Oct. 30, 1934. E. E. WINKLEY 1,978,850

COP WINDING

Filed Feb. 13, 1930 4 Sheets-Sheet 1

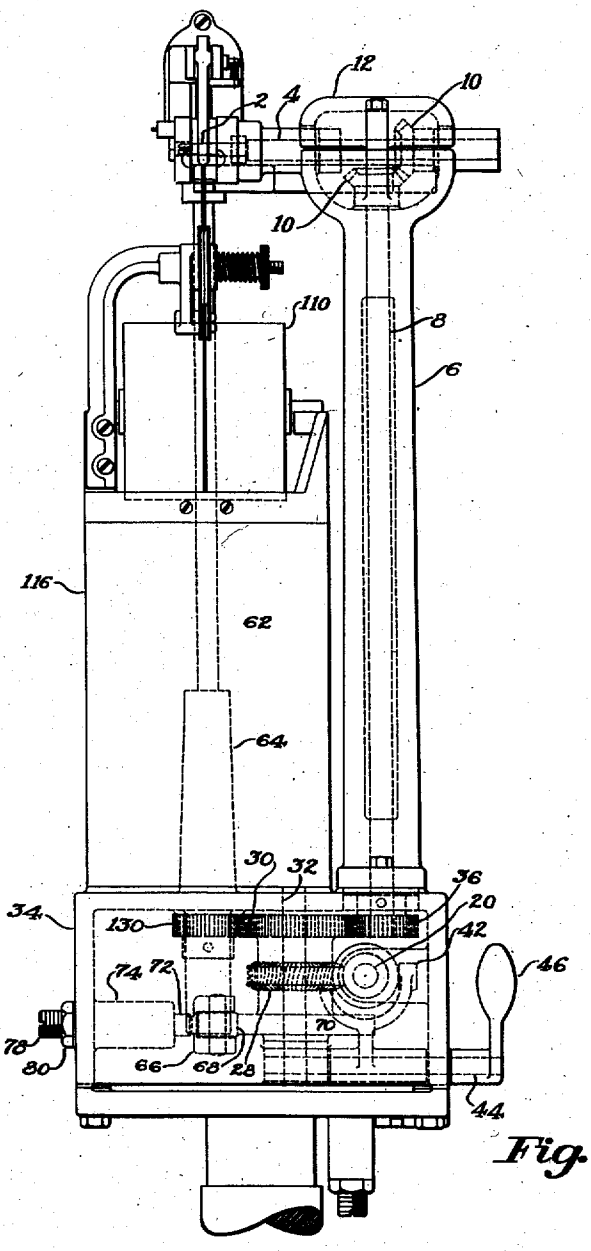


Fig. 1

Witness
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by Van Orsen Fish
Hildreth & Sarg Attys.

