

Sept. 7, 1943.

R. R. ALMY

2,329,027

WINDING MACHINE

Filed Jan. 15, 1940

3 Sheets-Sheet 1

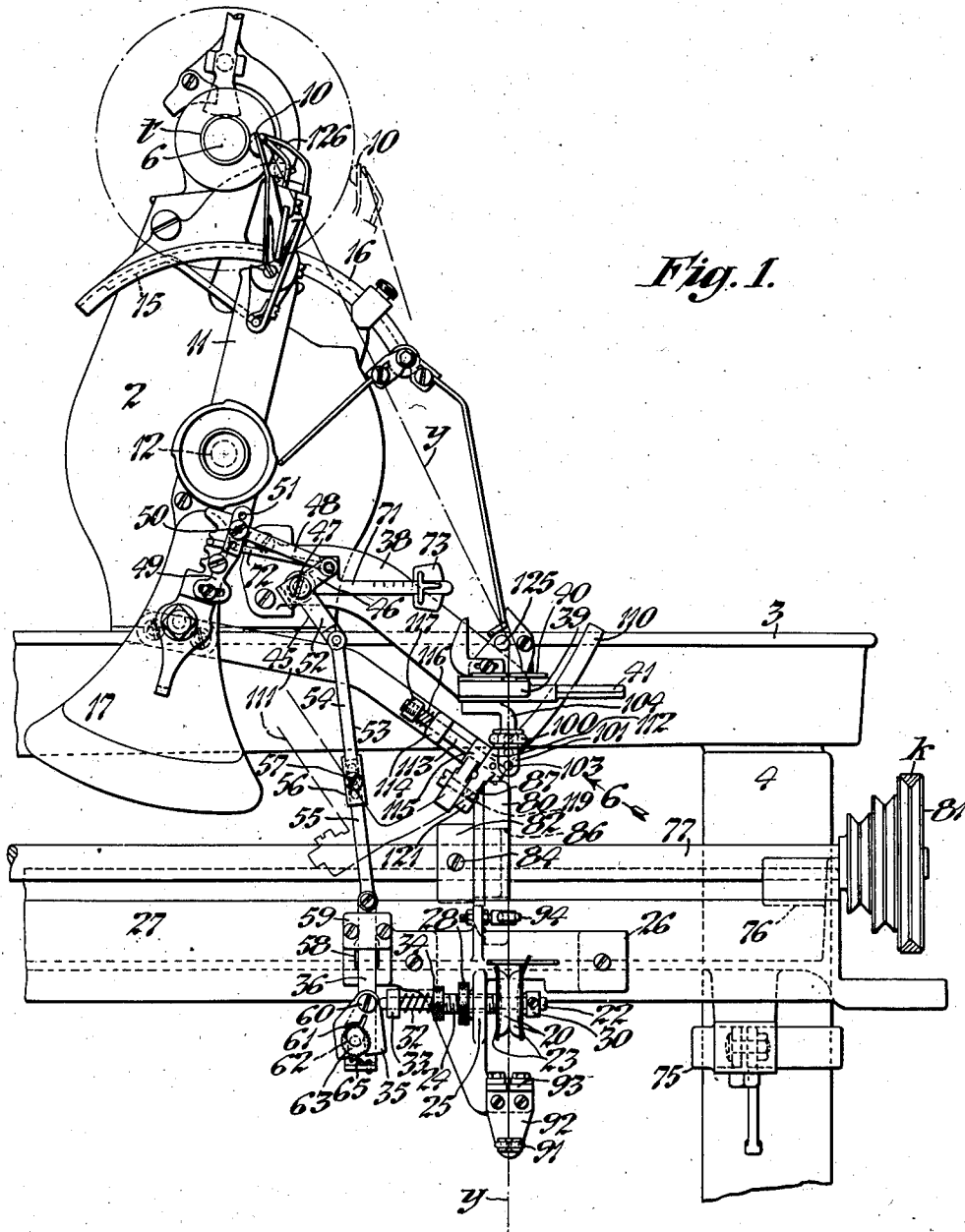


Fig. 1.

