F. S. RAND.

WINDING MACHINE.

APPLICATION FILED APR. 24, 1912.

1,088,367.

Patented Feb. 24, 1914.

2 SHEETS—SHEET 1.

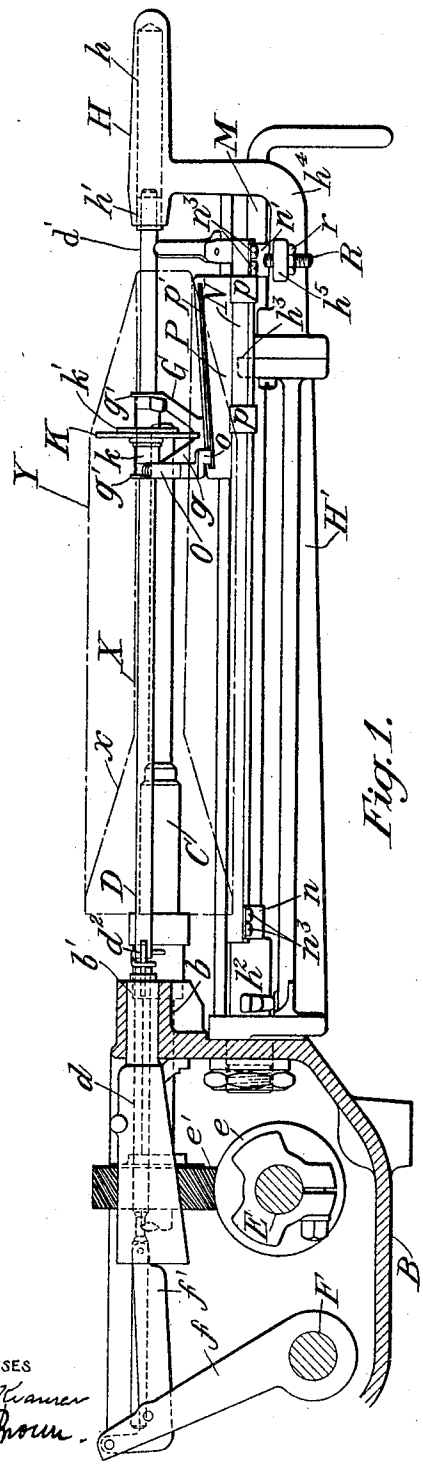


Fig. 1.

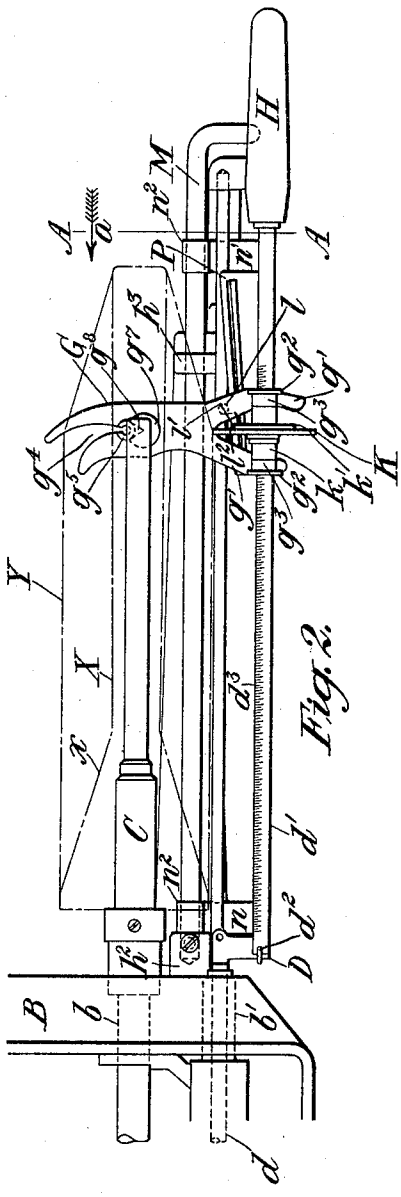


Fig. 2.

