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METHOD AND DEVICE FOR APPLYING OIL OR OTHER LIQUID TO THREAD

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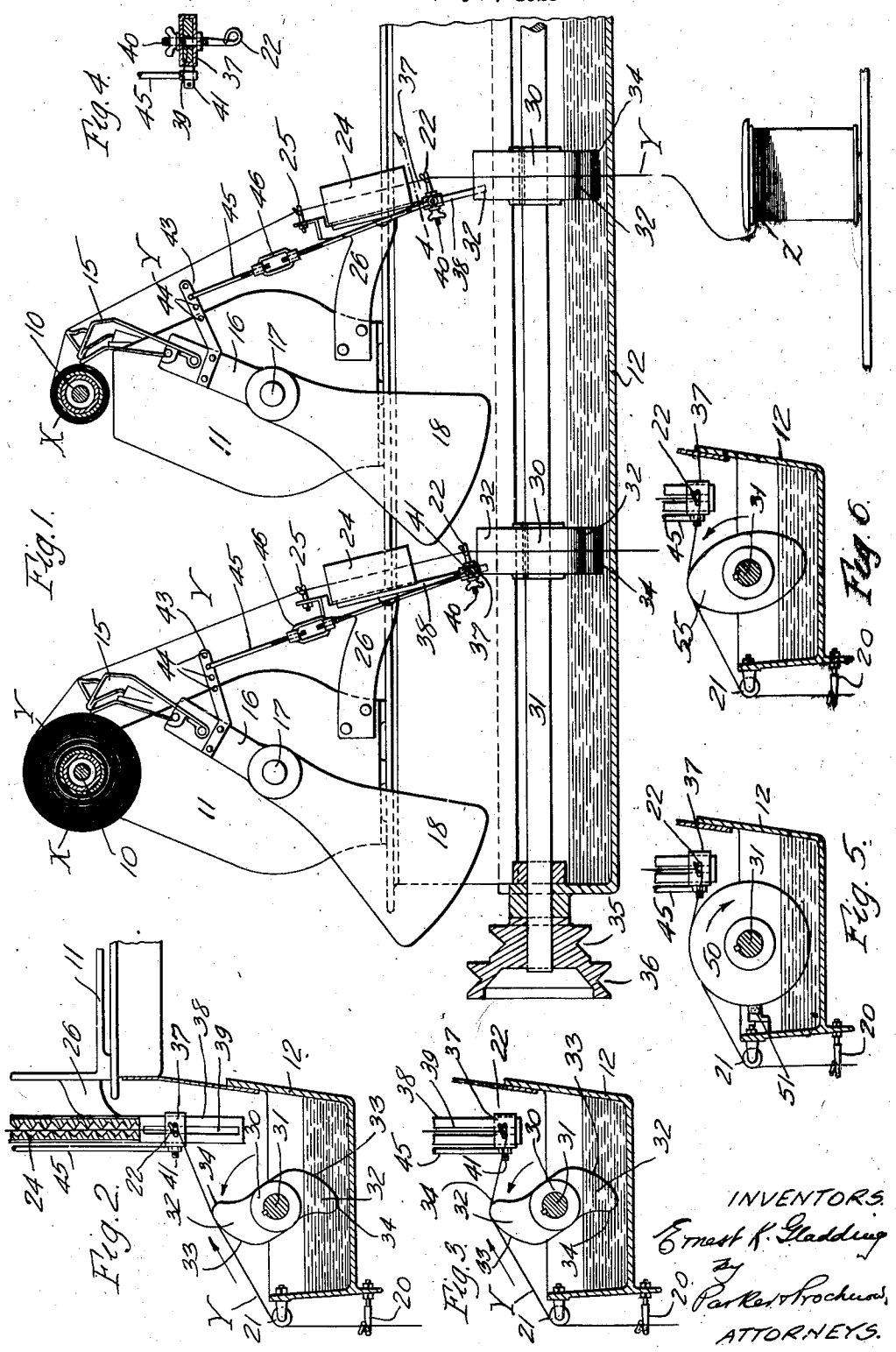


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

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METHOD AND DEVICE FOR APPLYING OIL OR OTHER LIQUID TO THREAD

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This invention relates to devices for applying a liquid to a thread of rayon or other material while the same is being wound on a spool or other support.