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COP WINDING

Filed Feb. 13, 1930 4 Sheets-Sheet 2

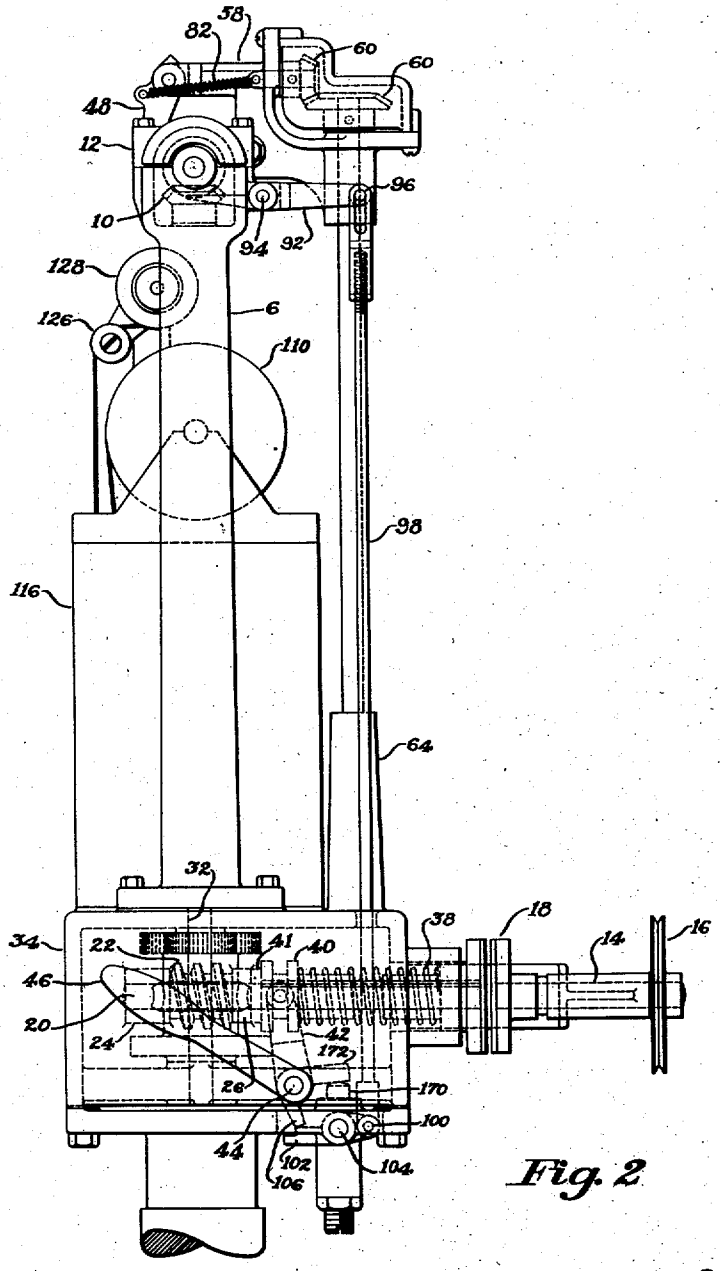


Fig. 2

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Oct. 30, 1934. E. E. WINKLEY 1,978,850

COP WINDING

Filed Feb. 13, 1930 4 Sheets-Sheet 3

Fig. 4

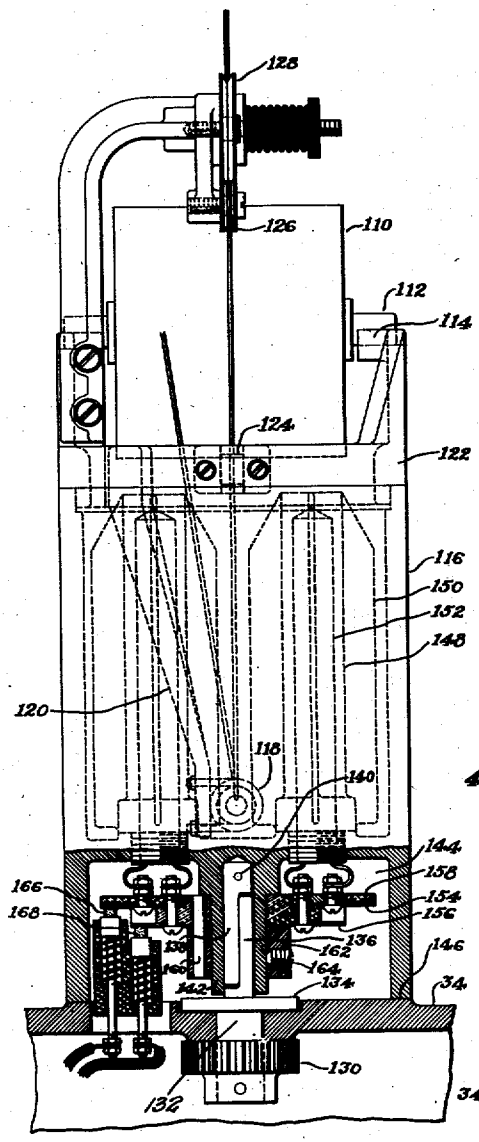
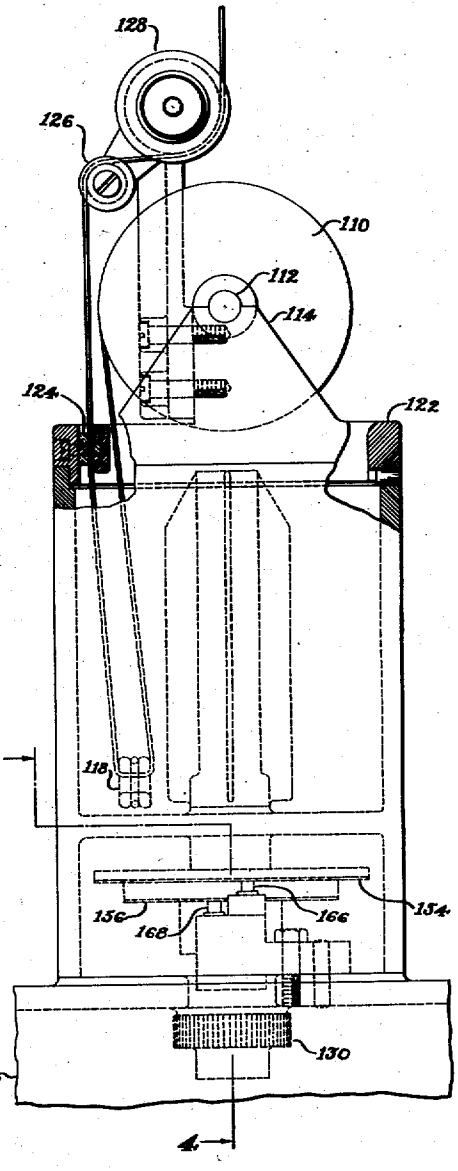


