Dec. 1, 1942. D. I. GROSS 2,303,353

DEVICE FOR USE IN WINDING RAYON

Filed Feb. 10, 1940

Fig. 1.

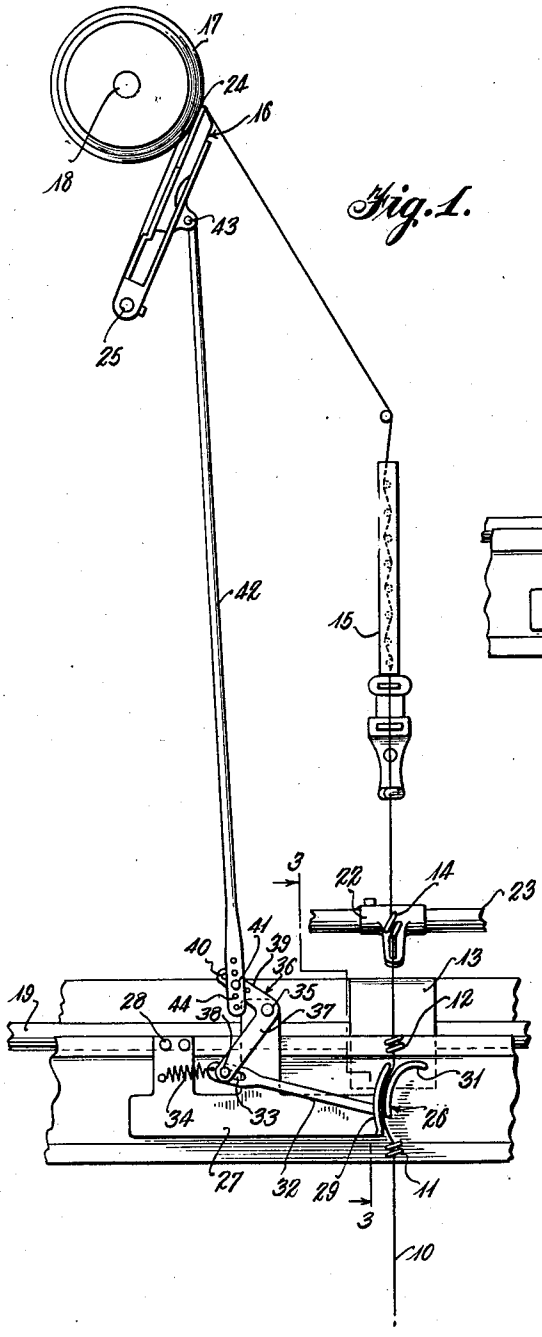


Fig. 2.

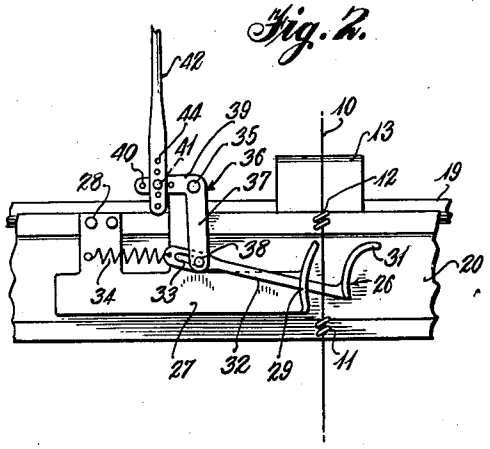
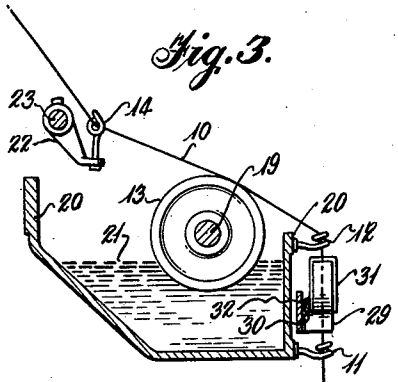


Fig. 3.



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DEVICE FOR USE IN WINDING RAYON

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4 Claims. (Cl. 91—13)

This invention relates to the treatment of yarn, thread or the like in its passage between a thread storage device and a collecting device and more particularly to treatments wherein succeeding portions of a yarn, thread or the like are passed in contact with a surface which will modify its characteristics.

While yarn or the like may be subjected to the modifying influence of many varying types of materials, liquid or solid, involving such operations as abrading, waxing, lubricating, etc., by passage across a suitably prepared surface, it will be recognized that regardless of the type of treatment to be effected it is highly desirable that the yarn or the like be modified substantially uniformly throughout its length.