In winding a thread of rayon or other fibrous material on a spool or other support to form a package or roll ready for the market, it is necessary for certain purposes to add a quantity of oil to the thread. In oiling devices as heretofore constructed, a definite quantity of oil was supplied to the thread said oil being picked up by the thread as it passed to the spool or other support. Since the spool or support in machines of this kind was rotated at a definite speed of rotation during the entire winding operation, it was obvious, that, as the quantity of thread on the support built up and increased the diameter of the package or mass, the speed of the thread increased proportionately. In oiling devices heretofore used, an increased quantity of oil was not successfully supplied to the thread when the same moved at a higher rate of speed. This resulted in an unequal oiling of the thread, the inner portions of the package receiving a greater quantity of oil than the outer portions thereof.

An object of this invention is to provide a device of this kind in which the diameter of the mass of thread on the spool or support is used to guide the thread into different relations to the thread wiping member, whereby the oil or other liquid is applied to a longer stretch of the thread as the speed of the thread increases. Another object of this invention is to improve the construction of devices of this kind in other respects hereinafter specified.

In the accompanying drawings,

Fig. 1 is a fragmentary, longitudinal, sectional view of an oiling mechanism of a winding machine showing my improved compensating oiling device applied thereto.

Figs. 2 and 3 are fragmentary, transverse, sectional views showing different positions of the thread relative to the wiping member.

Fig. 4 is a fragmentary sectional view, on an enlarged scale, on line 4—4, Fig. 1.

Figs. 5 and 6 are transverse sectional elevations similar to Figs. 2 and 3 and showing two modified forms of this invention.

Referring to the drawings wherein like reference numerals designate like parts, the reference numeral 10 represents spindles which are adapted to be rotated in any suitable or desired manner, and on which supports, cores or spools X are adapted to be mounted. These supports, cores or spools are commonly made of paper and conical or cylindrical in shape to adapt the same to readily cooperate with knitting and weaving machines. The reference character Y represents the thread of rayon or other fibrous material which is being wound from a spool Z. The spindle 10 may be mounted on an upright frame member 11 of the machine. Disposed beneath and/or in the path of travel of the thread Y is a trough or container 12 for the oil or other liquid to be applied to the thread.

The machine is provided with any usual or suitable mechanism for moving the thread Y back and forth lengthwise of the support or core X to form a substantial frusto-conical mass or package of thread thereon. In the drawings I have illustrated a portion 15 of the thread guide mechanism commonly used in connection with machines of this kind. This thread guide mechanism is mounted on a transverse frame or support 16 which is pivoted at 17 to the frame member 11, and includes a transverse frame counterweight 18 for holding the mechanism 15 in engagement with the outer face of the mass or body of thread on the support or spool X. The thread passes from a supply drum or spool Z through suitable thread guide devices 20 and 21 of usual construction arranged on an oil trough or reservoir 12, see Figs. 2 and 3, the thread guide 21 being in the form of a pulley. The thread then passes through a guide 22, arranged above the oil reservoir, from which the thread passes through the tension device indicated generally by the reference numeral 24, and which is also of usual construction, and serves to apply the necessary tension to the thread to enable the same to

be uniformly wound on the core or spool X. Another thread guide 25 is arranged above the tension device 24. The thread guides 22 and 25 and the tension device 24 are supported from the frame member 11 by means of a bracket 26. The counterweight 18 maintains the thread guide mechanism 15 in contact with the outer or peripheral surface of the mass or body of thread wound on the core or support X, and as the thread builds up on the core or support, the traverse frame swings about its pivot 17, two different positions of the traverse frame being shown in Fig. 1. All of the parts so far described have heretofore been used in connection with winding machines and of themselves constitute no part of this invention.

The oiling or wetting of the thread preferably, but not necessarily, takes place intermittently, the excess oil from the oiled portions of the thread which was oiled by contact with the wiper is thereby deposited on the various tensions and guide members. The portion of the thread which does not contact with the wiper receives oil from these members so that a substantially uniform oiling of the thread takes place. In accordance with my improved device, the length of contact or intervals of time during which oil or liquid is applied to the thread is increased as the speed of the thread increases with the result that after engaging the various guides and tension member approximately the same quantity of oil is applied to any given length of thread at all times during the winding of the thread. In order to accomplish this result, a number of different mechanisms may be used, the one shown in the drawings by way of an example embodying one form of my invention including a rotary oiling or wiper member 30, one of these members being employed in connection with each thread. This rotary member may preferably, but not necessarily, be substantially S-shaped in cross section and is mounted on a driven shaft 31. This member is provided with one or more peripheral wiping portions or arms 32 which are adapted to dip into the oil during the rotation of the oiling member, and also to contact at intervals with the thread and wipe the oil on the thread, two of these wiping arms being shown in the construction illustrated.

