

D. NOBLE.
 MACHINE FOR COVERING OR INSULATING WIRE WITH YARN OR ITS EQUIVALENT.
 APPLICATION FILED AUG. 18, 1910.

1,000,109.

Patented Aug. 8, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

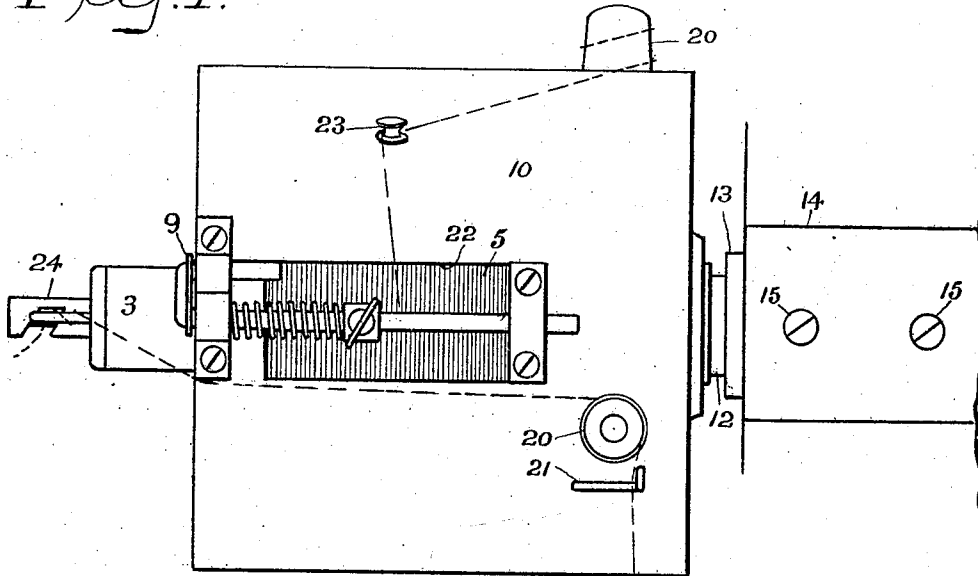
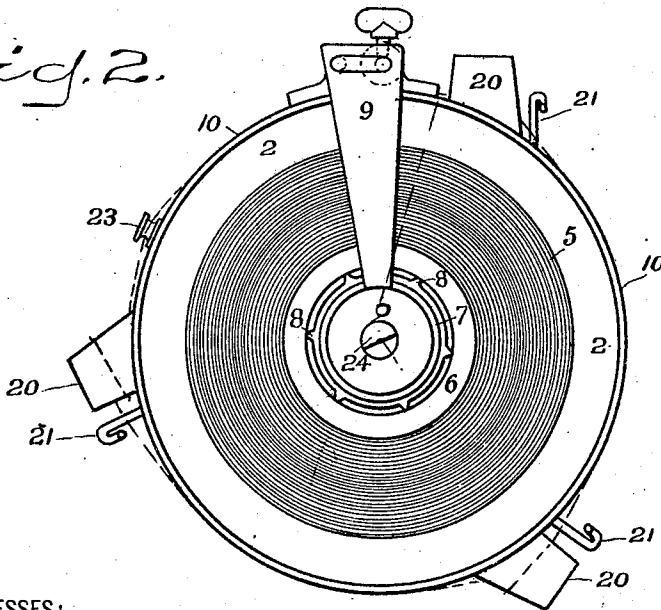


Fig. 2.



WITNESSES:

H. A. Lamb.
M. J. Longden

INVENTOR

Donald Noble

BY

H. M. Smith

ATTORNEY

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2 SHEETS—SHEET 2.

Fig. 3.