An appreciation of typical difficulties which have been encountered in the treatment of yarns by passing the same across a prepared surface may be had by a consideration of the problems encountered in the preparation of wound cones for use in the manufacture of knitted fabrics such as underwear, tubing and hosiery. Since such cones are customarily used by the manufacturers of knitted goods in the form in which they are received from the yarn producers, it is encumbent upon the latter to furnish the cones in a condition suitable for insertion directly into knitting machinery without further alteration. It has been found that yarns for use in such machinery must be suitably lubricated in order to render them sufficiently flexible and pliable to be fed through knitting needles without danger of breakage. Furthermore, the good appearance of the knitted fabric is to a large extent dependent upon the amount of lubricant accepted by the yarn and the evenness of its distribution over succeeding portions thereof. In furnishing yarns to be used in knitting operations, it is necessary therefore that the entire length of yarn be uniformly lubricated to an extent within critical limits so that the knitting operation may progress efficiently while the finished product will have a commercially desirable appearance and feel.

In lubricating yarns for use in knitting machinery and the like, it is now the common practice to apply the lubricant during that winding operation in which cones are prepared for shipment. Usually the yarn is passed from a supply package tangentially across a cylindrical metal roller which rotates partially submerged in a suitable lubricant bath, generally in the form of an emulsion, to a driven collecting bobbin or the like. The roller is so arranged with respect to the lubricant bath as to pick up a film of lubricant of sufficient thickness to permit the imparting of a definite amount thereof to the yarn passing thereover, the amount in any instance, of course, being dependent upon the size or denier of the yarn being wound, as well as the use to which the yarn is to be put. The roller is driven at a constant speed and turns counter-current to the direction of yarn travel, thus continuously presenting a uniformly coated surface to the yarn.

As has been pointed out above, it is highly desirable not only that a suitable amount of lubricant be imparted to a given length of yarn but also that such amount be applied uniformly for the entire length of the yarn. This is difficult of accomplishment by the employment of conventional machinery because of the fact that the yarn take-up steadily increases as the driven cone increases in diameter while the roller is driven at a constant speed so that the time of contact of the yarn with the roller proportionally decreases as the winding operation progresses. An attempt has been made to obviate this difficulty by the use of a device for progressively guiding the yarn across the roller at an increasing angle as the cone diameter increases, thus compensating for loss of contact time by the provision of a longer path of contact.

While the use of the guiding device outlined above has resulted in some improvement as regards the maintenance of uniformity of application of lubricant to succeeding portions of yarn, it has been noted that the amount of lubricant accepted by the yarn during that period when the cone is being started, and consequently its take-up is near the minimum, is generally higher than the desired amount and that at this stage the application of lubricant to succeeding portions of yarn lacks uniformity. By experiment it has been determined that the initial non-uniformity and over-coating results from insufficient tensioning of the yarn passing to the roller, the peripheral speed of the collecting device being relatively low, such lack of tension resulting in undesirable vibration of the thread in its path between the storage device and roller. The vibration causes the surface contact between the yarn and roller to vary considerably with the result that the amount of lubricant accepted by the yarn under these conditions is higher than desired and less uniform. Incident to the vibration additional damage to the yarn may be caused by uneven and excessive tensions due to drag between the yarn and the lubricant. It was further discovered that the extent and duration of the vibration is subject to considerable variation when yarns of different deniers or other physical characteristics are being wound. On the other hand, at some time during the winding operation it has been found that the peripheral speed of the collecting device and consequently its take-up will increase to a point where the vibration is stopped and satisfactory lubrication can be effected. This time, of course, will depend upon the characteristics of the yarn, winding speed and other variables.

It is an object of this invention to overcome all of the difficulties heretofore encountered in the treatment of yarn by the passage of the same across a surface which will modify the characteristics thereof and to produce a surface treated yarn which is modified uniformly throughout its length.

By the employment of this invention it is contemplated that yarn treated by contact with a modifying surface during a winding operation will be automatically maintained in proper relation to such surface regardless of the speed of travel of the yarn, the condition of the surface, the physical and/or chemical characteristics of the yarn itself or the type of treatment effected by contact thereby rendering available a modified yarn of great uniformity throughout its entire length.

It is further contemplated by the use of this invention to damp the vibrations of yarn or the like being drawn between a storage device and a treating surface at such times as the normal tension of the yarn is insufficient for this purpose to thereby permit uniform treatment of succeeding portions of yarn contacting a treating surface while avoiding uneven and excessive tensions incident to drag between the yarn and treating surface.

Further objects and advantages of the present invention will be apparent from a consideration of the following detailed description of a preferred embodiment thereof taken in conjunction with the annexed drawing wherein:

Figure 1 is a view in front elevation of a portion of a winding machine showing a preferred form of the vibration damping device of the present invention in damping position;

Figure 2 is a detail view of the damping device in released position; and

Figure 3 is a view in section taken along the line 3—3 of Figure 1.