The rotary wiper 30 is adapted to turn preferably in the direction indicated by the arrows in Figs. 2 and 3, so that the portions of the outer wiping surface of the arms 32 contacting with the thread, moves contrary to the direction of movement of the thread since it has been found that when the thread and wiper move in opposite directions while in contact, the oiling of the thread can be more accurately regulated since the thread does not tend to adhere to the wiper due to capillary action. The peripheral portions of the arms 32 of the wiper may be of any suitable or desired construction, those shown having their leading faces 33 eccentric with reference to the axis of rotation of the wiper, and the outer ends of these eccentric faces terminate in an abruptly inwardly extending curve 34, for reasons which will be hereinafter explained. The shaft 31 is provided at one end thereof with suitable means for driving the same, pulleys 35 and 36 being shown in the construction illustrated which are secured to the shaft and which make it possible to drive the shaft at different speeds for controlling the quantity of liquid to be supplied to the thread. It will be understood that during the operation of the machine both the spindle axis and the shaft 31 are operated at comparatively constant speed and the pulleys 35, 36 are only intended to be used for controlling the total amount of oil or other liquid to be applied to the thread.

In accordance with this invention, the thread is so guided relatively to the wiper member that when the winding of the thread is commenced and the speed thereof is relatively slow, the thread will be guided approximately as shown in Fig. 2, in which the wiper arms 32 will contact with the thread only during short arcs of their revolution, and when the speed of the thread has increased the thread will be guided as indicated in Fig. 3. In this latter position the wiping portions of the arms 32 will engage with the thread during a much greater arc of revolution, so that the thread will be in contact with the wiper for greater lengths of stretches thereof when the same moves at a higher rate of speed.

In order to accomplish this operation, the thread guide 22, in the construction shown, is adjustable relatively to the wiper, the thread guide 22 being mounted on a slide member 37 which is slidably mounted on a guide arm 38 which may be rigidly secured on the tension device 24 or on any convenient stationary part of the machine. The slide 37 in the construction shown is in the form of a sleeve or collar extending around the guide arm 38 and is slidable lengthwise thereof. The guide arm is preferably also provided with a longitudinal slot 39 and a screw or bolt 40 on which the guide 22 is secured and which is secured to the slide member, passes through the slot and assists in guiding the slide member relatively to the guide arm, nuts of any suitable form being shown for removably securing the bolt 40 and the guide 22 carried thereby on the slide. The sleeve or slide member 37 is preferably provided with a laterally extending pin or trunnion 41. The movement of the thread guide 22 is controlled in accordance

with the rate of lineal movement of the thread, this being preferably accomplished by causing the thread guide 22 to move in accordance with the movement of the traverse frame 16. To attain this purpose an arm 43 mounted on and at an angle to the traverse frame 16 is provided near the outer portion thereof with a series of holes 44, arranged at different distances from the axis 17 about which the traverse frame moves. A link 45 connects at one end with any one of the holes 44 and at its other end is pivotally connected to the pin or trunnion of the slide member 37. Consequently, as the traverse frame 16 swings about the axis 17 due to the accumulation of thread on the rotary support or spool X, the arm 43 and link 45 will move accordingly and will move the slide member 37 and the thread guide 22 downwardly.

The link 45 is preferably adjustable as to its length and for this purpose the link is made in two sections or parts connected by means of a turn buckle 46.