Fig. 3



Witness

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Oct. 30, 1934. E. E. WINKLEY 1,978,850

COP WINDING

Filed Feb. 13, 1930 4 Sheets-Sheet 4

Fig. 6

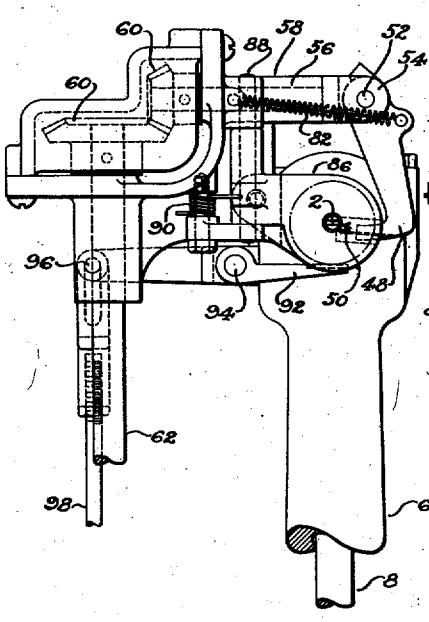


Fig. 5

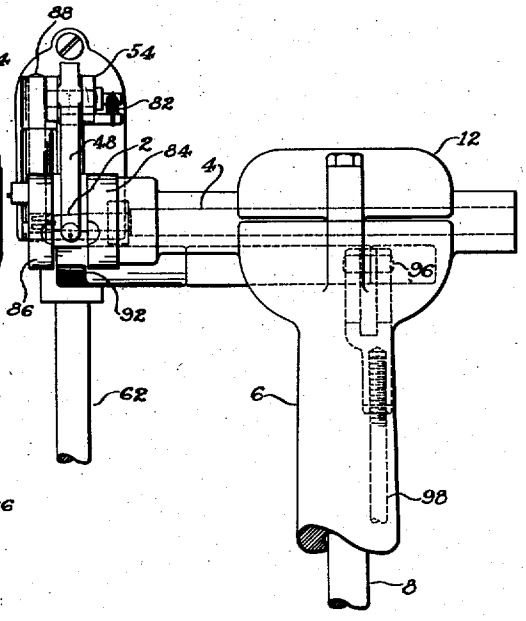
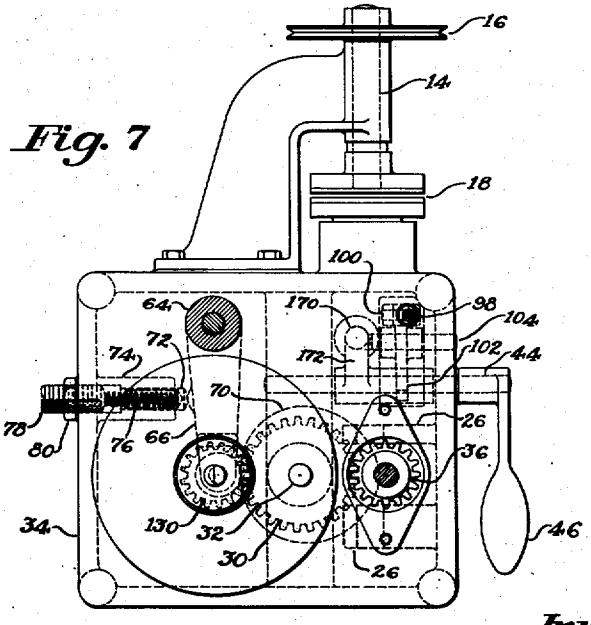


Fig. 7



Witness

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Patented Oct. 30, 1934 1,978,850

UNITED STATES PATENT OFFICE

1,978,850

COP WINDING

Erastus E. Winkley, Lynn, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application February 13, 1930, Serial No. 428,084