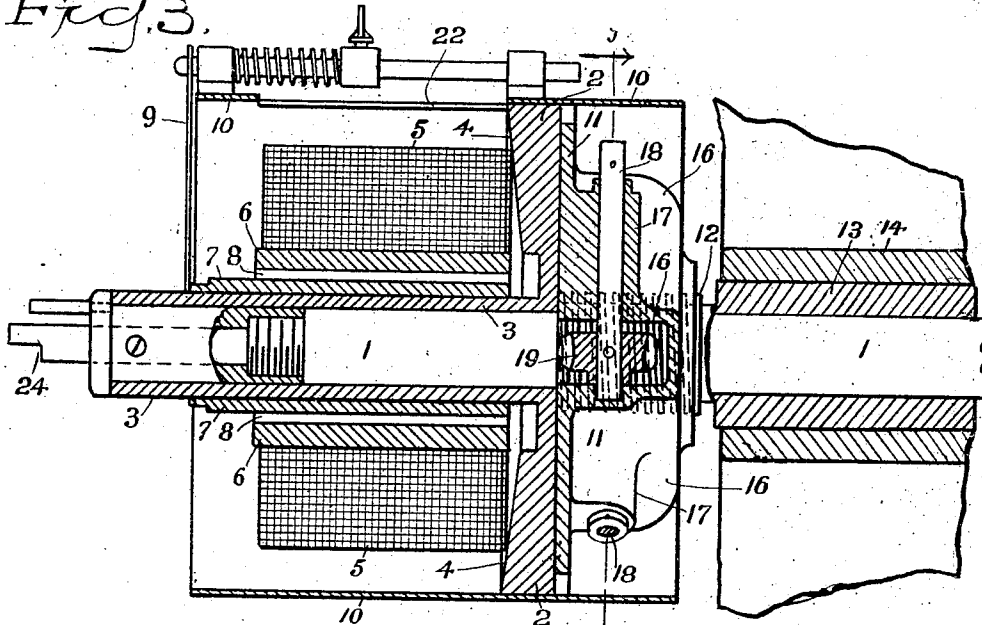
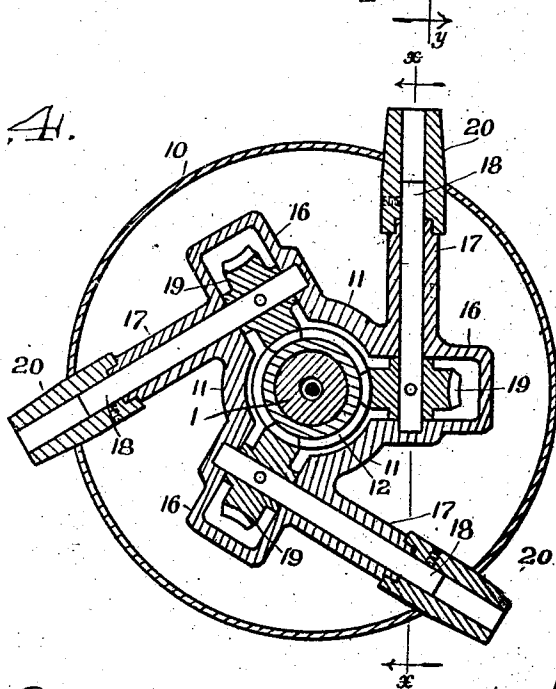


Fig. 4.



WITNESSES:

H. A. Lamb.
M. J. Lyden

INVENTOR

Ronald Noble

BY

H. Smith

ATTORNEY

UNITED STATES PATENT OFFICE.

DONALD NOBLE, OF BRIDGEPORT, CONNECTICUT.

MACHINE FOR COVERING OR INSULATING WIRE WITH YARN OR ITS EQUIVALENT.

1,000,109.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed August 18, 1910. Serial No. 577,879.

To all whom it may concern:

Be it known that I, DONALD NOBLE, a subject of the King of England, residing in the city of Bridgeport, county of Fairfield, and State of Connecticut, United States of America, have invented certain new and useful Improvements in Machines for Covering or Insulating Wire with Yarn or its Equivalent; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to machines for covering or insulating wire with yarn or its equivalent, and has for its object to improve upon the construction and operation of the machine shown and described in my pending application for Letters Patent, Serial No. 511,374, filed August 5, 1909.