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3 Sheets-Sheet 2

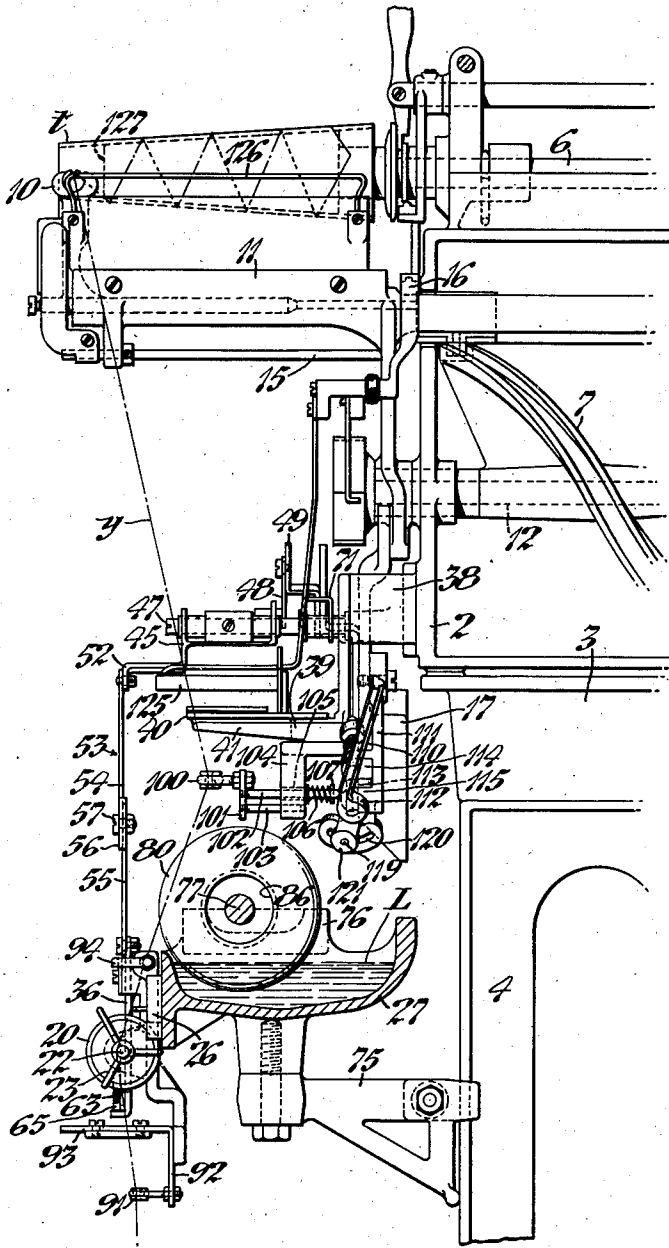


Fig. 2.

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WINDING MACHINE

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3 Sheets-Sheet 3

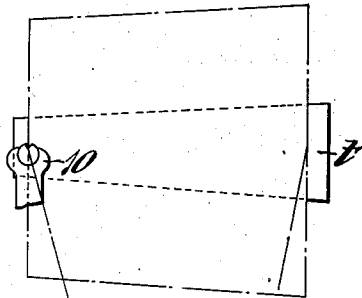
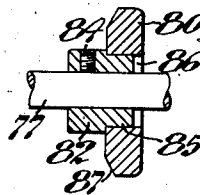


Fig. 4.

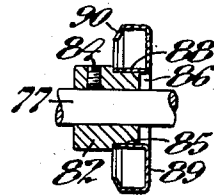


Fig. 5.

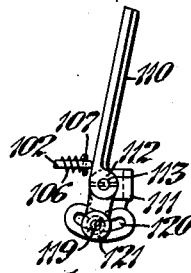


Fig. 6.

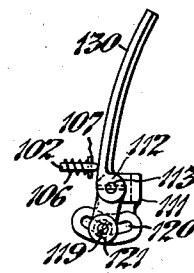


Fig. 7.

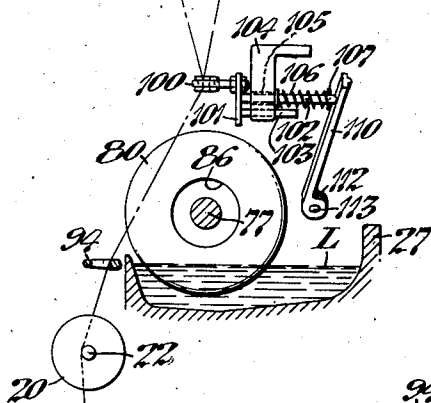


Fig. 3.

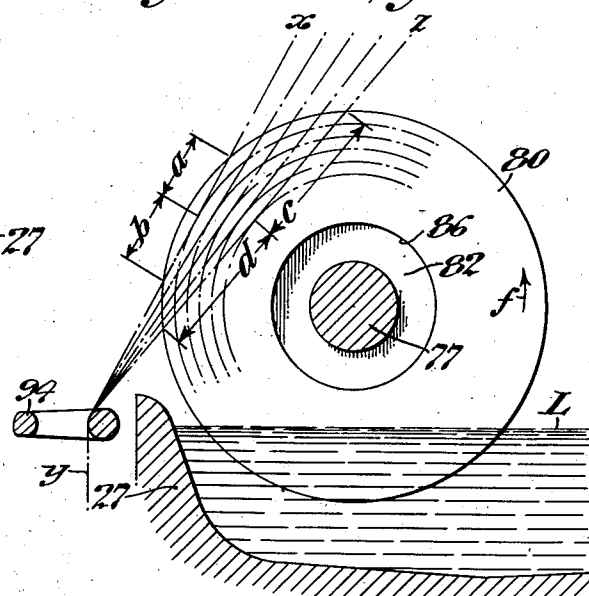


Fig. 8.

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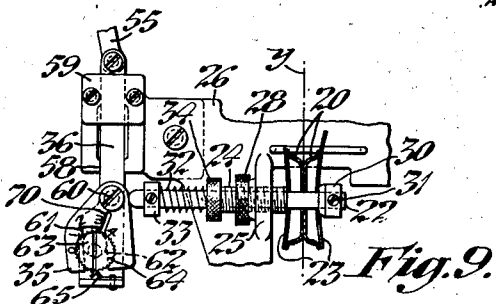


Fig. 9.