WITNESSES

G. P. Kramer

C. S. Brown.

INVENTOR

By Fenton S. Rand,

Foster, Freeman, Watson & Coit

ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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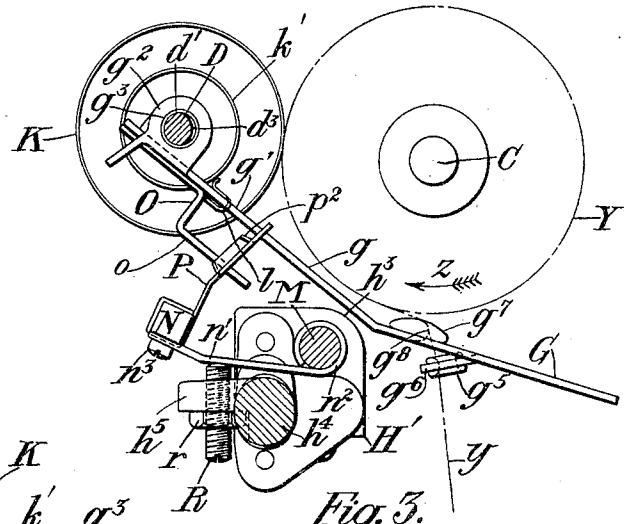


Fig. 3.

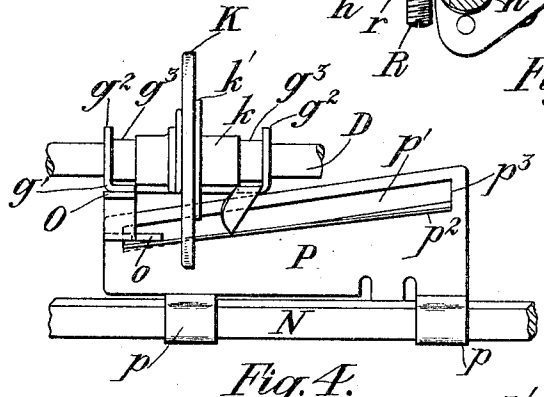


Fig. 4.

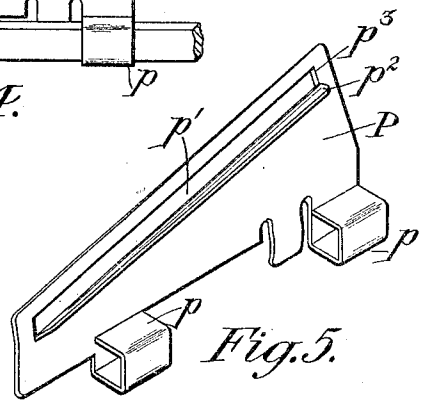


Fig. 5.

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C. D. Brown.

INVENTOR

Festus S. Rand.

BY Foster, Freeman, Watson & Coit

ATTORNEYS

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FESTUS S. RAND, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO UNIVERSAL WINDING COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

WINDING-MACHINE.

1,088,367. Specification of Letters Patent. **Patented Feb. 24, 1914.**

Application filed April 24, 1912. Serial No. 692,768.

To all whom it may concern:

Be it known that I, FESTUS S. RAND, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Winding-Machines, of which the following is a specification.

My invention relates to winding machines and particularly to machines for winding cops or bobbins in which the yarn or thread is built up in conical layers to form a cylindrical body portion terminating in a tapered nose or delivery end.

My improvement consists in providing means for guiding and directing the thread-guide in its traverse along the winding-spindle to so regulate its path of travel that it will follow the inclination of the surface on which the yarn is being wound, in close proximity thereto, but without contacting with, or bearing on, said surface.

The object of my improvement is to prevent the thread-guide from rubbing against the layers of yarn as the latter are deposited on the cop, thereby relieving the yarn of the abrasive action to which it is usually subjected and preventing the guide from displacing the coils of winding after they have once been laid in place.

My improved device also provides for winding the yarn in steeper layers, that is, with a greater inclination to the axis of the cop than has heretofore been possible, because there will be less tendency of the coils to become misplaced and the nose of the cop to be broken down under the action of the guide; and hence more material can be compacted in a cop having a definite diameter and length.

The invention is fully set forth in the following specification, illustrated by the accompanying drawings, in which:—

Figure 1 is a longitudinal elevation of a portion of a winding machine, showing the winding-spindle and traverse-mechanism for the thread-guide, with the frame shown in section to illustrate the means for driving the spindle and guide; Fig. 2, a plan view of the winding-spindle and traverse-mechanism; Fig. 3, an enlarged part-sectional view of the same, taken on the line A—A of Fig. 2, looking in the direction indicated by the arrow *a;* Fig. 4, an enlarged detail view of the guiding-devices for the thread-guide; Fig. 5, an isometric view of the track-plate for the thread-guide.

