Nov. 25, 1969 W. C. TROST ET AL 3,479,988

RUNNING THREAD WAXER

Filed June 26, 1967 3 Sheets-Sheet 1

Fig. 1.

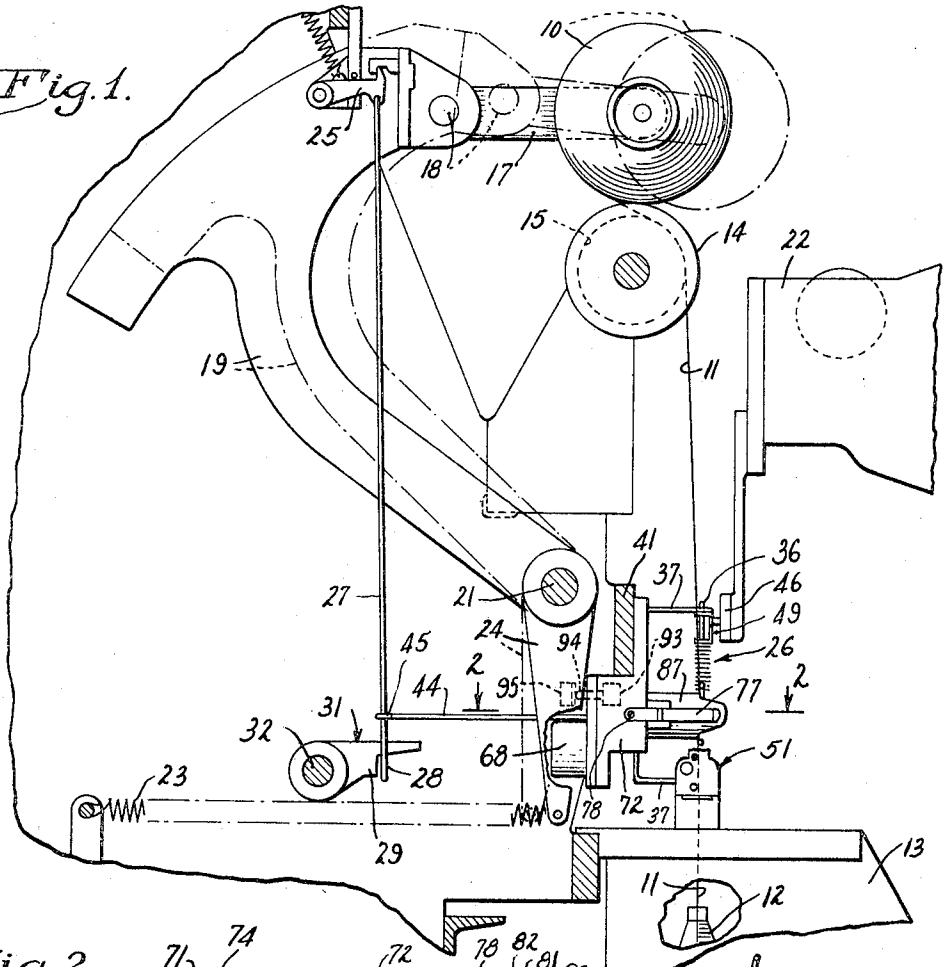
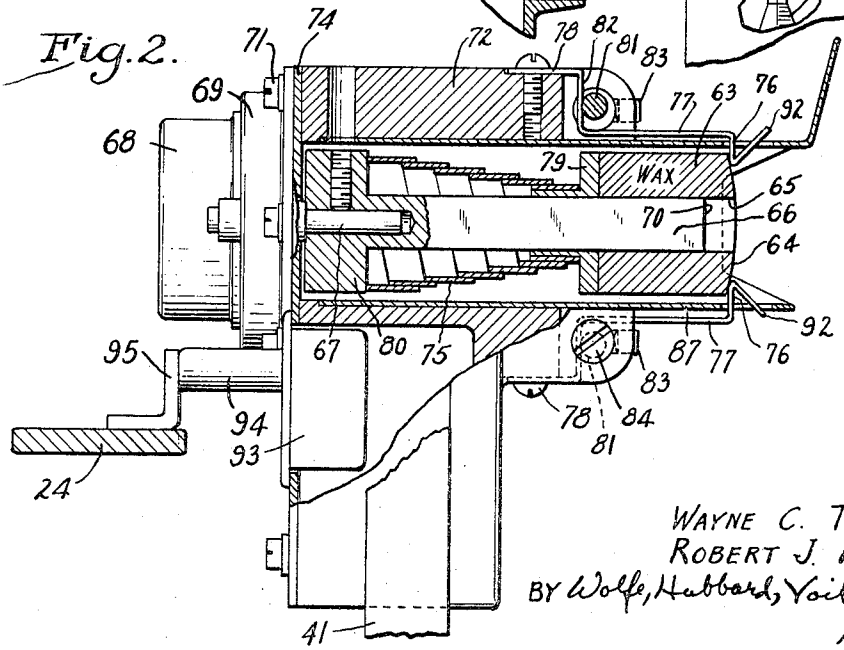


Fig. 2.