UNITED STATES PATENT OFFICE

2,329,027

WINDING MACHINE

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Application January 15, 1940, Serial No. 313,986

17 Claims. (Cl. 91—51)

This invention relates to winding machines and particularly to machines in which the winding spindle is driven at a constant rate of speed and the strand of yarn or the like delivering thereto is taken up by the winding package at a progressively increasing linear rate of draft.

In the present specification and claims the term "yarn" is used broadly to indicate any form of strand material such as silk, rayon, cotton or the like, and the term "package" is employed in a generic sense to indicate the product of the machine whatever its character.

One object of the invention is to provide in a machine of the present type means for maintaining a substantially uniform or in some instances a gradually decreasing tension on the winding strand as its linear speed increases and means for applying a uniform amount of liquid, such as an emulsion, of oil or the like, to the yarn during its linear travel to the winding package at a constantly increasing speed.

Another object of the invention is to provide in a machine of the type specified means actuated during the growth in diameter of the package being wound to control the tension applied to the feeding strand of yarn, and also the amount of liquid supplied for moistening or emulsifying the yarn in accordance with the changing speed of draft of the latter.

Another object of the invention is to provide in a machine of the present type means for contacting the yarn with a wetted surface across which it feeds and means for varying the extent of the contact in proportion to the increasing speed of the yarn as it is wound into the package whereby to moisten the material uniformly throughout the whole winding operation.

Another object of the invention is to provide a machine of the type indicated which is efficient and positive in performing its intended functions and adapted for use over long periods of time without requiring adjustment, repair or replacement of its parts.

Further objects of the invention are set forth in the following specification which describes a preferred form of construction of the improved winding machine and several modified forms of the controlling means therefor as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is an end-elevational view of one unit of a multiple winding machine showing the present invention applied to use thereon;

Fig. 2 is a side view of the same, part sectional through the moistening device;

Fig. 3 is a detailed view of the moistening de-

vice shown in connection with the winding package represented by dot-and-dash lines;

Fig. 4 is a sectional view of the liquid-applying disk of the moistening apparatus;

Fig. 5 is a similar view showing a modified form of construction of the disk;

Fig. 6 is a detailed view of the adjustable camming device for controlling the position of the strand on the contact disk looking in the direction indicated by the arrow 6 in Fig. 1;

Fig. 7 is a similar view showing a modified form of the cam;

Fig. 8 is an enlarged view of the contact disk of the moistening device including a diagrammatic representation of several different contact positions of the strand as it draws thereacross; and

Fig. 9 is a part-sectional detailed view of the tension-device showing the means for securing differential regulation of the applied tension on the strand.

In machines of the present type in which the cop or package is wound on a positively driven spindle rotating at constant speed, as the winding mass increases in diameter the linear speed of the strand of yarn feeding thereto increases progressively and in order that the tension on the strand shall not become excessive from this cause, automatic means are usually provided for relieving the applied tension to maintain the ultimate tension constant or to gradually reduce the same as the yarn is distributed on the package. In winding certain varieties of textile materials such as silk, cotton, rayon and other synthetic yarns it is of benefit to condition the latter by the application of a liquid thereto, such as an emulsion of oil or the like; for example, it is a preferred practice to emulsify or oil silk and rayon yarns in transferring them from cakes or skeins to cones or other supply packages from which the material is eventually delivered to further processes such as weaving, knitting or the like. Likewise, cotton yarns are sometimes moistened or treated by a suitable liquid during the process of winding the material from spools or bobbins onto cones or other forms of larger packages.

The present winding machine is designed particularly for effecting the above wet treatment or processing of materials during their transfer and in general the machine is of a standard type for producing cross-wound packages with a V-wind.

The present drawings illustrate one unit of a gang machine comprising a plurality of spindles, all of substantially the same design and construc-

tion. As shown in Fig. 1, each winding unit or head comprises a frame 2 mounted on a bed or table 3 which is supported from the floor by legs 4. Each head of the multiple machine comprises the frame 2 having bearings for a rotatable winding spindle 6 which may be driven from any suitable source of power by means not herein shown. The winding unit may also comprise a reciprocating yarn- or thread-guide 10 slidably mounted on a traverse-frame 11 which is pivoted on a shaft 12 journaled in bearings below and parallel to the winding spindle 6. A suitable cam 7 enclosed within the frame 2 and driven from the shaft 12 is connected to reciprocate the thread-guide 10 to cause it to traverse the yarn longitudinally of the winding spindle, these connections being shown in detail in Fig. 2 as common to machines of the present type. The traverse-frame 11 is adapted to pivot on the shaft 12 to permit the thread-guide 10 to recede from the winding spindle 6 as the winding package increases in diameter, the movement of the traverse-frame being controlled by a dog 15 sliding in a grooved quadrant 16 which prevents retrogressive movement of the thread-guide, all as is common in machines of the present type.

The traverse-frame 11 is counterbalanced by a depending, weighted arm 17 which swings toward the left as viewed in Fig. 1 as the thread-guide 10 moves outwardly away from the winding spindle 6 during the course of the winding. The swinging movement of the arm 17 is employed in connection with the present invention to actuate the means which control the tension applied to the winding strand and also the regulation of the contact of the strand with a wetted member as explained more fully hereinafter.