In my pending application referred to, I showed and described an arrangement of planetary rolls carried by the spinning head, in parallelism with the axis of revolution thereof, for the purpose of engaging the yarn and paying out the same to the wire covering devices at a tension less than that required to draw the yarn from the cop itself, and while this construction was entirely satisfactory under ordinary circumstances I discovered that when the spinning head was run at a maximum speed much greater than has heretofore been possible in machines of this description, the centrifugal force developed was so great that the planetary rolls would be driven against their bearings with such force that great power was required to revolve them, and the amount of power so required retarded the speed of the machine to a considerable extent.

Accordingly, in my present improvement, I have aimed to overcome this difficulty by disposing the yarn delivery rolls in such a manner that the centrifugal force caused by the rapid revolution of the spinning head will be so counteracted that it is reduced to a minimum, and with these ends in view my invention consists in certain arrangements of parts hereinafter fully described

and then particularly pointed out in the claims which conclude this description.

In the accompanying drawing Figure 1 is a plan view of the spinning head equipped with my improvement—Fig. 2 a front view of the same—Fig. 3 a longitudinal sectional elevation taken at the line *x, x*, of Fig. 4, and Fig. 4 a section at the line *y, y*, of Fig. 3.

Similar numerals of reference denote like parts in the several figures of the drawing.

Like the improvement set forth in my pending application aforesaid, my present invention relates solely to the delivery of the covering yarn at a proper tension to the wire covering devices and I have not illustrated nor will I describe any of the parts of a winding machine of this description except those that are immediately associated with the spinning head which winds the yarn around the wire.

1 is the power shaft of the machine and 2 is the spinning head which has an internal hollow hub 3 that is tightly secured to said shaft whereby the latter will impart rotary movement to said head.

In Letters Patent No. 919,751, issued to me April 27, 1909, I showed and described certain means for exerting an automatically diminishing tension against the yarn and cop, which means comprised a spring controlled tension finger carried by the spinning head and bearing against the outer face of the cop, the opposite peripheral edge of the cop having a constant bearing against an incline within the back of the spinning head, so that as the diameter of the cop decreased, the rear peripheral edge of the same would bear against said incline at points nearer the axis of revolution of the spinning head while the spring controlled tension finger would constantly bear against the front of the cop but with a diminishing pressure owing to the continual weakening of the spring. My present improvement employs this automatically diminishing tension, the rear wall of the spinning head being inclined from the outer periphery to the center as shown at 4, while the yarn cop 5 wound on its cop tube 6 is placed around a metal bushing 7 which has ribs 8 that fit the interior

of the tube 6 fairly tight, and this bushing is placed around the hub 3 and is loose thereon so as to be capable of an independent revolution, while the tension finger 9 bears against this bushing instead of against the cop itself as in my pending construction. But the provision of this bushing 7 has nothing to do with my present invention, and I employ this bushing merely because it affords a better slipping contact with the hub 3. Therefore I will enter into no description of this automatically diminishing tension since it is in all essentials the same as that shown, described and claimed in my aforesaid Letters Patent.

10 is the rim of the spinning head which incloses the cop and also extends rearward of said head, and within said rim and secured to the rear of the head is a casing 11 through which the power shaft freely extends.

