Feb. 23, 1926. 1,573,933

W. E. GUEST

METHOD AND MEANS FOR WINDING

Filed Feb. 9, 1924

Fig. 1.

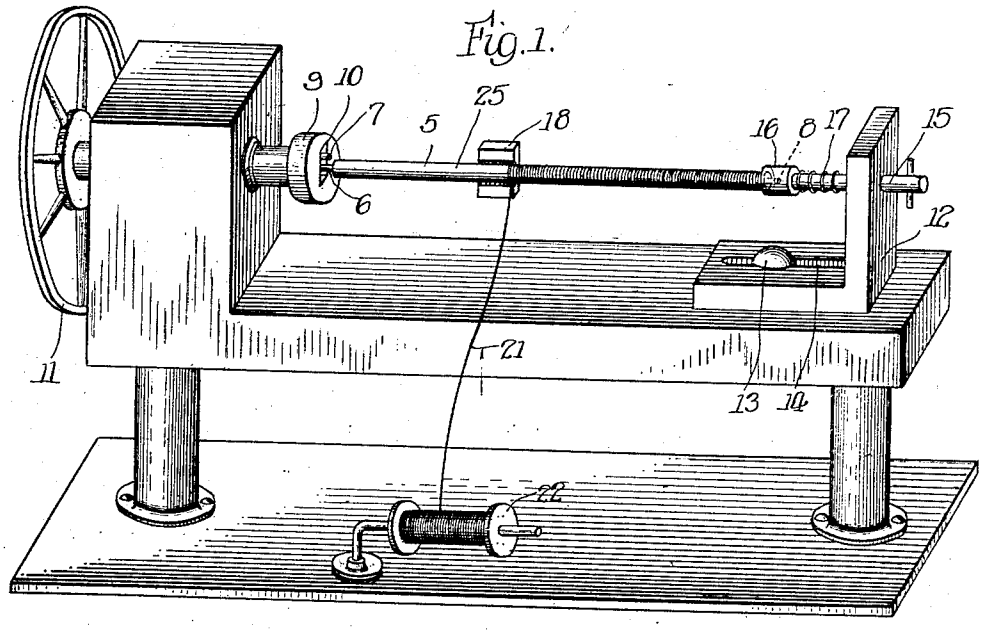


Fig. 2.

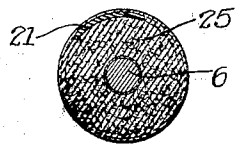


Fig. 4.

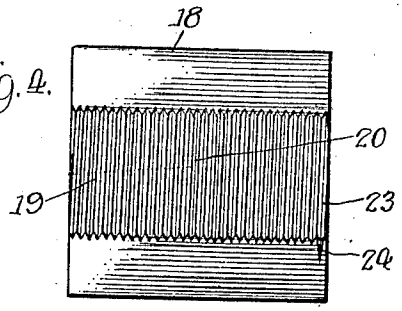


Fig. 5.

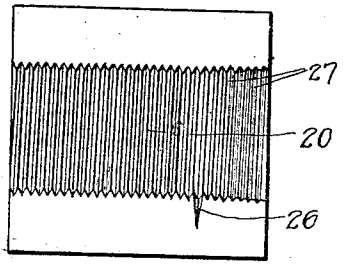
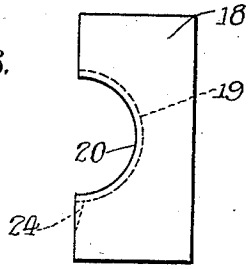


Fig. 3.



Inventor:
Ward E. Guest,
By Churchill Parker & Carlson
Attys.

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UNITED STATES PATENT OFFICE.

WARD E. GUEST, OF CHICAGO, ILLINOIS, ASSIGNOR TO WARD MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

METHOD AND MEANS FOR WINDING.

Application filed February 9, 1924. Serial No. 691,581.

To all whom it may concern:

Be it known that I, WARD E. GUEST, a citizen of the United States. residing in the city of Chicago, county of Cook, and State of Illinois, have invented a certain new and useful Method and Means for Winding, of which the following is a specification.