The tension-device for applying resistance to the draft of the yarn as it feeds to the winding package may be of any suitable type and, as herein shown, it comprises a pair of concavo-convex disks 20 rotatively mounted on a horizontal shaft or spindle 22 with their convex faces opposed to adapt them to bear against the strand of yarn *y* as it feeds therebetween, see Figs. 1 and 9. The disks 20 are pressed against the yarn by means of spider-like springs 23 having their hubs mounted on the spindle 22 with the ends of their arms bearing directly against the peripheral rims of the disks. The spindle 22 is mounted to slide in a tubular sleeve 24 screw-threaded through a bearing 25 on a bracket 26 fastened to the side of a horizontal trough 27 which, in the present form of construction, serves as the receptacle for the bath of treating fluid. The sleeve 24 is adjustable in its bearing 25, being secured in place by a check-nut 28 with its right-hand end, as viewed in Figs. 1 and 9, abutting the hub of one of the spider-springs 23. The opposite spider-spring 23 has its hub engaged by a collar 30 fastened to the end of the spindle 22 at 31, this form of construction providing that pressure may be applied to the opposite springs 23 to cause them to apply a greater or less force against the rims of the tension-disks 20 by sliding the spindle 22 in opposite directions. A helical spring 32 encircling the left-hand end of the spindle 22 with its end abutting a collar 33 adjustably secured to the spindle and its opposite end bearing against a hub or enlargement 34 on the end of the sleeve 24 tends to apply pressure to the springs 23 which act against the tension-disks 20. The left-hand end of the spindle 22 is preferably rounded to adapt

it to be acted upon by a cam 35 which is slidable vertically to force the spindle toward the right, as viewed in Figs. 1 and 9, to relieve the pressure of the springs 23 against the tension-disks 20. The cam 35 is in the form of a block or plate carried at the lower end of a slide-bar 36 adapted to be moved vertically from the swinging movement of the traverse-frame 11 through connections as next described.

Fastened to the side of the frame 2 of the winding machine is a bracket 38 formed with an outwardly and downwardly extending arm terminating in a horizontal shelf 39 which supports a slotted stub-catcher 40 of any suitable construction. The shelf 39 has a lateral extension in the form of a blade 41 which is employed for a purpose as explained later. Pivoted to the side of the bracket 38 is a bell-crank lever 45 adapted to rock on a screw 47 secured in the bracket. One arm 46 of the bell-crank lever 45 is connected by a link 48 to a member 49 carried by the depending arm 17 of the traverse-frame 11. The link 48 may be connected to the member 49 by means of a screw 50 engageable in any one of several holes 51 to adjust the position of the link relatively of the axis on which the traverse-frame 11 swings to thereby regulate the extent of movement of the lever 45 during the winding of a package. The opposite arm 52 of the bell-crank lever 45 is pivotally connected to a link 53 jointed at its opposite end to the slide 36 on which the cam 35 is mounted. The link 53 is preferably of two-part construction having its sections 54 and 55 telescopically connected, the upper section 54 terminating in a slotted portion 56 in which the end of the lower section 55 is slidably held. A slot in the end of the section 55 receives a screw 57 by which it is secured to the section 54 to provide for longitudinal adjustment between the parts. Through this form of construction the link 53 is telescopically adjustable to vary its length whereof to vary the position of the slide 36 and thereby the relationship of the cam 35 to the end of the plunger-pin 22. Referring to Fig. 9, the slide 36 is slidable in a guideway 58 formed as a part of the bracket 26, being held in place by a cover-plate 59 fastened to the front of the guideway.

The cam 35 is of novel construction comprising a plate-like member pivotally mounted on a stud 60 screwed into the slide 36. The lower portion of the cam 35 is provided with an opening 61 to receive an eccentric 62 formed as part of a screw 63 having an enlarged head 64 with a serrated or knurled periphery. Fastened to an offset portion of the slide 36 is a leaf-spring 65 having a V-shaped bent portion adapted to engage with the serrations in the knurled head 64 of the screw 63 to serve as a detent to maintain the screw in any position to which it is adjusted. The cam 35 has a slit 70 extending from its opening 61 toward the pivot-screw 60, this form of bifurcated construction of the cam providing that its two wings will be sprung apart slightly when the eccentric 62 is entered into the opening 61, whereby to provide a frictional engagement to resist the turning movement of the screw 63. By turning the eccentric 62 the cam 35 may be swung on its pivot 60 to adjust the angularity of its side edge which engages the end of the plunger 22 with respect to a vertical plane.

It will be observed that during the movement of the traverse-frame 11 its depending arm 17 will rock the bell-crank lever 45 to cause it to act through the link 53 to raise the slide 36, and

thereby the cam 35 will be drawn upwardly to slide the plunger 22 to the right as viewed in Figs. 1 and 9 to relieve the pressure on the spider-springs 23 which act against the tension-disks 20. A second lever 71 is pivoted on the screw 47 which forms the pivot for the bell-crank lever 45, this lever being adapted to be rocked during the swinging movement of the traverse-frame 11 by a wire link 72 connecting it to the depending arm 17 of the traverse-frame. The lever 71 carries a weight 73 adjustable longitudinally thereof, this arrangement being in accordance with the usual construction whereof to provide for resisting the movement of the thread-guide 10 away from the winding spindle 6 with the force of resistance gradually diminished as the package grows in diameter. It is pointed out, however, that this secondary pressure lever 71 has no function in connection with the tension-controlling means previously described.