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RUNNING THREAD WAXER

Filed June 26, 1967 3 Sheets-Sheet 2

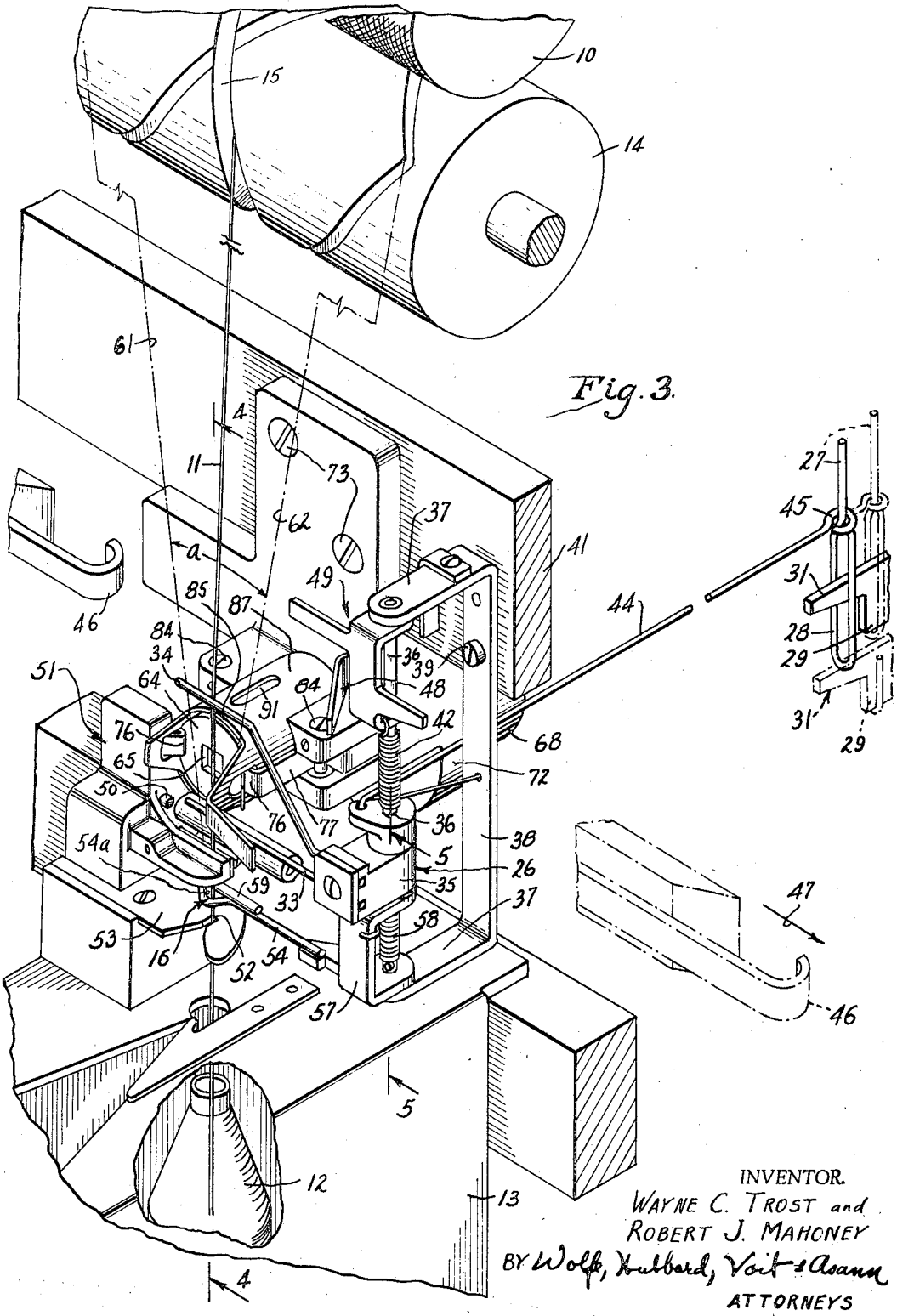


Fig. 3.