This invention relates generally to a method and means of winding, and more especially to winding helically a length of material upon a cylinder or the like.

Generally, such a winding process is carried out by hand or on a simple machine adapted for rotating the member to which is fed by hand the strip of material being wound. In more refined winding processes, complicated machines are employed which produce an exactness in the product which may be excessive for the particular purpose for which the article is employed. Such means include automatic feeding means timed to the location of the member being wound.

In my method I aim to dispense with such complicated and expensive means and to employ a simple device for rotating the member, and a simple method of feeding the strip being wound with an accuracy entirely consistent with the use of the article.

It is one object of my invention to provide a method for advancing the feeding of the material being wound upon a rotating member.

It is another object of my invention to provide a method of and means for winding helically a length of material on a relatively soft surface of a rigid rotating member.

It is another object of my invention to provide a simple independent feeding and guiding device for the material being helically wound, which device is not a part of the rotating machinery.

It is still another object of my invention to use a simple device to be manually held on a rotating member engaged thereby and fed along the axis of rotation substantially in timed relation thereto.

Still another object is to provide a method of winding which will produce little strain or tension on the material being wound thereby eliminating breakage, repairs, hold-ups in production, waste, and imperfect articles.

In the accompanying drawings there is shown by way of example a simple machine for rotating the central core of an electrical heating element which is to be helically wound with a resistance wire.

In the drawings, Figure 1 illustrates a machine for producing rotation of the member being wound.

Fig. 2 illustrates a cross section of the article being wound showing the wire embedded therein.

Figs. 3 and 4 show a device which accomplishes the feeding and guiding action of the process.

Fig. 5 is a modified form of such a device.

In order to set forth my invention, I have chosen to illustrate its application to the winding of an electric heating element with a strand of resistance wire. For this purpose there is shown a machine rotating an element which is especially adapted for that purpose. The heating element 5 which I have chosen is provided with a rigid axial rod 6 having at one end a U-shaped hook 7, and at the other end, a bared axial terminal 8. The machine for rotating the element may have any suitable form. That herein shown has a head or chuck 9 provided with a recess 10 adapted to receive the hook 7 in a manner to hold the rod in axial position. Any suitable driving means as a wheel 11 may be employed and controlled as desired. The tail stock 12 of the machine is made adjustable for different lengths of elements, herein being shown a clamping bolt 13 through the slot 14 of the tail stock whereby it is secured to the base of the machine. The tail stock has a shaft 15 alined with the axis of the chuck 9. This shaft is axially loose in the tail stock and is provided with means for forcing it inwardly. A suitable head 16 is provided on the inner side of the shaft with an axial bore therein for the end 8 of the rod 5. A coil spring 17 normally forces the head 16 toward the chuck end. This arrangement permits easy insertion and removal of the rod 5 into the rotating device.

Ordinarily, to wind a length of material onto such an element rotatably supported between the centers as illustrated in the drawings, one end of the material is secured to the rotating element and the length guided, pulled and suitably advanced. According to my invention I provide a combined semi-automatic and semi-manual means for accomplishing this. By holding a sharp edge

angularly against a rotating body, it will be made to advance along the same producing a spiral of a helical pitch according to the angle of contact. My invention provides a body having one or more of these sharp edges for the purpose of advancing the body axially along the rotating member, and further provides on such body a guide for the material being wound. For this purpose in connection with the heating element illustrated I use a half-nut 18, the threads 19 of which are the cutting edges angularly in contact with the rotating element. The use of the foregoing principle is, of course, dependent upon the surface of the rotating element being relatively softer than the cutting edge. The use of the half-nut provides a semi-cylindrical groove 20 which facilitates holding the guide on the rotating member and which further provides a plurality of cutting edges to bite into the member being wound.