12 Claims. (Cl. 117—2)

The present invention has relation in general to the winding of thread, and in particular to the operation of winding thread into self-sustaining packages known as cops, which are used for various purposes, as for example in the shuttles of lock-stitch sewing machines in place of the older form of supply wound on bobbins and requiring to be mounted with capacity for rotation with respect to the shuttle in order to permit delivery of the thread from the bobbin. In the case of the cop-wound supply of thread, the thread is drawn off endwise from the cop, usually from the interior, without resulting rotation of the cop. This form of delivery puts into the thread delivered one turn of twist for each convolution unwound from the cop, which twist tends to cause trouble in many ways, as by causing the stranding or kinking of the thread, and through accumulating and then forcing its way through the tension devices causing wide fluctuations in the tension injuriously affecting the strength and appearance of the finished seam.

The main object of the present invention is to provide a novel and improved cop, and method and apparatus for winding the same which shall provide a "reverse" or compensating twist in the thread as it is wound into the cop, in properly proportioned amount such that the thread will be delivered on unwinding from one end of the cop in straight and balanced relation.

To this end, the invention consists in the method, devices, combinations, and arrangement of parts hereinafter described and claimed, which, together with the advantages to be obtained thereby, will be readily understood by one skilled in the art from the following description, taken in connection with the accompanying drawings showing an illustrative embodiment of the invention.

In the drawings, Fig. 1 is a front elevation of the improved cop winder; Fig. 2 is a side elevation of the same; Fig. 3 is a side elevation on a larger scale of the revolving wax pot and the support for the thread supply in connection therewith, certain portions being broken away; Fig. 4 is a view of the wax pot and support of Fig. 3, viewed from a direction at 90 degrees from that of Fig. 3, shown partly in section on line 4—4 of Fig. 3; Fig. 5 is a front view and Fig. 6 a side view of the winding head, including the winding spindle and the traversing guide; and Fig. 7 is a plan view of the driving devices and transmission of the machine with the wax pot removed and the standard supporting the head also broken away.

Having reference to the drawings, the cop is wound upon the tapered extremity 2 of a positively driven spindle 4 mounted in bearings at the upper end of a standard 6 and driven by a shaft 8 rotating within the standard through beveled gears 10 housed at 12 at the top of the standard. This shaft 8 is driven by power from a suitable source applied to the short shaft 14 by means of a pulley 16 fixed thereon and transmitted through a clutch 18 to the shaft 20 separate from and axially aligned with the shaft 14. This shaft 20 is provided with a worm 22 positioned between the two bearings 24 and 26, which meshes with a worm gear 28 to drive the latter and the spur gear 30 formed integrally therewith and rotatably mounted on a vertical stud 32 fixed in the gear box 34, the spur gear 30 serving to drive the gear 36 fixed on the lower end of the shaft 8. The movable member of the clutch 18 is splined to the shaft 20 and brought into driving engagement with the opposing clutch member by the pressure of a spring 38 which is compressed when the sliding collar 40 splined on the shaft is moved in the direction of the clutch by movement of the yoke 42 that is fixed on a short shaft 44 which extends out through the side of the gear box and is provided at its outer end with a lever 46 whereby the clutch can be operated manually to start the winding operation. The thread is guided onto the end 2 of the spindle 4, slotted to hold the end of the thread, by means of a traversing guide in the form of an arm 48 having a pigtail guide eye 50 fixed on the end thereof, the arm being pivoted at 52 within a yoke 54, the shank 56 of which is rotatably mounted in a bearing in connection with the frame 58 of the winding head and receives a rocking movement of slight amplitude through the beveled gears 60 and the rock shaft 62. The rock shaft 62 extends down through a guide 64 in connection with the gear box into the interior of the latter, where it is provided with an arm 66 having a cam follower 68 which is caused to follow the periphery of a cam 70 on the hub of the worm gear 28 by means of a hollow plunger 72 slidably mounted in a guide 74 in connection with the gear box and pressed against the arm 66 by means of a spring 76 which has a tension adjustment in the form of a set screw 78 threaded into the enlarged portion of the passage through the guide 74 and secured by lock nut 80. The traversing movement thus imparted by cam 70 to the guide eye 50 lays the thread onto the spindle after the familiar quick-traverse manner, to form a cop with the well-known self-sus-

taining wind. The arm 48 is pressed yieldingly against the spindle by means of a spring 82, so that as the cop increases in diameter, the arm moves outwardly away from the spindle to permit such growth. The position of the guide-eye pressing against the cop as the latter grows, controls the winding-on of the thread closely, and also helps to compact the cop. One side of the cop as it is built up is controlled by the adjacent surface of the lug 84 which is a fixed part of the frame 58 of the head while the free end of the spindle is covered by a swinging plate 86 which confines the cop at the opposite side during the winding, and after the completion of the winding is swung outwardly about its pivot in 88 against the compression of a small spring 90 to permit the finished cop to be slipped off the spindle and removed.