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RUNNING THREAD WAXER

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Fig. 4.

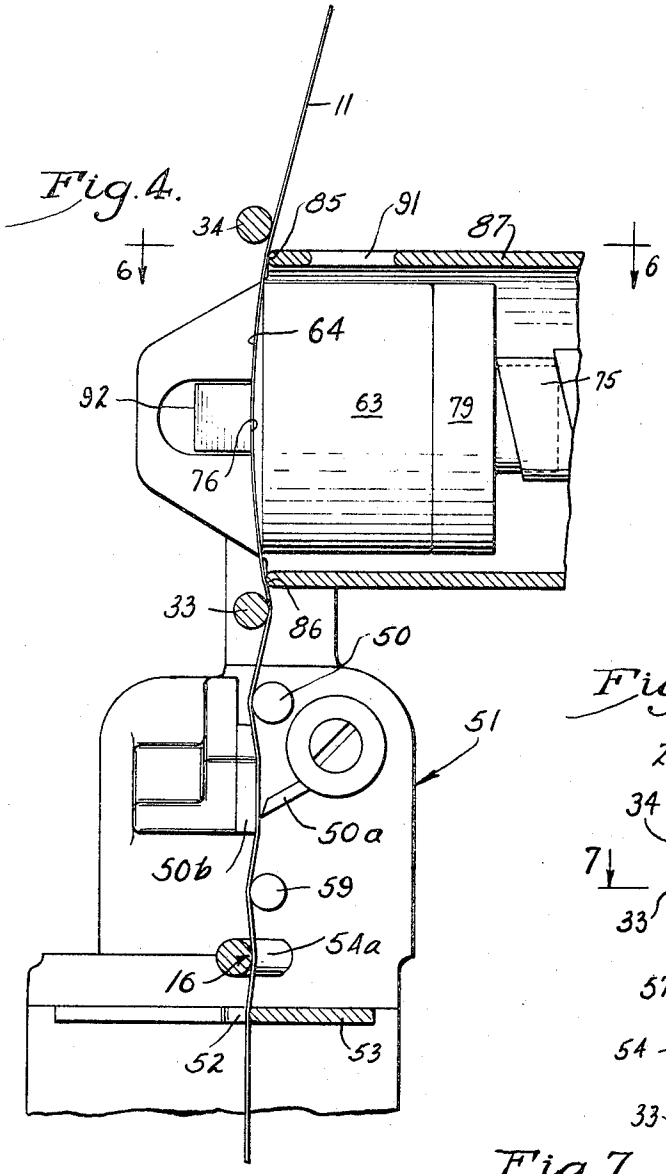


Fig. 6.

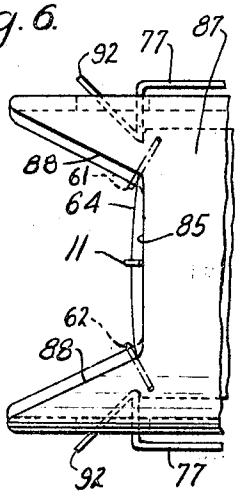


Fig. 5.

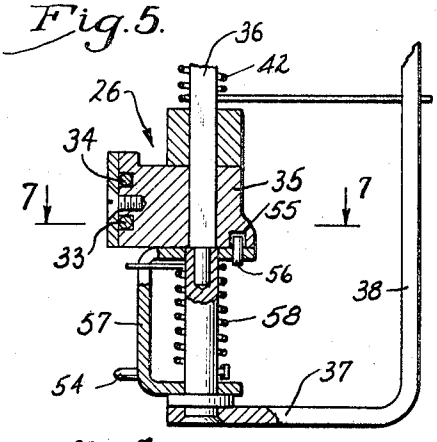
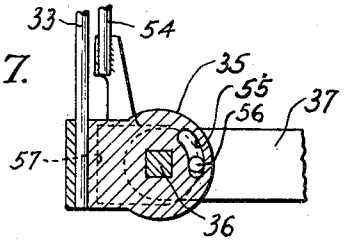


Fig. 7.