Any suitable form of carrying-guide may be employed on the advancing body as the conditions may require. Herein where I show the winding of the fine wire 21 from the spool 22 secured on the base of the machine, I utilize the last thread 23 of the half-nut 18 as the guide and may further provide a V-shaped depression 24 in the face of the nut to act as an additional guide. In the use of this half-nut for the heating element shown, certain other advantageous features of this process are exemplified. The wire rod 6 of the heating element is covered by an asbestos tubular covering designated 25, the special property of which, for the winding process, is its relatively soft and yieldable character. In placing the nut on the member the asbestos is compressed so that the inner surface of the nut travels closer to the axial center than it would otherwise. Consequently the wire 21 is wound on the member in coils of a smaller diameter. There is no tension produced on the wire during the winding process except that which is produced by the unrolling action from the spool 22. As the nut leaves the coils of the wire which have been wound, the asbestos tends to assume its normal uncompressed character. This causes it to expand between the coils leaving the latter embedded therein and held in spaced relation under slight tension produced by the expansion of the asbestos.

A further example (Fig. 5) of my invention in the same application is the provision of the guiding notch 26 more remote from the end of the nut, the threads 27 beyond the notch being smoothed off so that the expanding of the asbestos is gradual with a smooth action. This prevents the expansion of the asbestos from drawing on the slack of the feeding wire and thereby loosening the coils. Any other location for the guide may be used depending upon the character of the material being wound and the character of the rotating member.

The above disclosure is not limited to the use of the means illustrated, but may be utilized in a variety of forms according to the limitations of the appended claims.

Reference is hereby made to my copending application, Serial No. 691,580, filed February 9, 1924, in which are disclosed certain features of construction and the specific method of manufacturing a heating element of the type disclosed in the present application.

I claim as my invention:

1. A method of winding fine wire on small elements having a relatively soft surface, comprising, rotating the element, manually placing a half-nut against said element in such a manner that the threads thereof are engaged by the soft surface to feed the half-nut along the rotating element, and carrying by the half-nut a wire which is secured to the rotating element.

2. A method of winding fine wire on small elements having a relatively soft and yielding material at the surface thereof, comprising, securing the wire to the element, rotating said element, pressing a manually-held half-nut against said surface to compress the material, introducing a wire between the half-nut and the element, the threads of the nut feeding the wire along the element for helical winding on the compressed material, whereby after passage of the nut from the coils of wire, the material expands to bind and to embed the coils of wire in fixed spaced relation.

3. A device for winding fine wire on small heating elements and the like having a relatively soft and yielding surface material, comprising, in combination, means to rotate the element to be wound, a freely movable longitudinal nut-section, the helical threads of which, when placed against said member, feed the nut section along the rotating member, and a guide on said nut section for carrying the wire thereby to effect helical winding of the element.

4. The method of helically winding a rotating member with a length of material, comprising securing the material to the member, placing the material in a guide secured to a body having a plurality of spaced cutting edges, leading said material between adjacent cutting edges, pressing said body against the member with the cutting edges at an angle thereto, and rotating said member.

5. A winding device having in combination means to rotate a member to be wound helically with a fine strand, and a guiding body in the form of a half nut having its semi-cylindrical groove adapted to fit over said member, the threads of the nut entering

into the material of the member to feed the body axially thereof during rotation, the body having a guiding groove leading to one of the threads remote from the rear end to guide the thread for helical winding, the threads between said end and groove being smoothed off flaringly toward the end.

6. A winding device having, in combination, means to rotate a member to be wound helically with a fine strand, and a guiding body in the form of a half nut having its semi-cylindrical groove adapted to fit over said member, the threads of the nut entering into the material of the member to feed the body axially thereof during the rotation, the body having a guiding groove leading to one of said threads to guide the strand for helical winding.

7. A winding device having, in combination, means to rotate a member to be wound helically with a fine strand, and a guiding body with a portion thereof in the form of a half nut having its semi-cylindrical groove adapted to fit over said member, the threads of the nut entering into the material of the member to feed the body axially thereof during the rotation.

8. A winding device having, in combination, means to rotate a member to be wound, and a guiding body in the form of a half nut having its semi-cylindrical groove adapted to fit over the member, the threads of the nut cutting into the material of the member to advance the body during the rotation of the member, said body having a guideway to receive and feed the material to be helically wound on the member.