Referring to Figs. 1 and 2, B designates the frame of the winding machine, in which is a bearing *b* for the rotating winding spindle C and a bearing *b'* for the reciprocating traverse-bar D. The spindle C is driven from the main driving-shaft E of the machine through suitable connections, such, for instance, as the spiral or skew-gears *e*, *e'*, shown in Fig. 1; and the traverse-bar D is reciprocated by a rocker-arm *f* mounted on the oscillating shaft F and connected to the traverse-bar by a link *f'*. The traverse-bar D is preferably constructed in two parts, with the main portion *d* arranged to slide in the quill-shaped bearing *b';* and the extension *d'* secured at d^2 to the outer end of the portion *d* and supported at its opposite end in an outboard bearing H. The bearing H is mounted on a bracket H' secured to the main frame B of the machine and extending parallel to the winding-spindle. An elongated bore *h* is provided in the bearing H and at its inner end is a bushing *h'* in which the end of the extension *d'* of the bar D slides.

Mounted on the extension *d'* of the traverse-bar D and arranged to oscillate about its axis is the traverse thread-guide G. Preferably, the main portion *g* of the thread-guide, or the guide-holder as it is usually called, is constructed of sheet-metal in bifurcated form, with two legs *g'*, *g'* having upturned ears g^2, g^2. The ears g^2, g^2 are bored to receive bushings g^3, g^3 which surround the round rod or bar *d'* and constitute bearings for the guide-holder *g* on the bar. Referring to Figs. 2 and 3, the opposite end of the guide-holder is formed with a curved opening or mouth g^4 which leads into an eye g^5 secured in an ear g^6, see Fig. 3, bent down from the main portion of the holder. Also secured in the guide-holder *g*, adjacent the eye g^5, is the main button-shaped guide g^7, formed with a V-shaped opening g^8 through which the yarn *y* draws as it leads to the cop Y.

Between the legs *g'*, *g'* of the guide-holder *g* is an internally-threaded sleeve or nut *k*, arranged with its ends abutting the inner ends of the bushings g^3, g^3. As will be seen from reference to Fig. 2, the bar *d'* is formed with screw-threads d^3 which are cut only partially around it, that is to say, through-

out only one-half of its circumference. The threaded bore of the nut k is of sufficient internal diameter to allow it to slide freely over the threads d^3 on the bar d' when the nut and bar are in axial alinement; but the threads in the bore of the nut may be engaged with those on the bar by carrying the nut into a position eccentric to the axis of the bar. This is accomplished automatically by a spring l fastened to the guide-holder g at l' with its end l^2 bearing on the periphery of a flange k' secured to the nut k, see Fig. 2. A contact-wheel or disk K is secured to the nut k adjacent the flange k' and is adapted to bear on the periphery of the cop to receive an intermittent rotation therefrom which is transmitted to the nut k to turn the latter on the traverse-bar. The turning of the nut k on the traverse-bar D acts to advance the thread-guide G progressively along the winding-spindle to effect the longitudinal growth of the cop, in a manner now well known to those versed in the art to which the present invention belongs.

The winding is started at the base end of the cop and the first layers of yarn are deposited on the conical butt or form x of the wooden bobbin X, represented by dot-and-dash lines in Figs. 1 and 2. In the machines previously employed for winding cops of the kind hereinbefore described it has been the usual practice to arrange the guide to bear directly on the surface of the winding as the coils of yarn are deposited in place. It has always been considered necessary that the guide should be in close contact with the cop in order that the coils of yarn may be disposed precisely and accurately as they are deposited on its surface. I have now determined, however, that the winding can be performed with the same accuracy and precision if the guide does not bear directly on the surface of the cop, providing it is maintained in close proximity thereto. In fact, the character of the winding is improved under these latter conditions, since the coils when once laid in position will not be subsequently displaced by the rubbing action of the guide. To accomplish my purpose of maintaining the guide in close proximity to the surface of the winding during its traverse without allowing it to contact with the cop I make use of the devices now described:

Mounted in bearings h^2, h^3 in the bracket H' is a rod M extending parallel to the traverse-bar D. This rod serves, in connection with certain other devices, to control the starting and stopping of the machine, but as the stopping-mechanism is not related to the present invention it will not be described in detail. Pivoted on the rod M, at either end, are two hinge-members n and n' which support a longitudinal bar N of square section extending parallel to the traverse-bar D. The members n and n' preferably take the form of sheet-metal strips having their ends curled over at n^2, n^2 to surround the rod M, and their opposite ends are secured to the bar N by any suitable means, such, for instance, as the screws n^3, n^3, etc., see Figs. 1, 2 and 3. Mounted to slide on the bar N is the track or guiding-plate P which controls and directs the course of the thread-guide. As shown in Fig. 5, the plate P is formed of sheet-metal, substantially triangular in shape, with two ears p, p bent to conform to the shape of the bar N on which the plate is supported. Extending along the upper edge of the plate P is a slot p', formed by cutting away the metal which is bent back in a lip p^2 to serve as a bearing face or track for the guide-holder, as more fully explained hereinafter.