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3,479,988

RUNNING THREAD WAXER

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Int. Cl. B05c 3/132
U.S. Cl. 118—78 17 Claims

ABSTRACT OF THE DISCLOSURE

A thread, while being unwound from a bobbin and onto a cheese in a Barber-Colman multiple winder or spooler is traversed back and forth across and held against the exposed end of a wax cylinder by the horizontally swingable fingers of the thread break detector. The cylinder is supported on a horizontal shaft and urged outwardly by a volute spring to hold the cylinder end against adjustable stops which are retractible radially to permit replacement of the cylinder. The cylinder is telescoped on the squared end of the shaft driven by a motor controlled by a switch which is closed when the cheese is in winding position but opened automatically as an incident to breaking of the thread. Means are disposed on opposite sides of said exposed end which engage and raise the thread at reversals of travel to relieve pressure thereof with respect to the wax cylinder.

BACKGROUND OF THE INVENTION

This invention relates to waxer having a rotating wax cake with a circular end surface against which a traveling strand of thread is pressed and lubricated while being drawn longitudinally past and traversed laterally across the wax surface.

SUMMARY OF THE INVENTION

The primary object of the present invention is to provide a waxer of the above character in which the strand is traversed laterally back and forth across substantially the full face of the rotating wax surface without any substantial lateral restraint so as to increase the path of contact of the strand with the wax and to avoid lateral deflection of the strand while effecting uniform waxing of the strand and uniform wearing away of the wax surface. A further aim of the invention is to provide a waxer which is especially suitable for use with existing automatic winders such as a Barber-Colman type winder, the waxer taking advantage of the full strand traversing motion produced by such a winder without requiring any substantial modifications to the winder and while utilizing parts of the winder to accomplish effectual lubrication of the strand.

The invention also resides in the novel arrangement for relieving the rubbing pressure between the strand and the wax surface during momentary reversal of the traversing motions of the strand, and in the unique mounting of the wax cake enabling independent control of the rubbing pressure and the strand tension and enabling easy replenishing of the wax cake.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a fragmentary vertical sectional view through a Barber-Colman spooler showing one winding unit and improved waxer elevation.

FIG. 2 is a fragmentary section taken along the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary perspective view of the parts shown in FIG. 1.

FIGS. 4 and 5 are fragmentary sections taken along the lines 4—4 and 5—5 of FIG. 3.

FIG. 6 is a fragmentary section taken along the line 6—6 of FIG. 4.

FIG. 7 is a fragmentary section taken along the line 7—7 of FIG. 5.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For purposes of illustration, the invention is shown in the drawings incorporated in one winding unit of a Barber-Colman type spooler in which a cheese or cone **10** being formed by thread **11** unwound from successive bobbins **12** placed in a pocket **13** rests on and is driven by a continuously rotating drum **14** having a helical groove **15** in which a thread traveling upwardly through a guide **16** is traversed during the winding laterally back and forth between dot-dash positions shown in FIG. 3 in a triangular path whose apex is defined by the guide **16**. In a Barber-Colman Type F spooler, the cheese **10** is journaled on a horizontal arm **17** pivoted at **18** on the upper end of a lever **19** rotatable on a rockshaft **21** extending along the winder frame so as to swing transversely of and toward the parallel path of movement of a traveler **22** movable along the row of winding units. The traveler includes a knotter and other mechanism for finding the end of a broken thread on the cheese, tying the same to the thread of a new bobbin, and resuming the winding with the return of the cheese arm to the winding position shown in full in FIG. 1.

A spring **23**, acting on an arm **24** rigid with the lever **19**, urges the cheese toward braking position shown in phantom in FIG. 1 to which the cheese is moved upon release of a latch **25** in response to breaking or exhaustion of the thread sensed by a detector **26**. Movement of the cheese to the braking position, then to the tying position and finally return to the winding position is effected by mechanism similar to that disclosed in United States Patent No. 2,757,874.

Release of the latch **25** is effected by a downward pull on a rod **27** having an eye **28** at its lower end straddling the rod and movable by the detector **26** in response to a breaking of the running thread from the inactive position shown in FIG. 3 beneath a part **29** of an arm **31** fixed to a shaft **32** which, in the Type F spooler, is cam oscillated continuously between the upper and lower position shown in full and in phantom in FIG. 3. The thread break detector **26**, which is modified somewhat from prior Barber-Colman constructions for purposes of the present invention, includes two fingers **33** and **34** spaced vertically along the traveling thread and projecting across the thread path from a hub **35** fixed to an upright shaft **36** paralleling the thread. This hub is fulcrumed on the ends **37** of a U-shaped bracket **38** fixed at **39** (FIG. 3) to a horizontal frame plate **41** of the winder frame.