It has been stated that it is of advantage to moisten or emulsify the yarn feeding to the winding package and it is necessary that this be accomplished subsequent to its passage through the tension-device. Consequently, the moistening device is interposed between the tension-device and the winding spindle and constructed to operate as explained hereinafter. The trough 27, previously referred to, is mounted on brackets 75 attached to the legs 4 which support the machine bed 3, only one of these brackets being herein shown, see Figs. 1 and 2. The brackets 75 are adjustable vertically of the legs 4 to regulate the height of the trough. The trough 27 is provided at each end with bearings 76 for a horizontal shaft 77 which carries a series of contact rolls or disks 80. The shaft 77 is mounted above the level of the liquid L in the trough 27, being rotatable in its bearings and driven from any suitable source of power by means of a grooved and stepped pulley 81 at one end, see Fig. 1. A V-shaped belt k is adapted to engage in one or another of the grooves of the pulley 81 and thus the shaft may be rotated at the desired speed in accordance with the character of the winding being performed and the liquid material used for moistening the yarn.

The disk 80 may be of any suitable construction and as shown in Fig. 4 it comprises a hub 82 secured fast to the shaft 77 by means of a screw 84. The hub 82 is reduced in diameter at one end and the disk 80 a relatively large bore forced onto the reduced portion of the hub to seat the disk against the shoulder formed thereby. It is to be particularly noted that the thickness of the disk is greater than the axial length of the reduced portion 85 of the hub 82 so that the forward face of the disk is located outwardly beyond the end of the hub to provide a central recess 86 surrounding the shaft 77; the purpose of this construction being explained later. The rearward face of the disk 80 is beveled at its periphery to form an inclined face 87 and the forward face of the disk is preferably rounded at its periphery. A modified form of construction of the disk is illustrated in Fig. 5 as being constructed of sheet-metal with an annular portion 88 fixed to the reduced portion of the hub 82 and a forward radial face 89 terminating in a cylindrical rim at its periphery with an inclined flange 90 at the rear. This form of disk may be spun or otherwise formed into shape from sheet-metal to reduce the weight and economize in the cost of manufacture.

Referring now to Figs. 1 and 2, the strand of yarn *y* feeds upwardly from its source of supply, arranged below, and passes through a suitable guide-eye 91 mounted on a member 92 attached to a downwardly-projecting arm of the bracket 26. Above the eye 91 is a slub-catcher 93 of usual form through which the yarn draws and thence it feeds between the tension-disks 20 and passes upwardly through a second guide-eye 94 attached to an ear on the bracket 26. From the guide-eye 94 the yarn is directed across the radial face of the disk 80 by being threaded through a movable guide-eye 100 which is displaced automatically during the progress of the winding to change the position of the yarn on the disk whereby to regulate its extent of contact therewith. The guide-eye 100 is fastened to a member or plate 101 supported by two parallel rods 102 and 103 which are slidably mounted in an angle-shaped arm 104 secured to the underside of the shelf 39 on the bracket 38.

The upper rod 102 projects through a bushing 105 in the arm 104 and carries a helical spring 106 held under tension between the end of the bushing and a pin 107 extending through the end of the rod. The spring 106 tends to slide the rods 102 and 103 in their bearings to move the guide-eye 100 toward the right as viewed in Fig. 2 of the drawings to shift the strand *y* toward the axis of the disk 80 whereof to increase its extent of contact with the face of the disk. This movement of the guide-eye 100 is controlled automatically during the building of each package on the winding spindle 6 by the movement of the thread-guide 10 away from the spindle. Conveniently, the shifting of the guide 100 is controlled by a cam 110 carried at the end of an arm 111 fastened to the depending arm 17 of the traverse-frame 11. The cam 110 is arranged to bear against the rounded end of the rod 102 and may have a straight face as shown in Fig. 6; or a cam 130 having a face of arcuate contour may be employed in its stead, see Fig. 7.

The cam 110 has a hub 112 pinned to the end of a rod 113 which projects through bores in a pair of spaced lugs or ears 114 and 115 projecting from the side of the arm 111. A helical spring 116 surrounding the end of rod 113 bears against the ear 114 and a collar 117 screwed onto the end of the rod to hold the hub 112 against the finished face of the ear 115. The cam 110 may be swung about the axis of the rod 113 to adjust its inclination or eccentricity with respect to a vertical plane; a screw 119 passing through an arcuate slot 120 in an extension of the ear 115 being screwed into a boss 121 on the cam and tightened in place to secure the cam in its adjusted position. The face of the cam 110 which bears against the end of the rod 102 is of arcuate shape in side view, as shown in Fig. 1, with a curvature concentric to the axis on which the traverse-frame 11 pivots, see 1. Consequently, as the thread-guide 10 is forced outwardly away from the winding spindle 6 during the growth of the winding package the swinging movement of the arm 17 of the traverse-frame 11 will traverse the face of the cam across the end of the rod 102 to permit the spring 106 to slide the rod to the right as viewed in Figs. 2 and 3 to shift the guide-eye 100 in the same direction.