12 is a worm supported loosely by the shaft 1 and extending within the casing 11 and provided with a sleeve extension 13 which forms the journal bearing for the shaft and which is secured to the bed 14 of the machine by means of set screws 15, so that it will be clear that said worm is a stationary element. The casing 11 has housings 16 which are disposed radially with respect to the power shaft and are provided with laterally extending bearing sleeves 17, and 18 are spindles journaled within said housings and sleeves and therefore each extend in a plane at right angles to the radius of said shaft. 19 are worm wheels secured to the inner extremities of said spindles and meshing with the worm 12, so that it will be readily understood that when the spinning head is revolved said worm wheels will travel around the stationary worm and thereby revolve the spindles 18. These spindles 18 extend slightly beyond the outer extremities of the sleeves 17 and to these projecting ends are secured the yarn delivery rolls 20 which extend through the rim 10 in planes that are inclined from a tangent to said rim. Adjacent to these rolls 20 and projecting from the outer periphery of the rim 10 are yarn guides 21 which, in connection with the inclination of the rolls beyond said rim, causes the coils of the yarn around the rolls to be kept apart so that they cannot overlie each other and become bunched and thereby prevent the proper slipping between the yarn and rolls, and while these yarn guides are desirable I would say that they are not absolutely necessary and I do not wish to be limited thereto.

Referring particularly to Figs. 1 and 2, the yarn is led from the cop through any suitable opening 22 in the rim, passed around a guide stud 23 projecting from the

rim, then wound once or twice around one of the rolls and passed up over a yarn guide 21, thence passed once, for instance, around the next roll and led up over the next yarn guide and thence passed over the third guide and around the third roll and finally led to the spinning nozzle 24 in the usual manner. The passing of the yarn around the rolls of course causes more or less friction between said yarn and rolls when the latter are revolving axially, and the number of coils of the yarn disposed around the rolls depends of course upon circumstances such as, for instance, the size and strength of the yarn and the size of wire to be covered. In some instances, if too many coils of yarn were disposed around one or more of these rolls the result would be that the yarn would exert such a grip upon the rolls that when the latter revolved altogether too much yarn would be paid out to the wire covering devices which would create a slack and would quickly cause the yarn to become snarled. On the other hand, if too few a number of coils were disposed around these rolls there would not be friction enough between the latter and the yarn, and this would result in the paying out of no yarn to the covering devices by the action of the rolls, and the tension at which the yarn would be delivered to the wire covering devices would be practically as great as the tension required to draw the yarn from the cop itself, and would be altogether too great in the instance of finer gages of wire. The proper coiling of the yarn around the rolls for various sizes of wire is readily ascertained by experiment, the conditions in these respects being precisely the same as those attaching to the yarn delivery rolls set forth in my pending application aforesaid.

The revolution of the rolls is very slow as compared with that of the spinning head, and the character of the worm and worm wheels is such that twenty-four revolutions of the spinning head will effect one revolution of the rolls. As the spinning head revolves there is a tendency to cause the inner ends of the spindles 18 to hug their inner bearings, due to the fact that the worm 12 is stationary while the worm wheels travel around the same, but the centrifugal force tends to throw the spindles outwardly which force is partially counteracted by the fact that these spindles are not radially disposed with respect to the axis of rotation of the power shaft. By careful experiment I have ascertained that this centrifugal force is practically counteracted by the manner in which the spindles are disposed together with the tendency of the inner ends of the spindles to hug their inner

bearings, and, therefore, practically there is no loss of power by the action of centrifugal force, and I am enabled to run the spinning head at a speed hitherto not obtained.

5 The projection of the rolls at an angle from the periphery of the rim serves to keep the yarn from being accidentally cast from the ends of the rolls, and also enables the yarn to be passed around the rolls in
10 coils so that the latter cannot possibly become merged.

The function and operation of the rolls is the same as in the instance of my pending application above referred to, since the rolls
15 are revolved independently and very slowly and the grip of the yarn around the rolls gives a slipping tension, so that there is always a tendency to pay out to the wire covering instrumentalities too great an
20 amount of yarn which tendency is counteracted by the slipping between the rolls and yarn, this slipping being due to the back drag on the yarn caused by the comparatively greater tension at which the yarn is drawn
25 from the cop itself, and, therefore, the yarn is paid out to the wire covering instrumentalities at a certain predetermined and greatly diminished tension. The greater the extent of revolution of these rolls the
30 greater is the excess of yarn which these rolls tend to pay out, and therefore the greater is the slipping between the yarn and the rolls in order to take up this excess, and thus it will be clear that the number of rolls
35 and extent of revolution thereof are immaterial although it is of course desirable to employ such number of rolls properly revolved as will give the best results.