A torsion spring **42** encircling the shaft urges the fingers **33** and **34** clockwise as viewed in FIG. 3 to bend the traveling thread which, when unbroken, holds the fingers in the position shown in FIGS. 3 and 4. When the thread breaks or becomes exhausted, the spring **42** swings the fingers, the hub **26**, and an arm **43** thereon clockwise as viewed in FIG. 3 thus moving to the right a link **44** and an eye **45** encircling the rod **27** thus carrying the eye **28** beneath the vertically oscillating arm **31** so as to trip the latch **25** and release the cheese arm for movement to the braking position. As disclosed more fully in the above mentioned patent, this movement is limited by engagement of a lever (not shown) on the cheese arm with a suitable stop (not shown) on the frame.

For restarting each idle winding unit that it passes, the traveler **22** includes a cam **46** (FIGS. 1 and 3) movable along a path **47** in front of the row of winding units and engageable with a lug **48** on an arm **49** fixed to the shaft **36** of the detector **26** in thread-broken position thereof to swing the same counter-clockwise as viewed in FIG. 3 to allow the entry of the thread after retying of the

broken end of the cheese thread to the end of a replacement bobbin in the winder pocket. After passing the lug **48**, the cam **47** allows the detector fingers to swing back to normal operating position in which the lower finger **33** presses the traveling thread against a stationary horizontal finger **50** of a thread cleaner or so-called snick plate **51**. The latter includes a serrated faced blade **50a** and a platen **50b** against which the thread is urged by fingers **50** and **59**. From the bobbin, the upwardly running thread passes through a notch **52** in a horizontal plate **53** and then through the guide **16** which, during the winding, is formed by a bend **54a** near the free end of a tensioning finger **54**. The latter projects across and in front of the notch **52** and the thread and holds the thread in the notch and against a horizontal pin **59** on the snick plate **51**. The finger is fixed to the lower end of a U-shaped bracket **57** loose on the lower end portion of the shaft **36**. Through a lost motion connection including a slot **55** in the hub **35** and a coacting pin **56** on the bracket **57**, a torsion spring **58** swings the finger **54** clockwise as viewed in FIG. 3 to bend the thread between the notch **52** and the lower guide **59** of the snick plate and thus maintains the traveling thread under a desired winding tension determined by the stress of the spring **58**. By virtue of the lost motion, the latter acts independently of the break detector spring **42**, the finger **54** being swung counterclockwise with the fingers **33**, **34** when the detector **26** is opened by the cam **46** of the traveler.

In a winder of the above character, the running thread between the guide **16** and the driving drum **14** is traversed rapidly back and forth across the detector fingers **33**, **34** and a triangular path defined by the dot-dash lines **61**, **62** in FIG. 3. The apex of the triangle defined by the guide **16** and the included angle *a* is limited, for example to 30 degrees, to insure holding of the thread in the drum groove **15** at conventional high winding speeds.

As incorporated in the winder above described, the improved waxing device includes generally a member, preferably a solid cylinder **63**, presenting, between the detector fingers **33**, **34** and in the triangle defined by lines **61**, **62** near the apex thereof, an upright end surface **64** against which the thread is held as it runs upwardly and is traversed back and forth. The pressure is relatively light but sufficient to cause the lubricant to be picked up from the surface **64** and form the desired coating on the thread.

Preferably, the lubricant is a solid block of wax of a suitable composition such as, for example, a paraffin compound. It is formed into the cylinder **63** of a diameter somewhat greater than the range of traverse of the thread at the level of the end surface **64**. A hole **65** of square cross-section loosely receives the squared forward end of a horizontal shaft **66** attached at its other end to and supported cantilever fashion by a shaft **67** driven at about 60 r.p.m. by a small electric motor **68** operating through reduction gearing in a case **69**. The latter is secured by screws **71** to the cover plate **74** on the inner end of a casting **72** bolted at **73** to the winder frame plate **41** so as to locate the wax surface **64** in proper relation to the line of travel of the thread between the guide **16** and the drum **14** and also at the proper level within the traverse range **61**, **62**.

The wax cylinder is backed by a disk **79** telescoped on the shaft **66** and continuously urged outwardly by a light compression spring **75** abutting at its other end against a hub **80** on the shaft **67**. Being of the so-called volute type, the spring exerts a substantially uniform and outwardly directed biasing force in all degrees of expansion during wearing down of the wax cylinder in service use. The outward advance of the cylinder by the spring is limited by one or more stops **76** which, in the present instance, comprise inwardly bent ends of flat springs **77** lying along diametrically opposite sides of the cylinder and supported cantilever fashion by anchors **78** at the other ends. As shown in FIG. 2, the stops **76** are spaced apart horizontally, and project radially of the cylinder and toward each other so as to project across and engage edge portions of the rotating wax surface **64** outwardly beyond the range **61**, **62** of traverse of the running thread. By employing two stops disposed in a common transaxial plane, cocking of the wax cylinder after only a short length is left on the shaft **67** is avoided effectually.