Means is provided for automatically stopping the winding when the cop has reached a predetermined diameter. This is effected by means of a feeler 92 in the shape of a lever pivoted at 94 on the frame of the head and connected at 96 with a link 98 which extends down through the gear box and is connected at 100 to a detent 102 pivoted at 104 to the bottom of the gear box and adapted to engage a finger 106, integral with the yoke 42 controlling the clutch and extending down through a slot in the bottom of the gear box, to hold the clutch in engagement and the machine in winding relation. When the cop has attained the predetermined diameter, its periphery forces the feeler 92 away from the spindle, pulls the detent 102 out of engagement with the finger 106, releasing the yoke, and the recoil of the spring 38 together with the push of a spring plunger 170 bearing against a second finger 172 in connection with the yoke 42, thrusts the collar 40 in a direction away from the clutch to disengage the clutch and stop the winding. The collar brings up against a leather washer 41 resting against the side of the bearing 26, to cushion the shock of recoil induced by spring 38, and to act as a brake to check rotation as the collar is held against it by the action of spring plunger 170. The spring 38 reaches the limit of its expansion before the collar reaches the leather washer.

The reverse twist is put in by rotating the wound mass of thread constituting the supply upon an axis at right angles to that of such wound mass. By such rotation, the insertion of one turn of reverse twist for each convolution of the thread wound into the cop is easily accomplished. It is desirable to wax the thread forming the cop, both to improve the quality of the seam formed from such thread and to make the cop itself more rigid and cause it to retain its form better, and where this waxing of the thread has not already been accomplished before the supply thread is wound, it is most satisfactorily performed after the thread leaves the wound mass 110 constituting the supply, and before it is wound into the cop. Thus in the present embodiment, the wound mass of supply thread is mounted on a horizontal axis formed by the spindle 112 received in bearings 114 on the cover 122 of the wax pot 116, and the whole wax pot is rotated on a vertical axis so as to put the reverse twist into the thread. When necessary to effect the waxing at this stage, the thread drawn off from the wound mass 110 is passed down into the wax pot and through the guide eye 118 at the lower end of arm 120 in connection with the cover 122 of the wax pot, and after passing through the molten wax contained in the pot, travels through a stripper 124, over a truck 126 and through the tension device 128, of familiar form and construction, and thence to the guide eye 50 which directs it onto the end 2 of the winding spindle. The thread leads from the tension device to the guide eye 50 substantially in the vertical axis of rotation of the support for the supply thread.

While the thread is travelling along this path, the whole wax pot, together with the support for the wound mass 110 of supply thread, is being rotated about its vertical axis one turn for each revolution of the winding spindle 4. This motion is derived from the spur gear 30 through the gear 130 meshing therewith, the latter being of the same size as the gear 36 which drives the winding spindle, and fixed upon a short shaft 132 which has a flange 134 seated in the top surface of the gear box 34 and a half-round continuation 136 which acts as a driving key through its engagement with a corresponding half-round section 138 which is pinned at 140 within the circular bore of a sleeve 142 extending downward axially at the center of the hollow base 144 of the wax pot. The depending rim of this hollow base rests upon the top of the gear box 34 at 146 and when the gear 130 is rotated, the wax pot also rotates while its weight is supported by such rim at 142.

To provide for keeping the wax within the wax pot in proper molten condition, heat is supplied to the interior of the wax pot, as it rotates, by means of housings 148 equipped with radiating flanges 150 and containing electric heating units 152, the terminals of which are respectively connected to slip-rings 154, 156, of different diameter, mounted upon circular plates of insulating material 158, and caused to turn in unison with the wax pot by reason of the pin 160 and the collar 162 fixed to the sleeve 142 by a clamping screw 164. Spring-pressed brushes 166, 168 bear against the respective slip-rings 154, 156, and carry electrical current from suitable source to energize the heating units. By this arrangement, current is fed continuously to the heating units within the wax pot while the latter is in rotation.