Referring to the drawing in further detail, the invention is shown in a machine adapted to receive yarns or the like 10 from a suitable source not shown which may be a spool, cake or the like, which yarns are to be treated with a liquid dressing such as a lubricating emulsion and are to be wound into the form of cones or cops. Inasmuch as the machine is adapted to simultaneously treat and wind a plurality of yarns by identical mechanism, the description will be confined for convenience to the mechanism acting upon a single yarn. It is understood, however, that any number of such mechanisms may be included in the machine and may be operated simultaneously.

Thread 10 taken from its source is passed through stationary pigtail guides 11 and 12, tangentially across a roller 13, through an additional pigtail guide 14 and a tensioning device 15, of well known form, to a traverse mechanism 16 through which it is drawn by cone or cop 17 mounted for rotation with a shaft 18 driven at constant speed from a source of power not shown.

Roller 13, across which the thread 10 passes in its travel between the source and cop 17, is mounted for rotation with shaft 19 which is driven from a source of power not shown. Shaft 19 is so journaled that roller 13 will rotate partially below the edge of longitudinally extending tank or trough 20 which is partially filled with a suitable lubricating emulsion 21. Conveniently a wall of trough 20 constitutes a support for guides 11 and 12.

Guide 14 is attached to a sleeve 22 which is axially movable along a shaft 23, this movement controlling the path of yarn 10 across roller 13. The movement of sleeve 22 is effected automatically so that the length of the path of the yarn in contact with the roller is increased as the speed of take-up increases due to increase in effective diameter of the cop 17. There are several excellent known mechanisms for effecting this automatic adjustment and since such adjustment is not a part of this invention further reference thereto is deemed unnecessary.

Traverse mechanism 16 is of conventional form and includes a guide member for causing the yarn to be wound on the cop in a series of helices. The guide member is mounted on a cone surface contacting member 24 which in turn is arranged for pivotal movement about shaft 25 in response to variations in the effective diameter of the cop. One of the many well known means for maintaining member 24 in contact with the body of wound yarn is employed.

In the path of yarn 10 between guides 11 and 12, there is interposed a damping mechanism indicated generally by reference numeral 26. The damping mechanism includes a flat plate 27 attached by bolts 28 to the front of tank 20 and an arcuate member 29 lying in a plane at right angles thereto to present a concave braking surface to the path of yarn 10 intermediate guides 11 and 12. While plate 27 and arcuate member 29 are preferably integral it is desirable to cut a notch in the plate before or after deformation, thereby providing a recess 30 between arcuate member 29 and plate 27. A brake shoe mechanism including an arcuate member or shoe 31 presenting a convex surface to member 29 and a depending arm 32 lying in recess 30 constitutes another part of the damping device 26. Arm 32 is provided with a longitudinal slot at 33 and is attached to plate 27 only through spring 34 which normally urges shoe 31 against member 29. Pivoted to supporting plate 27 at 35 is a bell crank 36, the lower arm 37 of which carries a pin 38 which is received in slot 33 of arm 32. The other arm 39 of bell crank 36 is provided with a series of spaced holes 40 through which a pin 41 is passed for effecting a connection between arm 39 and a rod 42 which depends from traverse mechanism 16 to which it is pivoted at 43. Rod 42 is provided with a series of holes 44 adapted to overlie holes 40 in the bell crank arm 39 and to receive pin 41, thus permitting an adjustment of the effective lengths of both rod 42 and arm 39.

When the device is to be put in operation, traverse mechanism 16 is swung about pivot point 25 away from shaft 18 to permit the placing of a cone or cop thereon. This movement of traverse mechanism 16 will cause shaft 42 to move down rocking bell crank 36 about its axis at 35 thus causing the lower arm 37 of the bell crank to progress in an arcuate path until pin 38 has moved through slot 33 and strikes against arm 32 thereby moving brake shoe 31 against the action of spring 34 to the position shown in Figure 2. Thereafter, the device is threaded up by passing yarn from the storage device through guides 11 and 12, across roller 13, through guide 14, tensioning device 15 and traverse mechanism 16, to the cop or cone 17 to which the end is attached. Traverse mechanism 16 is now moved into contact with cop 17, this causing the bell crank 36 to again rock about its axis 35 thus disengaging pin 38 and arm 32 permitting spring