Attached to the under side of the leg g' of the thread-guide holder g is a finger O having an offset portion o which extends through the slot p' and bears on the track p^2. The finger O acts as a runner for the guide-holder g and travels in the slot p' to direct the course of the thread-guide in conformity to the track p^2 on the guide-plate P.

Extending from the arm h^4 of the bearing H is a lug h^5, see Figs. 1 and 3. The lug h^5 is positioned directly beneath the hinge-member n' and a stud R extends up through the lug with its end bearing against the under side of the member n'. By turning the stud R the hinge-member n' can be adjusted upward or downward to raise or lower the bar N, and a check-nut r is provided on the stud to lock the latter in its adjusted position.

The operation of the whole device is as follows: Referring to Fig. 3, it will be observed that the thread-guide holder g is arranged to swing on the traverse-bar D to adapt it to oscillate toward and away from the winding-spindle C. The guide-holder g is arranged below the spindle C, this being opposite to the usual arrangement in previous machines, so that the movement of the guide away from the spindle is downward instead of upward. The yarn y is led up from its source of supply, not here shown, draws through the eye g^5 and guide g^7, and thence feeds on to the surface of the cop, which is illustrated in Fig. 3 by the dot-and-dash line Y. The cop rotates in the direction indicated by the arrow z and the tension on the yarn y tends to draw the whole thread-guide G downward, away from the winding-spindle. This downward pressure of the guide is resisted by the finger O which bears on the track p^2 of the plate P and the relation of the guide g^7 to the surface of the cop is adjusted by regulating the position of the plate. Now, since the plate P rides on the bar N it is only necessary to raise or lower the latter to adjust the guide in relation to the winding, and this is ac-

complished by simply turning the stud R which bears on the hinge-member n'. As shown in Fig. 3, the guide g^7 is set to just clear the outer surface of the cop Y when the finger O is in the position illustrated in Fig. 4, and the tension of the yarn drawing through the guide will hold it away from the cop and maintain the finger O bearing on the track p^2. As the traverse-bar D is reciprocated the thread-gide G is traversed back and forth along the winding-spindle C and the finger O will ride up and down the incline of the track p^2. This causes the guide g^7 to oscillate toward and away from the winding-spindle and the inclination of the track is such as to direct the guide in a path conforming to the tapered surface of the butt x of the cop-tube or bobbin X. In this way all of the layers of winding are laid on the cop-tube with the same inclination to the axis of the cop while, at the same time, the thread-guide is kept from rubbing against the yarn during the whole winding. After the first layer of winding is built upon the butt x the periphery of the contact-wheel K will engage the yarn at its point of greatest diameter, during the backward stroke of the thread-guide, and the wheel will be turned to impart a slight, rotary movement to the nut k. In this way the thread-guide G is advanced a short distance along the traverse-bar at each reciprocation, or after each layer of winding is completed, so that the cop grows by longitudinal extension without any increase in the diameter of its body portion. Each advance of the thread-guide serves to slide the plate P along its supporting-bar N to a corresponding extent, the finger O on the thread-guide holder g contacting with the end p^3 of the slot p' in the plate to push the latter forward. It will be seen, therefore, that the guiding-plate P keeps pace with the thread-guide in the latter's advance along the winding-spindle and is constantly in position to direct the course of the guide so that the latter will follow the surface on which the winding is being performed, but without bearing on or rubbing against the yarn in the cop.

As before explained, my invention provides a simple and efficient means for controlling the path of the thread-guide to maintain the latter in close proximity to the surface on which the winding is being performed, so that the coils of yarn may be laid in place accurately and precisely, while, at the same time, the guide is prevented from rubbing on the yarn. The yarn is therefore saved from rubbing friction and abrasion and the cop can be built up with steeper layers without any tendency for its nose to become soft or malformed through the displacement of the coils.

Various modifications might be made in the form and arrangement of the parts of my device without departing from the spirit or scope of the invention.