In the operation of the device for applying liquid to the thread, it will be obvious that when the parts are in the position shown in Fig. 2, so that the thread is approximately tangent to the outer portions of the wiper arms 32, only the tips of these arms will touch the thread and through a comparatively short arc of the revolution of the wiper. On the other hand when the thread is lowered as indicated in Fig. 3, the thread will first contact with the cam surface 33 of each wiper arm 32 and thus receive a considerable quantity of liquid from this cam surface, and then upon further rotation of the wiper arm, the thread will wipe across the end 34 of the arm. It will also be obvious that when the thread is in the position shown in Fig. 3, the thread will be in contact with the surface of the wiper arm 32 during very much larger arcs of revolution of the arms than when the parts are in the position shown in Fig. 2. Consequently liquid is supplied to greater length or stretch of the thread, which compensates completely for the increase in speed of the thread. By means of the construction described including the guiding and tension devices a uniform application of oil or other liquid to the thread is insured and the operation of the mechanism is entirely automatic and is controlled entirely by the outer diameter of the mass or bulk of thread which has been wound upon the rotary support or spool axis. By making the end portions 34 of the wiper arms of a fairly abrupt curvature, the arms when about to move out of engagement with the thread will contact with the thread only along a small surface so that capillary attraction of the thread to the wiper will be negligibly small.

In the modified construction shown in Fig. 5, a substantially cylindrical wiper member 50 is employed in place of the S-shaped wiper 30 illustrated in Figs. 1, 2 and 3. The operation of this device is similar to that which has been described in that the thread guide 22 moves the thread into contact with a greater arc of the surface of the cylindrical member. In this construction, however, the thread is continuously in contact with the wiper member 50 and in order to avoid supplying an excess of liquid to the thread, a stationary wiper or brush 51 is preferably used to remove excess oil from the rotary wiper member 50.

Fig. 6 shows still another form of rotary wiper 55, which is substantially elliptical in form and which contacts intermittently with the thread. In this case also the variations in speed of the thread are compensated for by variations in the position of the thread guide 22. Other forms of rotary wiper members may be employed if desired.

I claim as my invention:

1. In a winding machine having a rotary support on which a package of thread is wound in successive layers of increasing diameters, the combination of a device having a surface with which the thread contacts at intervals in passing to said support and which supplies liquid to the thread, and means for causing said thread to contact with larger areas of said surface as the diameter of the package and the speed of movement of the thread increases.

2. In a winding machine having a rotary support operating at an approximately constant speed of rotation and on which a thread is wound in successive layers of increasing diameters, the combination of a device having a surface with which the thread contacts at intervals in passing to said support and which supplies liquid to the thread, and means for causing said thread to contact with said surface for longer stretches of thread as the diameter of the mass of thread wound on said support increases.

3. In a winding machine having a rotary support on which a thread is wound in successive layers of increasing diameters, the combination of a wiping member having a surface which dips into a liquid and contacts with the thread, and means for changing the relative positions of the thread and said wiping member to cause the thread to contact with larger areas of said surface as the speed of the thread increases.

4. In a winding machine having a rotary support on which a thread is wound in successive layers of increasing diameters, the combination of a rotary wiping member having a surface which dips into a liquid and contacts with the thread, and means controlled by the outer diameter of the mass of thread on said rotary support for so guiding

said thread relatively to said wiper that said wiper contacts with said thread during a greater arc of revolution of the wiper as the diameter of the mass of thread on said support increases.

5. In a thread winding machine having a rotary support on which the thread is wound in successive layers of increasing diameters, the combination of a mechanism for applying liquid to the thread including a rotary wiper member adapted to dip into liquid and with which the thread engages during its passage to said rotary support, and means controlled by the diameter of the mass of thread on said rotary support for guiding said thread into contact with a larger portion of the surface of said wiper member.

6. In a thread winding machine having a rotary support on which the thread is wound in successive layers of increasing diameters, the combination of a mechanism for applying liquid to the thread, including a rotary member having a wiper arm adapted to dip into liquid and to engage the thread during the passage of the thread to said rotary support, means for guiding the thread past said rotary wiper member, and means for changing the position of said thread guiding means in accordance with the diameter of the mass of thread on said rotary support, whereby the thread is guided into a position to contact with a greater portion of the wiper arm as the diameter of said mass of thread increases.

7. In a thread winding machine having a rotary support on which the thread is wound in successive layers of increasing diameters, and a traverse frame contacting with the outer periphery of the mass of thread on said rotary support, the combination of a mechanism for applying liquid to the thread passing to said rotary support and including a wiper member having a part adapted to alternately dip into the liquid and contact with the thread passing to said rotary support, guides for conducting said thread into operative relation to said wiper member, and a connection between said traverse frame and one of said guides for guiding said thread into different relative positions to said wiper member so as to cause the thread to remain in contact with said wiper member for greater thread stretches as the diameter of the mass of thread on said rotary support increases.