9. A winding device having, in combination, means to rotate a member to be wound, and an independent body in the form of a nut section having its arcuate groove adapted to fit over said member, there being a guideway on said body for the material being wound, the threads of the nut being adapted to cut into the material of the member during the rotation thereof whereby the body is advanced axially of the member to feed the material being wound thereon to produce a helical winding.

10. A winding device having, in combination, means to rotate a member to be wound, a body having an arcuate cylindrical groove therein adapted to fit over the member being wound, said groove having portions of helical threads therein adapted to cut into the material of the member being wound to advance the body axially during the rotation of the member, and guiding means on said body to receive the material being wound on the member.

11. A winding device having, in combination, means to rotate a member to be wound, a body having a plurality of spaced cutting edges adapted to be pressed onto the rotating member at an angle thereto, and guiding means on said body for the material being wound on the member.

12. A winding device having, in combination, means to rotate a member to be wound, a body having a plurality of spaced cutting edges adapted to be pressed onto the rotating member at an angle thereto, means to maintain said body on the member with the cutting edges in fixed angular relation to the rotating member, and guiding means on said body for the material being wound on the member.

13. A winding device having, in combination, means to rotate a member to be wound, a body having a groove therein to fit over said member for guiding the body axially along the member, spaced cutting edges within said groove at an angle to the rotating member, and guiding means on said body for the material being wound on the member.

14. A device for winding fine wire on small electrical heating elements and the like having a layer of asbestos or similar yielding material at the surface thereof, comprising, in combination, means for rotating the element to be wound, a freely movable body having a groove therein for receiving the element, said body being adapted to be pressed against the yielding surface of said element, and a cutting edge on said body adapted to contact angularly the element to lead the body along the element by rotation thereof, said body having a guideway leading to said groove for the wire which is to be carried along thereby to be wound upon said member at the compressed portion lying in said groove.

15. A device for winding small elements with wire comprising, in combination, means to rotate the element to be wound, and a longitudinal nut section having threads therein providing edges adapted to bite into a surface of said rotating element to lead the nut along, the threads of said nut being sufficiently large to contain the wire to be wound on said element in the valleys thereof, whereby the coils of wire become spaced on the element.

16. A device for winding rotating elements with a length of material comprising, in combination, means for mounting and rotating the element to be wound, a supply of said material independently located for winding onto said rotating element, and a guiding and feeding member independent of said means and said material supply adapted to be pressed against said rotating element, said member having a cutting edge angularly in contact with said element to feed the same along, and having a guide thereon to carry the material along therewith to wind the same on the element.

17. A winding device having, in combination, means to rotate a member to be wound,

and a body having a plurality of spaced cutting edges adapted to be pressed against the rotating member with said edges at an angle thereto, the material being wound on the member being adapted to lie between adjacent cutting edges.

18. A device for winding electric heating elements with fine wire comprising, in combination, a base, a chuck mounted on said base and adapted to receive one end of the element to turn the same, a tail stock alined with the chuck for supporting the element for rotation, means for effecting rotation, a supply of wire carried on the base to be wound on said element during rotation thereof, and a freely movable body having a threaded groove therein to receive the element, the body being adapted for pressure contact with the rotating element whereby the threads in the groove lead the body along the member, and a guiding portion on said body to introduce the wire between the threads thereof, the pitch of the threads being greater than the thickness of the wire whereby he wire coils become spaced apart.

19. A device for winding an element with spaced coils of material, comprising, in combination, means to mount said element, means to rotate the element, a device adapted to be pressed against said rotating element having a part angularly in contact therewith to feed the device along the member with a certain pitch, said pitch being greater than the width of the material being wound, and a guide on said device to carry the material along therewith to effect winding the material in spaced coils.

In testimony whereof, I have hereunto affixed my signature.

WARD E. GUEST.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,573,933, granted February 23, 1926, upon the application of Ward E. Guest, of Chicago, Illinois, for an improvement in "Methods and Means for Winding," an error appears in the printed specification requiring correction as follows: Page 1, line 22, for the word "location" read *rotation;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23d day of March, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.