34 to urge shoe 31 against arcuate member 29 so that the yarn 10 will be caused to pass in an arcuate path between guides 11 and 12 when shaft 18 is caused to rotate. When the cop 17 is drawing yarn 10 from its source through the various guides, shaft 19 and consequently roller 13 is caused to rotate in a direction countercurrent to the path of travel of the yarn. Thus the lubricant 21 is picked up by the roller and imparted to the yarn at the point of contact. During the initial stages of the winding yarn 10 will be passed between members 29 and 31 the two being urged together by the action of spring 34. As the winding progresses, however, traverse mechanism 16 will be moved away from shaft 18 by the increasing yarn body on cop 17, thus pivoting about point 25 and moving shaft 42 downward. This action will be imparted to bell crank 36 through connecting pin 41 so that lower arm 37 and pin 38 will move, the latter gradually taking up the lost motion provided by slot 33. At some stage in the building of the cone, determinable by the length of slot 33 and the adjustment between rod 42 and bell crank 36, pin 38 will engage arm 32 and gradually move shoe 31 away from the concave face of member 29 thus permitting the yarn path between guides 11 and 12 to straighten. Since the vibration which causes uneven coating of the yarn exists only when the tension on the yarn is low, it will be seen that damping mechanism 26 will operate when needed while an automatic release thereof is effected by the very factor which increases tension, the diameter of the cop and wound yarn body thereon.

It will be clear that at the beginning of the winding operation pin 38 will be at the left side of slot 33 as shown in Figure 1 so that during the initial winding of the cone or cop 17 pin 38 will move gradually to the right without effecting any movement of arm 32 against the urging of spring 34. As soon as the pin engages the portion of the arm defining the right-hand end of slot 33 the arm and shoe will be gradually moved out of damping position to the position shown in Figure 2.

It will be apparent that the stage in the winding at which the release of damping mechanism 26 is to be effected will vary considerably dependent upon the size of the cone, the denier of the yarn and other variables. However, by adjustment of the effective length of rod 42 and bell crank arm 39 any required lost motion between arm 32 and pin 38 is attainable thereby permitting a uniform treatment of a wide range of threads.

The above description of a preferred embodiment of this invention is but for purposes of illustration and it is not intended that the scope of the invention be limited beyond the spirit of the appended claims.

I claim:

1. In a winding machine, a source of yarn, thread or the like, a driven collecting device, means in the path of said yarn intermediate said source and said device for contacting said yarn with a treating surface, vibration damping means comprising a movable member initially in contact with, and normally operable on, said yarn in its path between said source and said contacting means, and means responsive to a change in thickness of the yarn body on the collecting device for withdrawing said movable member from contact with said yarn.

2. In a winding machine, a source of yarn, thread or the like, a driven collecting device, means in the path of said yarn intermediate said source and said device for contacting said yarn with a lubricating surface, vibration damping means comprising a movable member initially in contact with, and normally operable on, said yarn in its path between said source and said contacting means, and means responsive to a change in thickness of the yarn body on the collecting device for withdrawing said movable member from contact with said yarn, said last named means including a traverse mechanism in pivotal association with the yarn body and effective to move the damping means, through a linkage connection.

3. In a winding machine, a source of yarn, thread or the like, a driven collecting cop, a traverse mechanism contacting said collecting cop and movable in response to increase in diameter thereof as succeeding portions of yarn are wound thereon, means in the path of said yarn intermediate said source and said cop for contacting said yarn with a uniformly coated lubricating surface, vibration damping means operable on said thread in its path between said source and said contacting means, said damping means including a fixed member and a movable member for receiving the yarn therebetween in damping position, spring means normally urging said movable member into damping position, and means connecting said traverse mechanism and said movable member for moving the latter against the action of said spring toward releasing position as the diameter of the cop increases and the traverse mechanism is moved, said connecting means including an adjustable lost motion connection, whereby said movable member will not be urged away from said fixed member during initial movement of the traverse mechanism.

4. In a winding machine, a yarn source, a driven collecting device, a traverse mechanism contacting the yarn body on said collecting device and movable thereby, a trough adapted to contain a lubricant, said trough being positioned adjacent the path of said yarn intermediate said source and said device, a driven roller in said trough adapted to operate partially submerged in said lubricant, guiding means for directing the yarn in a tangential path across said roller to be lubricated, and a vibration damper interposed in the path of said yarn intermediate said source and said roller comprising, a fixed support including a braking surface, a shoe operable upon said surface and having a slotted depending portion, said shoe and said surface defining an arcuate path for the thread therebetween, a spring attached to said depending portion and normally urging said shoe in the direction of said surface, a bell crank pivoted to said fixed support and having a pin on one arm engaged in the slot of said depending portion, a crank arm attached to said traverse mechanism and movable thereby, means for effecting an adjustable connection between said crank arm and the other arm of said bell crank, whereby the free movement of the pin in the slot may be adjusted to predetermine when the movement of the crank will begin the release of the shoe.

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