Therefore, without limiting myself to the exact embodiment shown and described, what I claim is:—

1. In a winding machine, the combination with a winding-spindle, of a reciprocating thread-guide adapted to oscillate toward and away from the axis of the spindle and arranged with the yarn drawing through it in such manner as to tend to hold the guide away from the surface of the winding, and means engaging the guide to direct its path of travel and to resist the tendency of the yarn to move the guide away from the axis of the spindle whereby the guide is maintained in close proximity to the surface of the cop without contact therewith.

2. In a winding machine, the combination with a winding-spindle and thread-guide, of means to cause a relative reciprocation between the spindle and guide, and a track against which the guide bears to direct its path of travel in relation to the spindle to maintain it constantly in close proximity to the conical surface of the winding, said guide arranged with the yarn drawing through it in such manner as to maintain the bearing surface of the guide constantly in engagement with the guiding-track and to hold the guide away from the surface of the winding.

3. In a winding machine, the combination with a winding-spindle, of a reciprocating thread-guide adapted to oscillate toward and away from the spindle, guiding-means to direct the traverse of the guide in a path parallel to the conical surface of the winding, and means to adjust said guiding-means to maintain the guide in a fixed relation to the winding surface without contact of the guide therewith.

4. In a winding machine, the combination with a winding-spindle, of a reciprocating thread-guide, means to progressively advance the guide along the spindle to build the cop, a track adapted to direct the traverse of the guide to maintain it in close proximity to the conical surface of the winding without contact therewith, means to support said track to allow it to move longitudinally of the spindle with the advance of the guide, and means to adjust the track-supporting means to vary the position of the guide in relation to the spindle.

5. In a winding machine, the combination with a winding-spindle, of a reciprocating thread-guide arranged to be normally held away from the surface of the winding, means to progressively advance the guide along the spindle, a member extending parallel with the winding-spindle and adjustable in lateral relation thereto, and a track mounted to slide on said member and

adapted to take the thrust of the guide outward from the spindle to hold the guide in proximity to the surface of the winding.

6. In a winding machine, the combination with a winding-spindle, of a reciprocating and oscillating thread-guide arranged below the spindle with the yarn leading through it and tending to hold it away from the spindle, a member extending parallel with the spindle, a track supported on said member and arranged to direct the thread-guide in a path parallel to the surface of the winding, and means to adjust the member laterally in relation to the spindle to regulate the position of the guide in relation to the surface of the winding.

7. In a winding machine, the combination with a winding-spindle, of a reciprocating thread-guide arranged to oscillate toward and away from the spindle, a bar N supported parallel with the spindle and adjustable laterally in relation thereto, a plate P arranged to slide on the bar and formed with a track adapted to direct the course of the thread-guide in its traverse, and means to adjust the bar N to vary the position of the guide in relation to the surface of the winding.

8. In a winding machine, the combination with a winding-spindle C, of a reciprocating traverse-bar D, a thread-guide G pivoted on said bar to oscillate toward and away from the winding-spindle, a bar N supported parallel with the bar D and adjustable laterally in relation to the spindle C, means to adjust the bar N, a track-plate P mounted to slide on the bar N and formed with a slot p', and a finger O on the guide G adapted to slide in the slot p', to direct the path of travel of the guide in conformity with the surface of the winding.

9. In a winding machine, the combination with the frame B, of a winding-spindle C rotating in a bearing in the frame, a bracket H′ supported on the frame, a traverse-bar D reciprocating in bearings in the frame and bracket, a thread-guide G pivoted on the bar D to oscillate toward and away from the winding-spindle, a rod M mounted in bearings in the bracket H′, hinge-members n, n' pivoted on said rod, a bar N supported by said hinge-members, a guiding plate P adapted to slide on the bar N and formed with a track p^2, a finger O extending from the guide G to engage the track p^2, and a stud R adjustable in the bracket H′ to engage one of the hinge-members n' to raise or lower the bar N and adjust the position of the thread-guide in relation to the winding-spindle.

10. In a winding machine, the combination with the winding-spindle and thread-guide, of a track-plate P for directing the course of the thread-guide, said plate formed of sheet-metal with a slot p' extending along its edge and having a portion of the metal cut away from the slot bent at right-angles to the plate to form a bearing track p^2.

11. In a winding machine, the combination with the winding-spindle and thread-guide, of a bar N, and a track-plate P for directing the course of the thread-guide, said plate formed of sheet-metal with two ears p, p bent around the bar N and a slot p' extending along its edge with the metal cut away from the slot bent at right-angles to the plate to form a track p^2.

In testimony whereof I affix my signature in presence of two witnesses.

FESTUS S. RAND.

Witnesses:

ARTHUR A. ARMINGTON,

HERBERT K. ALLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."