From the guide-eye 100 the strand of yarn *y* feeds upwardly through the slot in the slub-catcher 48, thence draws across a pin or guide-rod 125

and is directed therefrom to the thread-guide 10 by passing it over a wire bail 126 at the top of the traverse-frame 11. The yarn *y* feeds through a groove in the thread-guide 10 to direct it onto the receiver which is rotated by the spindle 6; the present drawings illustrating the yarn-receiver in the form of a paper or fiber tube *t* of conical shape held on a mandrel 127 fast on the winding spindle 6. Suitable starting and stopping means are provided in the winding machine and indicated in the present drawings, but as these devices do not function directly in connection with the present invention they are not described in detail herein.

To prepare the machine for operation a suitable bath of conditioning fluid *L*, such as an emulsion of soap or oil, is supplied to the trough 27 at a level capable of immersing the lower portion of the disks 80 which rotate therein. Each unit of the multiple machine is threaded-up by passing the strand *y* upwardly through the guide 91, drawing it through the slub-catcher 93 and inserting it between the tension-disks 20. Thence, the yarn is threaded through the fixed guide-eye 94 and movable guide-eye 100, and then drawn upwardly through the groove in the slub-catcher 40 and led across the wire bail 126. As the strand *y* is drawn upwardly from the guide 94 and through the guide 100 it may contact with the periphery of the disk 80, but should this occur it will slide down over the rounded edge thereof to position it against the face of the disk. Likewise, should the yarn lie across the rearward face of the disk 80 after being threaded through the guides, immediately it is placed under tension by starting the winding it will be drawn outwardly onto the beveled face 81 and then across the periphery of the disk and down onto its forward face. Thus, the present improved construction of the contact disk insures that the strand will always be properly positioned for the wet treatment. The strand is placed in the groove of the thread-guide 10 and its end attached in any suitable manner to the receiver or tube *t*. Before operating the machine the tension-device is adjusted to apply the proper degree of initial tension in accordance with the character of the yarn and other variables. This adjustment may be accomplished by varying the length of the link 53 at the connection between its sections 54 and 55 to raise or lower the cam 35; and further adjustment may be secured by turning the eccentric 62 by means of the screw 63 to alter the inclination of the contact edge of the cam 35.

Upon starting the operation of the machine the yarn is drawn from its supply through the various guiding means mentioned above and wound onto the tube *t* as it is traversed longitudinally thereof by the thread-guide 10 to dispose it in helical coils forming the layers which build up the package. At the start of winding the guide-eye 100 assumes the position illustrated in Fig. 2 so that the strand of yarn *y* is drawn across the face of the disk 80 in a path adjacent the outer periphery of the disk; this position of the guide 100 being regulated by adjusting the cam 110 in the manner previously explained. As the winding progresses the swinging movement of the traverse-frame 11 causes its depending arm 17 to rock the bell-crank lever 45 to draw the link 53 upwardly and thereby raise the slide 36 carrying the cam 35. During this upward movement of the cam 35 its inclined face will act against the plunger 22 to force the latter to the right as

viewed in Fig. 1, thereby releasing the pressure of the collar 30 against the outer spider-spring 23 under the tension of the spring 32. Stated briefly, the action of the cam 35 is to relieve the pressure of the springs 23 against the tension-disks 20 whereof to reduce the tension applied to the strand feeding to the package. In this manner the applied tension is progressively reduced from start to finish of the winding for a purpose as more fully explained hereinafter.

Meanwhile, as the traverse-frame 11 is rocked on its pivot the arm 111 attached to its lower weighted portion 17 is swung downwardly to draw the cam 110 downward across the end of the rod 102. This traverse of the cam 110 across the end of the rod 102 permits the latter to be moved to the right, as viewed in Figs. 2 and 3, by the action of its spring 106 to shift the thread-guide 100 in the same direction and thereby adjust the path of the strand *y* toward the axis of the disk 80. As the yarn is thus shifted in position on the face of the disk 80 it will contact therewith to a progressively increasing extent as indicated diagrammatically in Fig. 8 of the drawings. Referring to this latter view of the drawings, at the start of winding a package with the yarn *y* feeding in a course as indicated at *x* the disk 80 will have initially a wiping contact with the strand to an extent indicated by the arrow *a* and then a second contact to an extent indicated by the arrow *b*. As the yarn is shifted to the right from the position indicated at *x* to that indicated at *z* its contact with the disk will be increased, and finally, at the completion of the winding, the strand will be directed in a course where it will have first a wiping contact to the extent indicated by the arrow *c* and later a further contact indicated by the arrow *d*. In this way the contact of the yarn on the disk is increased progressively so that as its linear rate of travel increases sufficient liquid will be applied thereto to insure a uniform saturation or coating of the yarn by the material in the bath *L*; it being understood that as the disk 80 rotates in the direction indicated by the arrow *f* it will carry the liquid upwardly from the bath in a film covering the greater portion of its forward face. In some instances, for example, when the emulsion is of certain viscosity or different materials are being wound it may be necessary to shift the path of the strand inwardly of the disk with an accelerated rate of movement and this may be accomplished with an arcuately shaped cam 130 such as shown in Fig. 7. As the yarn passes beyond the moistening device it draws through the slub-catcher 40 which removes any excess treating fluid adhering thereto before it is wound into the package.

