yarn to the package, guiding-means for the yarn movable toward and away from the package, means for maintaining said guiding-means remote from the package during the winding operation, stopping-means for arresting the winding operation, a continuously-rotating shaft, means for shifting the guiding-means to position it adjacent the package, and a clutch operated from the stopping-means to connect the shifting-means with the continuously-rotating shaft.

11. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, means for holding a supply of yarn, a substantially vertical trackway, a slide slidable on the trackway, guiding-means on the slide for engaging the yarn to direct it from the supply to the package, and means for lowering the slide on the guideway when the winding operation

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is started and raising it on the guideway when the winding operation is arrested.

12. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, means for holding a supply of yarn, a substantially vertical trackway, a slide slidable on said trackway, guiding-means on the slide for directing the yarn from the supply to the package, a drum, a cord connecting the slide with the drum, and means to rotate the drum to wind the cord thereon to raise the slide to the top of the trackway when the winding operation is arrested.

13. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, means for holding a supply of yarn, an upright trackway, a slide slidable on the trackway, guiding-means on the slide for engaging the yarn to direct it from the supply to the package, a cord connected to the slide, a drum for winding up the cord, means for rotating the drum, and automatically-operated means for releasing the drum from its rotating-means when the winding operation is started and reconnecting it therewith when the winding operation is arrested.

14. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, means for holding a supply of yarn, an upright trackway, a slide slidable on the trackway, guiding-means on the slide for engaging the yarn from the supply to direct it to the package, a drum, a cord connecting the slide with the drum, means for rotating the drum, a clutch for connecting the drum with its rotating-means, and means for operating the clutch to release the drum when the winding operation is started and connect it with the rotating-means when the winding operation is arrested.

15. In a winding machine, the combination of means for rotating the package, means for traversing yarn on the package, means for holding a supply of yarn, a tension-device arranged above the supply, a slide slidable toward and away from the tension-device, guiding-means on the slide for directing the yarn from the tension-device to the package, and means to slide the slide downwardly below the tension-device when the winding operation is started and to return it into proximity with the tension-device when the winding operation is arrested.

16. In a winding machine, the combination of an upright trackway, a tension-device supported at the upper end of the trackway, means for holding a supply of yarn below the tension-device, a slide slidable on the trackway, guiding-means on the slide for directing the yarn from the tension-device to the package being wound, means for starting and stopping the operation of the winding

machine, and means for lowering the slide on the trackway when the winding operation is started and for raising it into position adjacent the tension-device when the winding operation is arrested.

17. In a winding machine, the combination with the winding-mechanism, of means for holding a supply of yarn, means arranged above the supply through which the yarn feeds, a substantially vertical trackway, a slide slidable on said trackway, guiding-means on the slide for directing the yarn from the supply to the package being wound, stopping-means for the winding-mechanism, a continuously rotating shaft, a drum free on said shaft and provided with clutch teeth, a cord connecting the drum with the slide, a clutch having teeth engageable with the teeth on the drum, friction means for driving said clutch from the shaft, and means operated from the stopping-means to engage the teeth on the drum with the teeth on the clutch to rotate the drum to wind up the cord to raise the slide on the trackway.

18. In a winding machine, the combination with the winding-mechanism, of a trackway, a slide slidable on the trackway, guiding-means on the slide for directing the yarn from the supply to the package being wound, a shaft driven continuously from the winding-mechanism, a drum free to rotate on said shaft and provided with clutch-teeth, a clutch-disk having teeth engageable with the teeth on the drum, means rotatable with the shaft and frictionally engaging the clutch-disk, a spring for maintaining the clutch-disk and drum out of engagement, stopping-means for controlling the operation of the winding-mechanism, and a clutch-lever operated from the stopping-means to effect engagement of the clutch-disk with the drum to rotate the latter to wind up the cord to raise the slide on the trackway when the winding operation of the machine is arrested.

19. In a winding machine, the combination of a drive-roll, a spindle for supporting the package in contact with the drive-roll, a slide for raising the spindle to lift the package off from the drive-roll to arrest the winding operation, a rockable lever for moving the slide, a dog on said lever, a rotating bunter-cam adapted to engage the dog to rock the lever, a second lever pivoted to the first lever, a spring connecting the second lever with the dog, and means adapted to move the second lever as the first lever is rocked whereby to stretch the spring to cause it to remove the dog from contact with the cam after it is acted to rock the first lever.

20. In a winding machine, the combination of a drive-roll, a pivoted arm, a spindle carried by the arm to adapt it to rotatably support the package in contact with the drive-roll, a rack-bar connected to rock the arm to raise the package off from the drive-roll to

arrest the winding operation, said bar formed with ratchet teeth, a rockable lever, a pawl on said lever engaging successive teeth on the rack-bar as the winding progresses, a dog  
5 pivoted to the lever, a bunter-cam for engaging the dog to rock the lever and thereby the pawl to move the rack-bar, a second lever pivoted to the first lever, a spring connecting the second lever with the dog, a thread-bail  
10 normally maintained in position by the tension of the yarn being wound to maintain the second lever in position to hold the dog out of range of the bunter-cam and upon its release allowing the dog to drop into position  
15 to be engaged by the cam, and means engaging the second lever as the first lever is rocked from the dog to stretch the spring under tension to cause it to draw the dog out of range of the bunter-cam.

20 21. In a winding machine, the combination of a drive-roll, a spindle for supporting the package in contact with the drive-roll, a rockable arm on which the spindle is mounted to adapt it to recede from the drive-roll with  
25 the growth in the winding, a bar connected to raise the arm to lift the package off from the drive-roll to arrest the winding operation, a rockable lever, means on said lever engaging the bar to move it to raise the spindle, a dog  
30 pivoted to said lever, a bunter-cam adapted to engage the dog to rock the lever to cause it to move the bar, a weight pivoted on the lever, a latch on the weight, means engaging the latch to hold the weight suspended and  
35 adapted to release the latch when the package reaches a predetermined diameter, and means operated from the weight upon release of its latch to swing the dog into position to be engaged by the bunter-cam.

40 22. In a winding machine, the combination of drive-roll, means for supporting the package in driving contact with said roll, a slidable rack-bar connected to remove the package from contact with the drive-roll to ar-  
45 rest the winding, a rockable lever, a pawl on said lever adapted to engage the teeth on the rack-bar to slide the latter, a dog pivoted to said lever, a bunter-cam for engaging the dog to rock the lever to slide the rack-bar,  
50 means controlled by the yarn being wound to maintain the dog out of range of the bunter-cam and adapted to be released upon breakage or exhaustion of the yarn to allow the dog to be carried into position to be acted upon  
55 by the cam, a pivoted weight, a latch on said weight having a detent, means carried by the rack-bar and engaging the detent on the latch to hold the weight in suspended position, and means operated by the weight upon release  
60 of its latch to cause it to move the dog into position to be operated upon by the bunter-cam.

In testimony whereof I hereunto affix my signature.

65 ERNEST R. SWANSON.