8. In a thread winding machine having a rotary support on which the thread is wound in successive layers of increasing diameters, and a traverse frame contacting with the outer periphery of the mass of thread on said rotary support, the combination of a mechanism for applying liquid to the thread passing to said rotary support and including a wiper member which dips into a liquid and contacts with the thread, means for guiding the thread into operative relation to said wiper member and which include an adjustable part, and an adjustable connection between said traverse frame and said adjustable part for causing the thread to contact with said wiper member for longer thread stretches as the diameter of the mass of thread on said rotary support increases, thus maintaining the quantity of liquid supplied to the thread substantially uniform.

9. In a thread winding machine having a rotary support on which the thread is wound in successive layers of increasing diameters, and a pivoted traverse frame contacting with the outer periphery of the mass of thread on said rotary support and which swings about its pivot in accordance with changes in the diameter of said mass of thread, the combination of a rotary wiper member which dips into a liquid and contacts with the thread passing to said rotary support, guides for conducting the thread passing to said rotary support into operative relation to said wiper member, one of said guides being movable to change the relative position of said thread to said wiper member, a part mounted on said traverse frame and extending outwardly therefrom, and a link, one end of which is adapted to be connected to said part, the other end of said link being connected to said movable guide, whereby the thread contacts to a greater extent with said wiper member as the diameter of said mass of thread increases.

10. In a winding machine having a rotary support on which a thread is wound in successive layers of increasing diameters, the combination of a rotary wiping member having a surface which alternately dips into oil and contacts with the thread, means controlled by the outer diameter of the mass of thread on said rotary support for so guiding said thread relatively to said wiper that said wiper contacts with said thread during a greater arc of revolution of the wiper as the diameter of the mass of thread on said support increases, and means for varying the speed of rotation of said wiper member to vary the quantity of oil applied to the thread.

11. A device for applying liquid to a thread and adapted for use in connection with a thread winding machine of the type in which a thread is wound in successive layers of increasing diameters including a rotary wiper member adapted to dip into liquid, thread guides for guiding the thread into operative relation with said wiper member, means for causing varying linear travel of said thread, and means operated by said travel causing means for moving said guide members to cause contact of the thread with said wiper member for a longer stretch of thread at each contact therewith with

variations in the rate of linear travel of the thread.

12. A device for applying liquid to a thread and adapted for use in connection with a thread winding machine of the type in which a thread is wound in successive layers of increasing diameters, including means for causing varying linear travel of a thread to be treated, a rotary wiper member adapted to dip into a liquid, a thread guide for guiding the thread into operative relation to said wiper member, and means controlled by said travel causing means for automatically moving said thread guide in a plane perpendicular to the axis of the rotary wiper with changes in the linear travel of said thread so that the length of thread engaged at each contact of the thread with the wiper member increases proportionally to increases in the speed of the thread.

13. A device for applying oil to rayon thread and adapted for use in connection with a thread winding machine of the type in which a thread is wound in successive layers of increasing diameters, including an arcuate-shaped oiling member, means for causing varying linear travel of a thread to be treated, means for guiding the linearly traveling thread into contact with said member, means for applying oil to said member so as to oil the thread in contact therewith, and means controlled by said travel causing means for actuating said guiding means to increase the arc of contact between said thread and member automatically approximately proportionally to the rate of linear travel of said thread.

14. A device for applying liquid to a thread and adapted for use in connection with a thread winding machine of the type in which a thread is wound in successive layers of increasing diameters, including a wiper member adapted to intermittently dip into liquid, means for causing varying linear travel of a thread to be treated, thread guides for guiding the linearly traveling thread into operative relation with said wiper member, and means controlled by said travel causing means and operable automatically to move said thread guides in a manner to cause increased duration of each contact of said thread with said wiper member approximately proportional to the increases in the rate of linear travel of said thread.

15. The process of applying liquid to a linearly traveling thread, which comprises conducting the traveling thread into and out of the path of travel of a liquid bearing contact surface for intermittent contact of said surface and thread, an extent varying with variations in the rate of linear travel of the thread past the contact surface.

16. The process of applying liquid to a linearly traveling thread, which comprises conducting the traveling thread through a chord of the arc of travel of a liquid bearing contact surface, whereby the thread will be engaged intermittently by said surface, and varying the duration of each contact of thread and member by varying the distance between the thread and the center of curvature of said arc with variations in the rate of linear travel of said thread through said chord.