It is pointed out that in order that the yarn may be treated in the proper manner it is necessary that the application of the liquid thereto be made after the yarn passes through the tension-device so that the liquid will not be removed therefrom by the compression of the tension-disks on the strand. The positioning of the slub-catchers 40 and 93 above and below the moistening trough 27 and the location of the tension-device 20 below the trough serves to eliminate vibration of the yarn strand to provide for an accurate and uniform wetting of the yarn. Furthermore, due to the positioning of the tension-device 20 below the moistening trough none of the emulsion will be deposited on the tension-device to clog its action, for example, cause the tension-disks to stick and prevent accurate con-

trol of the tension applied to the strand. Thus, by the present arrangement a more accurate control of the tension-device is attained. Moreover, it is important in winding packages of moistened or emulsion-treated yarn that the tension on the strand be regulated so as not to become too great as the linear rate of draft is increased. That is to say, the tension of the yarn at the point where it is applied to the package must not be so great as to cause the outer layers of the package to constrict the inner layers to cause bulging at the ends of the wound mass. Furthermore, unless the tension is maintained substantially constant or gradually relieved throughout the winding of the full package there will be a tendency for the outer layers of winding to compress the inner layers and squeeze out the liquid solution which has been applied to the yarn. It will thus be seen that the present form of tension-device cooperates with the moistening or liquid-applying apparatus to insure uniform treatment of the whole length of yarn wound into the package.

The present invention also provides further improvements in the construction and method of operation of the moistening device. It has been noted that the forward face of the contact disk 80 is recessed circumferentially of the shaft 77 on which it is mounted. This provision is made so that if the yarn is broken at the package or between the package and the moistening device the end of the broken strand will not fall onto the drive-shaft 77 and be wound therearound to cause waste. Should the yarn *y* break above the guide-eye 100 the falling end will be deflected outwardly by the blade 41, previously referred to, so that the end will fall across the face of the disk away from the shaft 77. Likewise, should the yarn break just below the guide 100 it will still fall across the face of the disk 80 laterally away from the shaft 77 and in either instance it will adhere to the wetted face of the disk due to molecular attraction and be prevented from sliding down onto the shaft 77 to be wound therearound. Usually, an annular bead of liquid is formed around the rim of the opening or recess 86 in the forward face of the disk 80 by the liquid collecting thereon and adhering thereto and this has the effect to further guard against the broken end of the strand falling onto the shaft 77. Stated briefly, the annular recess 86 in the disk 80 tends to prevent the end of the yarn from being carried down onto the shaft 77 to be picked up thereby and wound therearound to cause a tangle or bunch resulting in waste.

As a further improvement contemplated by the present invention the cam 35 is adapted to be adjusted vertically to provide for its proper initial action on the plunger rod 22 which regulates the pressure of the tension-disks 20; and in addition the angularity of the cam can also be adjusted by rotating the eccentric 62 to vary the inclination of its contact face.

While the present apparatus is herein shown as embodied in a preferred form of construction, it is to be understood that various modifications may be made in the structure and arrangement of its parts 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 a package at a constant rate of speed, means for tensioning the yarn feeding to the package, means operative on the tensioning means for reducing the tension applied to the yarn as its linear speed increases throughout

the winding, contact means interposed between the tensioning means and the package for applying liquid to the yarn, and means to increase the extent of contact of the yarn with said contact means as the linear speed of the yarn increases during the winding.

2. In a winding machine, the combination of means for rotating a package at a constant rate of speed, means for tensioning the yarn feeding to the package, means operative on the tensioning means for varying the tension on the yarn in accordance with its varying rate of linear speed, a contact member for engaging the feeding strand between the tensioning means and the package, means to apply liquid to said contact member, and means to vary the extent of contact of the yarn with the contact member in accordance with the varying speed of draft of the yarn.

3. In a winding machine, the combination of a winding spindle, means for traversing yarn longitudinally on the spindle to wind a package thereon, means for tensioning the yarn feeding to the package, contact means between the tensioning means and package for moistening the yarn as it feeds from the tension-device to the package, and means actuated by the separation of the winding spindle and traversing means as the package increases in diameter to reduce the tension applied to the yarn and simultaneously increase the extent of contact of the yarn with the contact means.

4. In a winding machine, the combination of a winding spindle, a thread-guide for traversing yarn on the spindle, said spindle and thread-guide being constructed and arranged to separate during the winding of a package, means for tensioning the yarn feeding to the package, a contact member between the tensioning means and package for applying liquid to the yarn feeding to the package, and means actuated by and with the separation of the winding spindle and thread-guide to progressively reduce the tension applied to the yarn and progressively increase the extent of contact of the yarn with the contact member throughout the winding of a package.