In the event that the supply thread has been previously prepared with wax or lubricant, the lead of the thread through the wax pot is omitted, and the thread is carried directly to the truck 126 and thence through the tension to the winding spindle.

What is claimed as the invention is:

1. A cap winder having, in combination, a winding spindle, a wax pot mounted for rotation, a support for a wound mass of supply thread in connection with the wax pot, and means for rotating the wax pot to impart one turn of twist to the supply thread for each revolution of the winding spindle in a direction to neutralize the twist resulting from drawing thread axially from the completed cop.

2. A cop winder having, in combination, a winding spindle, a wax pot, a tension device, means for supporting a wound mass of supply thread, and means for imparting one turn of twist to the supply thread between the tension device and the winding spindle for every revolution of such winding spindle in a direction to neutralize the twist resulting from the drawing thread axially from the completed cop.

3. The method of winding self-sustaining cops for wax thread sewing machines consisting in impregnating the thread with wax and before the wax has set winding the thread into a cop and imparting to the thread one turn of twist for

each convolution of thread going into the making of the cop in a direction to neutralize the twist resulting from drawing thread axially from the completed cop.

4. A cop winder having, in combination, a winding spindle, a wax pot, a support for a wound mass of supply thread, means for imparting one turn of twist to the thread for each convolution thereof wound into the cop, actuating means for these instrumentalities, and means acting automatically to suspend the actuation when the cop has attained a predetermined size.

5. A cop winder having, in combination, winding means adapted to build the cop, a support for a wound mass of supply thread, and means for imparting to the thread one turn of twist for each convolution thereof wound into the cop in a direction to neutralize the twist resulting from drawing thread axially from the completed cop.

6. A cop winder having, in combination, a winding spindle, positive driving means therefor, a wax pot rotatably mounted and adapted to be revolved turn for turn with the spindle through positive connections with the driving means, supporting means for a wound mass of supply thread upon the wax pot, and means for automatically suspending the operation of the driving means when the cop attains a predetermined size.

7. A cop winder having, in combination, a winding spindle, a wax pot, a support for a wound mass of supply thread upon the wax pot, means for rotating the wax pot and the support to impart one turn of twist to the thread for each convolution wound onto the cop in a direction to neutralize the twist resulting from drawing thread axially from the completed cop, heating units in connection with the wax pot, and means for supplying a heating agency to such units while the wax pot is rotated.

8. A cop winder having, in combination, winding devices including a spindle, means for supporting a wound mass of supply thread, and means for relatively rotating the mass of supply thread and the spindle to impart one turn of twist to the supply thread for each revolution of the spindle in a direction to neutralize the twist resulting from drawing thread axially from the completed cop.

9. A machine for forming thread packages having, in combination, means including a spindle for winding a self-sustaining cop of thread, means for supporting a wound supply of thread to revolve about an axis concentric to that about which the supply is wound and also to revolve about an axis disposed at an angle to that of the supply, and connections between the winding spindle and the thread supporting means for revolving uniformly the supply of thread about the angularly disposed axis one turn for each complete rotation of the spindle.

10. A machine for forming thread packages having, in combination, a spindle for winding a cop of thread, means for supporting a supply of thread, a thread guide for quickly traversing the thread as it is wound on the spindle to render the cop self-supporting, a thread tension device and means for imparting uniformly a 360° twist to the thread extending between the winding means and the thread tension device for each complete rotation of the spindle, said thread guide being pressed resiliently against the spindle to compress the thread against the cop during winding.

11. A machine for forming thread packages having, in combination, means including a spindle for winding a self-sustaining cop of thread, a rotary shaft for supporting a supply of thread arranged relative to the spindle to produce a twist in the thread when rotated, an electrically heated wax pot mounted to rotate with said shaft, and electrical connections to the wax pot.

12. A machine for forming thread packages having, in combination, means including a spindle for winding a self-sustaining cop of thread, a rotary shaft for supporting a supply of thread arranged relative to the spindle to produce a twist in the thread when rotated, an electrically heated wax pot, disconnectible connections for mounting the wax pot on the machine to rotate with the shaft, and electrical connections to the wax pot including slip rings and brushes contacting therewith to permit separation of the wax pot from the machine.

ERASTUS E. WINKLEY.

CERTIFICATE OF CRRECTION.

Patent No. 1,978,850. October 30, 1934.

ERASTUS E. WINKLEY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 15, for "in" read pin; line 128, claim 1, for "cap" read cop; and line 144, claim 2, strike out the word "the"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of April, A. D. 1935.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.

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