By the location of the stops **76**, the wax surface **64** is disposed outwardly a short distance beyond the free end **70** of the shaft **66** and beyond a line extending between the snick plate finger **50** and the bottom of the groove in the drum **14** thus bending the running thread outwardly somewhat (see FIGS. 1 and 4) to produce a force component derived from the winding tension in the thread and acting to press the thread against the wax surface. Since the thread tension is determined by the resistance offered by the guide **16** to upward drawing of the thread, it will be apparent that the pressure of the thread against the wax surface may be varied by adjusting the position of the surface along the axis of the cylinder. This may be accomplished herein through eccentrics **81** journaled on the casting **72** and engaging the intermediate parts **82** of the fingers **77** which are of Z-shape to permit of such adjustment. After loosening set screws **83**, the screw heads **84** (FIG. 3) on the eccentrics may be turned to bend the parts **82** and thereby adjust the stops **76** inwardly or outwardly over the range of the eccentrics.

The high degree of uniformity of the thread coating in the present instance is attributable to the efficient wiping of the thread across all areas of the wax surface **64** as a result of the forced traversing of the thread across the central part of the circular end surface of the cylinder **63** combined with the rotation of the cylinder. Also contributing to the uniformity of the rubbing action are guide surfaces **85**, **86** which, as best shown in FIGS. 4 and 6, extend horizontally across the range of thread traverse adjacent and short distances above and below the wax surface **64** and slightly behind the circular periphery thereof as determined by the stops **76**. Herein, these guides are at the outer end of a tubular extension **87** of the casting **72** which extension is only slightly larger in diameter than the wax cylinder.

With the surfaces **85**, **86** thus disposed shortly behind the stops **76** and ahead of the normal line of travel of the thread between the guide **16** and the drum **14**, the thread will be held bent as shown in FIG. 4 and in continuous contact not only with the rotating wax surface **64** but also with these guides which limit the rubbing pressure between the running thread and the wax and thus maintain a uniform rate of transfer of the wax from the surface **64** to the thread. As a result, it has been found that in picking up wax from the surface **64**, the latter becomes rounded somewhat and convexly as shown in FIGS. 4 and 6.

Also, it has been found that any danger of the thread adhering to any area of the wax surface **64** and forming grooves therein can be avoided by relieving the rubbing pressure between the upwardly traveling thread and the wax when the thread is remaining momentarily in substantially the same lateral position at the limits of the range **61**, **62** while the direction of its traverse is being reversed. Herein this is accomplished through the provision of outwardly diverging surfaces **88** which constitute inclined extensions of the guide edges **85**, **86** positioned to engage and lift the thread slightly relative to these guides while the thread is disposed close to the limits of its lateral traverse.

When substantially the full length of the wax cylinder has been worn away as observed through a window **91** in the tube **87**, the remaining length can be removed by retracting the stops **76** radially and outwardly away from each other. For this purpose, wedge-shaped tools (not shown) may be inserted in the spaces (see FIG. 6) between the tube and the fingers **77** thus bending the latter outwardly to swing the stops **76** out of the way. After release of the fingers, a new cylinder is inserted between the converging free ends **92** of the fingers which are

cammed apart as the cylinder is pushed into the tube and telescoped onto its supporting shaft **66** while compressing the spring **75**. It will be observed that such replenishment of the wax supply may be effected without the necessity of swinging of the detector fingers **33, 34** or the tensioning finger **54** out of the way since these fingers do not extend in front of the opening in the tube **87**.

The waxing device above described performs the function of another part of a conventional Barber-Colman winder namely the stationary guide which coacts with the upper and lower fingers **33, 34** to form the thread break detector. Thus, the end surface **64** of the wax cylinder forms a stop in a fixed axial position between the fingers thus limiting the swinging thereof until the thread breaks or becomes exhausted.

In another of its aspects, the present invention utilizes a part of a conventional Barber-Colman winder to control the automatic stopping of the rotation of the wax cylinder in response to breaking of the thread and to utilize the restarting of a winder by the traveler **22** to resume rotation of the cylinder automatically. Preferably such control is achieved through the provision of a switch **93** which controls the energization of the motor **68** and which is biased to open, and is closed by a part of the winder which moves in one direction in response to stopping of the winding by the action of the break detector **26** and in the opposite direction as an incident to restarting of the winder.