5. In a winding machine, the combination of a winding spindle, a reciprocating thread-guide for traversing the yarn longitudinally of the spindle to wind a package thereon, a traverse-frame for mounting the thread-guide to adapt it to recede from the winding spindle during the growth of the package, a tension-device for applying tension to the yarn feeding to the package, a wetted member between the tension-device and package for applying liquid to the yarn feeding from the tension-device to the package, and means actuated by the movement of the traverse-frame as the guide recedes from the winding spindle to reduce the tension applied to the yarn and increase the extent of contact of the yarn with the wetted member.

6. In a winding machine, the combination of means for winding a package, means for tensioning the yarn feeding to the package, a container for liquid, a rotatable disk partly submerged in the liquid, means for directing the strand from the tension-device across the radial face of the contact disk, and means actuated during the winding of a package to shift the strand radially inward on the contact disk to increase its extent of contact therewith.

7. In a winding machine, the combination of means for winding a package, means for feeding a strand of yarn to the winding package, a con-

tainer for liquid, a contact disk having a radial face with a central annular recess therein, means for rotating the contact disk partly submerged in the liquid, means for guiding the strand across the radial face of the contact disk, and means for shifting the guiding means to progressively move the strand toward the axis of the disk to increase its extent of contact therewith during the winding of a package.

8. In a winding machine, means for winding a package, means for feeding a strand of yarn to the winding package, a container for liquid, a rotary shaft, a contact disk carried by said shaft and having a radial face with an annular recess surrounding the shaft, means for guiding the strand feeding to the package to cause it to contact with the radial face of the disk, and means for progressively shifting the strand toward the axis of the disk to increase the extent of its contact therewith during the winding of a package.

9. In a moistening device for yarn and like strand materials, the combination of a bath of liquid, a rotary shaft arranged above the bath, a contact disk carried by said shaft with its lower portion immersed in the liquid, said disk formed with a relatively flat radial face with an annular recess therein surrounding the shaft, and means for guiding a strand across the radial face of the disk to apply the liquid to the strand.

10. A moistening device for yarn and like materials comprising a trough for liquid, a rotatable shaft, a disk mounted on said shaft with its lower portion immersed in the liquid in the trough, said disk formed with a relatively flat radial face and a beveled edge at its periphery and having an annular recess surrounding the shaft, the opposite face of said disk being beveled toward its periphery, and means for guiding a strand across the face of the disk in a path outwardly beyond the annular recess therein.

11. In a winding machine, the combination of means for winding a package, means for tensioning the strand of yarn feeding to the package, a wetted contact disk for applying liquid to the yarn feeding to the package, means for guiding the yarn across the radial face of the disk, and camming means actuated during the winding of a package to shift the guiding means to cause it to move the strand progressively toward the axis of the disk.

12. In a winding machine, the combination of a winding spindle, means for traversing yarn on said spindle, a wetted contact disk for applying liquid to the yarn feeding to the winding spindle, means for guiding the yarn across the radial face of the disk, and a cam movable during the growth of the winding package and operating on the guiding means to shift the yarn toward the axis of the contact disk to increase its extent of contact therewith.

13. In a winding machine, the combination of a winding spindle, a thread-guide for traversing yarn on the spindle to wind a package, a swinging traverse-frame for mounting the thread-guide to adapt it to recede from the winding spindle with the growth of the package, a wetted contact disk for moistening the yarn feeding to the winding spindle, a guide for directing the yarn across the radial face of said contact disk, and a cam connected with the traverse-frame and operative to move the guide to shift the yarn toward the axis of the contact disk during the progress of winding a package.

14. In a winding machine, the combination of means for winding a yarn package, means for tensioning yarn feeding to the package, contact means between the tensioning means and package for applying liquid to the yarn feeding to the package, and a pair of slub-catchers arranged at opposite sides of the tensioning means and contact means whereby the tensioning means and slub-catchers will function to reduce vibration of the yarn strand during its engagement with the contact means to produce a uniform wetting of the yarn strand.

15. In a winding machine, the combination of means for winding a package, a tension-device for tensioning the yarn wound into the package, a rotatable oiling member disposed between the tension-device and the package to adapt it to act on the yarn after it has been tensioned by the tension-device, and means for gradually increasing the extent of contact of the yarn on the oiling member during the winding of the package.

16. In a winding machine, the combination of means for winding a package, a tension-device for tensioning the yarn feeding to the package, a rotatable oiling disk disposed between the tension-device and the package to adapt it to act on the yarn after it has been tensioned by the tension-device, and means for gradually increasing the extent of contact of the yarn on the disk during the winding of the package.

17. In a winding machine, the combination of a winding spindle, means for traversing yarn relatively of the spindle to wind a package thereon, means for tensioning the yarn feeding from a supply to the winding spindle, a container for liquid, a rotatable disk partly submerged in the liquid in the container, said container and disk being disposed between the tensioning means and the winding spindle to adapt the yarn to feed from the supply to the tensioning means, thence across the radial face of the disk and finally to the winding spindle, and means actuated during the winding of the package on the spindle to shift the yarn radially inwardly of the contact disk to increase its extent of contact therewith.

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