17. In a device for applying liquid to a thread in which a thread is given varying linear travel by being wound in successive layers of increasing diameters, a wiper having a liquid-coated contact surface engageable with said thread during linear travel of the thread, means for causing intermittent contact of said thread with said surface, and means for increasing the length of thread engaged with said surface at each contact of thread and surface with increase in speed of the thread.

18. In a device for applying liquid to a thread in which the thread is given varying linear travel by being wound upon a rotating form, in successive layers of increasing diameters, a wiper member having a liquid bearing contact surface intermittently engageable with said thread, and means including a control member engageable with the winding of the thread on said form for causing variations in linear duration of contact of the thread and wiper member at each engagement between the same, with variations in the winding upon said form.

19. In a device for applying liquid to a thread in which the thread is given varying linear travel by being wound upon a rotating form in successive layers of increasing diameters, a wiper member having a liquid bearing contact surface intermittently engageable with said thread, and means controlled by the thread wound upon said form for causing relative movement of the thread and wiper member in a manner to vary the linear duration of each contact between them with variations in the winding upon said form.

20. In a device for applying liquid to a thread in which a thread is given varying linear travel by being wound upon a rotating form in successive layers of increasing diameters, a wiper member having a liquid bearing contact surface, means for causing intermittent contact between said thread and contact surface, means for causing relative movement of said thread and contact surface in a manner to vary the linear duration of contact of thread and member, and means for operating said last named means, and in turn controlled by the thread wound on said form, whereby the duration of each linear contact of thread and member will

be varied with variations in the winding upon said form.

21. In a device for applying liquid to a thread in which a thread is given varying linear travel by being wound upon a rotating form in successive layers of increasing diameters, a wiper member having a liquid bearing contact surface, means for causing intermittent contact between said thread and contact surface, and means controlled by the winding on said form for causing relative movement of said thread and contact surface in a manner to vary the linear duration of contact of thread and member with variations of the winding on said form, said means being adjustable to vary the extent of change in linear duration of said contact of thread and member for a given change in the winding upon the form.

22. The process of applying liquid to a linearly traveling thread, which comprises causing the transfer to said traveling thread of charges of said liquid at intervals spaced apart along the thread, and varying the length of thread to which liquid is applied at such applications approximately in accordance with variations in the rate of travel of the thread.

23. The process of applying liquid to a linearly traveling thread, which comprises causing intermittent contact between the thread and a liquid bearing contact surface, and varying the duration of such contacts, considered linearly of the thread, with variations in the rate of travel of said thread.

24. In a thread winding machine having a rotary support on which a thread is wound in successive layers of increasing diameters and a traverse frame contacting with the outer periphery of the mass of thread on said rotary support, the combination of a mechanism for applying liquid to the thread passing to said rotary support and including a wiper member adapted to dip into the liquid and contact with the thread passing to said rotary support, guides for conducting said thread into operative relation to said wiper member and a connection between said traverse frame and one of said guides for guiding said thread into different positions to said wiper, so as to cause the thread to remain in contact with said wiper for greater intervals of time as the diameter of the mass of thread on said rotary support increases.

25. In a thread winding machine having a rotary support on which a thread is wound in successive layers of increasing diameters, the combination of a rotary wiper member having a surface which dips into a liquid and contacts with the thread, means controlled by the outer diameter of the mass of thread on said rotary support for so guiding said thread relatively to said wiper that said wiper contacts with said thread during a greater arc of revolution of the wiper as the diameter of the mass of thread on said support increases, and means for varying the speed of rotation of said wiper member to vary the quantity of oil applied to the thread and thus maintain the quantity of oil supplied to the thread substantially uniform.

26. A device for applying liquid to a thread and adapted for use in connection with a thread winding machine of the type in which a thread is wound in successive layers of increasing diameters including a wiper member adapted to dip into a liquid, means for causing varying linear travel of a thread to be treated, thread guides for guiding the linearly traveling thread into operative relation with said wiper member, and means controlled by said travel-causing means and operable automatically to move said thread guides in a manner to cause increased duration of each contact of said thread with said wiper member approximately proportional to the increases in the rate of linear travel of said thread.

27. In a winding machine having a rotary support on which a package of thread is wound in successive layers of increasing diameters, the combination of a wiping member which contacts with and applies a liquid to the thread passing to said support, and means for presenting a larger surface of said wiping member to said thread as the package increases in diameter.

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