Having thus described my invention what
40 I claim as new and desire to secure by Letters Patent is:—

1. In a machine for covering or insulating wire with yarn or its equivalent, the combination of the spinning head which carries
45 the yarn cop with a suitable tension acting thereagainst, means for revolving said head, rolls carried by said head and each projecting at an inclination from a tangent to said periphery through the periphery of said
50 head around which rolls the yarn is wound as it passes from the cop and from which rolls the yarn is delivered directly to the wire covering devices, said rolls rotating independently and operating always with a
55 tension to pay out to said instrumentalities an amount of yarn in excess of that needed.

2. In a machine for covering or insulating wire with yarn or its equivalent, the combination of the spinning head which carries
60 the yarn cop, a suitable tension thereagainst and means for revolving said head, of rolls carried by said head and extending in planes that are at a distance from the axis of revo-

lution of said head and are at right angles to direct radii of said head around which
65 rolls the yarn is wound as it passes from the cop and from which the yarn is delivered directly to the wire to be covered, said rolls rotating independently and operating
70 always with a tendency to pay out to the wire an amount of yarn in excess of that needed, which excess is constantly taken up by the slipping between said rolls and yarn due to the comparatively strong tension at
75 which the yarn is drawn by the rolls from the cop.

3. In a machine for covering or insulating wire with yarn or its equivalent, the combination of the spinning head which carries
80 the yarn cop with a suitable tension thereagainst and the spinning nozzle carried by said head and to which the yarn is led from the cop, means for revolving said head and nozzle, rolls extending lengthwise through
85 the periphery of said head and at an inclination from a tangent to said periphery, means carried by said head and cooperating with a stationary element for revolving said rolls independently and at a speed considerably
90 less than that of said head, around which rolls the yarn is wound as it passes from the cop and from which rolls the yarn is delivered directly to the spinning nozzle whereby said rolls will operate to draw the
95 yarn from the cop at a comparatively strong tension and to pay out said yarn to the spinning nozzle at a constant and greatly diminished tension which is maintained and predetermined by the bight of the yarn
100 against the rolls and by the slipping between the yarn and rolls due to the back draft exerted by the comparatively strong tension on the yarn as it is drawn from the cop.

4. In a machine for covering or insulating wire with yarn or its equivalent, the combination of the power shaft, the spinning head
105 carried thereby, the yarn cop contained within said head with a suitable tension thereagainst and the spinning nozzle at the extremity of said shaft, with the stationary
110 worm loose around said shaft, rolls projecting lengthwise through the periphery of said head in planes at right angles to direct radii of said head, and means connected to said rolls and cooperating with said worm for
115 revolving said rolls independently and at a speed greatly less than that of said head, the yarn being led from the cop and passed around the rolls and thence to said nozzle.

5. In a machine for covering or insulating
120 wire with yarn or its equivalent, the combination of the power shaft, the spinning head carried thereby, the yarn cop contained within said head with a suitable tension thereagainst and the spinning nozzle at the
125 extremity of said shaft, with the stationary

worm loose around said shaft, rotary spindles carried by said head at a distance from said shaft in planes which extend athwart the plane of said shaft and are at right angles to direct radii of said head, worm wheels secured to the inner ends of said spindles and engaging said worm, and rolls carried by the outer ends of said spindles and projecting through the periphery of

said head, the yarn being led from the cop and passed around the rolls and thence to said nozzle. 10

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

DONALD NOBLE

Witnesses:

F. W. SMITH JR.,

M. T. LONGDEN.