In Barber-Colman winders, the depending part **24** (FIG. 1) of the cheese arm **19** executes these desired motions and, in each winding unit, is disposed behind the range of traverse of the thread **11** and substantially in the transverse plane thereof. It is only necessary therefore to mount the motor control switch **93** on the casting **72** with its actuating pin **94** (FIG. 2) projecting rearwardly in line with a lug **95** fixed on and projecting laterally from the depending part **24** of the cheese arm. The lug is so positioned that in the winding position of the cheese arm shown in full in FIGS. 1 and 2, the pin **94** is held in switch-closing position. In response to breaking of the thread and the consequent rocking of the arm **24** to the phantom position by the spring **23**, the lug **95** will be retracted allowing the switch to open and stop the motor **68**. Then, when operation of the winder is resumed by return of the cheese and the arm **19** to the winding position, the lug **95** is moved back to the full line position thus reclosing the switch **93** to resume rotation of the wax cylinder.

With the cylinder thus stopped following a thread break, the danger of either broken end of the thread becoming entangled with the cylinder and wrapped around the latter is avoided. Thus the cylinder is left clear in spite of the tendency of the fibers projecting from the thread to adhere to the wax of the surface **64**.

As used in the appended claims, the term wax contemplates and includes other substances adapted to be picked up by the rubbing action of the running thread and to impart the desired lubricating quality thereto.

We claim as our invention:

1. A device for coating a running strand with a lubricating wax having, in combination, a stationary guide spaced from a supply of the strand, power driven means spaced along the strand from said guide for tensioning the strand and drawing the same off from said supply and longitudinally through said guide while traversing the strand laterally back and forth across a triangular path whose apex is defined by said guide, a generally cylindrical wax cake, drive means for power rotating said cake about an axis extending transversely of and disposed within said triangle adjacent said apex, said cake having a circular end surface yieldably urged to a position of continuous rubbing contact with the running strand and located within said triangle adjacent said apex in a position such that the engaged portion of the strand traverses back and forth across the center axis of said surface but through a range less than the diameter of said surface whereby the wax is removed uniformly from the surface by the combined rotation of said cake and the traversing and longitudinal motion of the strand across said surface, members extending transversely of said strand on diametrically opposite sides of said surface and engaging said strand to hold the latter against said surface, said members being spaced apart a distance greater than the diameter of said surface and being shaped to leave the strand free to traverse laterally back and forth across said surface, and a guide disposed between one of said members and the periphery of said surface and located on the side of the strand opposite the members, and a stop engageable with said end surface and coacting with and adjustable relative to said guide to different fixed positions to cause bending of the running strand a selectively variable amount transversely of said path to change the rubbing pressure of the strand against the surface and thereby control the amount of wax transferred to the strand.

2. A device as defined in claim **1** in which said device includes a second guide in addition to said one guide, said guides extending transversely of the axis of said end surface on diametrically opposite sides of the periphery thereof and on the side of the strand opposite said members, and means rigidly supporting said guides for continuous engagement by the strand as is approaches and leaves said end surface whereby the guides limit the degree of bending of said strand beyond the periphery of said surface.

3. A device as defined in claim **2** in which said first and second guides coact with the rotating end surface and the traversing strand to control the rounding of said end surface to a convex contour.

4. A device as defined in claim **2** in which said guides are formed on diametrically opposed portions of the end of a tube loosely telescoped around said wax cylinder.

5. A device as defined in claim **1** including means engaging said strand as it reaches opposite sides of said triangular path and acting to lift the strand relative to said end surface and thereby relieve the pressure between the surface and the strand during the reversals of the traversing motions of the strand.

6. A device as defined in claim **5** in which said pressure relieving means comprises stationarily mounted and outwardly diverging cam inclines.

7. A device as defined in claim **6** in which said cam inclines are formed on the end of a tube loosely telescoped around said wax cylinder.

8. The combination of, mechanism for drawing a strand off from a supply mass and guiding and tensioning the strand as it travels along an upright path, a power rotated shaft projecting horizontally toward but short of the traveling strand, a solid tubular cylinder of wax telescoped loosely on and coupled to said shaft with one end surface exposed beyond the shaft for engagement of such surface by the traveling strand, means yieldably urging said cylinder along said shaft into engagement with the strand, a stop engageable with an edge portion of said end surface offset horizontally from the path of travel of said strand, means supporting said stop with the strand in rubbing engagement with said end surface, members extending transversely of said strand on diametrically opposite sides of said surface and engaging said strand to hold the strand against and bend the strand around said surface, said members being spaced apart a distance greater than the diameter of said surface, said stop being adjustable to stop the end surface independently of the strand in a fixed but adjustable position thereby to cause bending of the running strand a selectively variable amount around said surface to change the rubbing pressure of the strand against the surface and thereby control the amount of wax transferred to the strand, a pair of guides extending transversely of the axis of the end surface on diametrically opposite sides of the

periphery thereof, each of said guides being disposed between one of said members and the periphery of the surface and being located on the side of the strand opposite the members, and means rigidly supporting said guides for continuous engagement with the strand as it approaches and leaves said end surface whereby the guides limit the degree of bending of said strand beyond the periphery of said surface.

9. A device as defined in claim **8** in which said stop is the inturned end of a lever lying alongside said cylinder and including means pivotally supporting said lever from its opposite end and urging the stop radially and partially across said end surface while permitting retraction of the stop out of the path of advance of said cylinder.

10. A device as defined in claim **8** including means supporting said stop for movement transversely of the shaft axis into and out of the path of advance of said cylinder.

11. A device as defined in claim **8** including a second stop engageable with said end surface diametrically opposite said first stop and means supporting said stops for movement transversely of the shaft axis and into and out of engagement with said end surface whereby to permit said stops to be retracted outwardly from said axis while a replacement cylinder is being telescoped on said shaft.

12. A device as defined in claim **11** in which said stops are individually biased continuously into the path of said end surface.

13. A device as defined in claim **12** including outwardly diverging surfaces carried by said stops and engageable with the end of a replacement cylinder to be cammed apart so as to retract the stops during insertion of such cylinder between the stops and telescoping thereof on said shaft.

14. A device as defined in claim **12** in which said stops are the inturned ends of leaf springs lying along opposite sides of said cylinder and including means supporting said spring cantilever fashion from their opposite ends.

15. The combination of, mechanism for drawing a strand off from a supply mass and guiding and tensioning the strand as it travels along an upright path, a power rotated shaft projecting horizontally toward but short of the traveling strand, a solid tubular cylinder of wax telescoped loosely on and coupled to said shaft with one end surface exposed beyond the shaft for engagement of such surface by the traveling strand, members extending transversely of said strand on diametrically opposite sides of said surface and yieldably urged against said strand to hold the strand against said surface, said members being spaced apart a distance greater than the diameter of said surface, a tube loosely telescoped around said cylinder and having an open end located short of said exposed surface, means on said tube yieldably urging said cylinder outwardly of the tube and into engagement with the strand and cooperating with said members to cause bending of the strand around said end surface, a rigidly supported stop engageable with an edge portion of said end surface offset horizontally from the path of travel of said strand and operable to limit the extent of projection of said cylinder out of said tube thereby to control the extent of bending of said strand around said end surface, said stop being adjustable along said tube to different fixed positions to cause the end surface to bend the strand a selectively variable amount, and a pair of guides on the open end of said tube and extending transversely of the end surface on diametrically opposite sides of the periphery thereof, each of said guides being disposed between one of said members and the periphery of said surface and being located on the side of the strand opposite the members, and means rigidly supporting said guides for continuous engagement with the strand as the latter approaches and leaves said end surface whereby the guides limit the degree of bending of the strand beyond the periphery of the surface.

16. In a device for coating a running strand with a lubricating wax, the combination of, a stationary guide spaced from a supply of the strand, power driven means spaced along the strand from said guide for tensioning the strand and drawing the same off from said supply and longitudinally through said guide while traversing the strand laterally back and forth across a triangular path whose apex is defined by said guide, a generally cylindrical wax cake, drive means for power rotating said cake about an axis extending transversely of and disposed within said triangle adjacent said apex, said cake having a circular end surface yieldably urged to a position of continuous rubbing contact with the running strand and substantially centered within the apex of said triangle in a position that the engaged portion of the strand traverses back and forth across the center axis of said surface but through a range slightly less than the diameter of the surface whereby the wax is removed uniformly from the surface by the combined rotation of said cake and the traversing and longitudinal motion of the strand across said surface, and means engaging said strand as it reaches opposite sides of said triangular path and acting to lift the strand relative to said end surface and thereby relieve the pressure between the surface and the strand during the reversals of the traversing motions of the strand.

17. A device as defined in claim **16** further including a cylindrical tube telescoped loosely around said wax cake, said pressure relieving means comprising stationary outwardly diverging cam inclines on the end of the tube and positioned at opposite sides of said path.

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U.S. Cl. X.R.

24—218, 230