Dec. 16, 1947. T. J. RHODES 2,432,935

APPARATUS FOR MAKING COILED YARN

Filed Feb. 5, 1946

Fig. 1

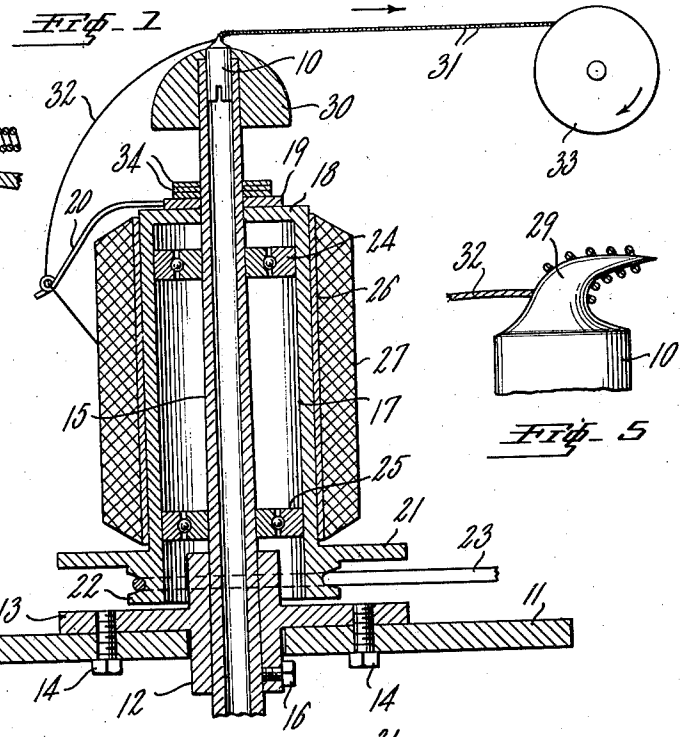


Fig. 4

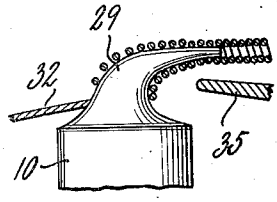


Fig. 5

Fig. 2

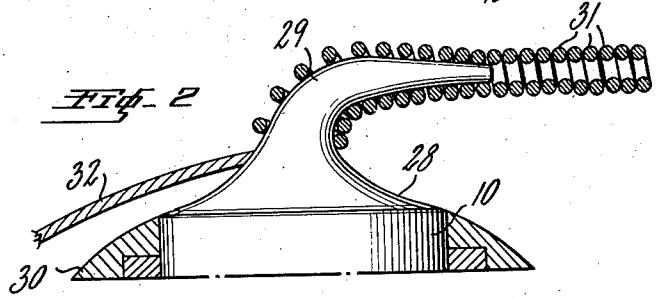


Fig. 6

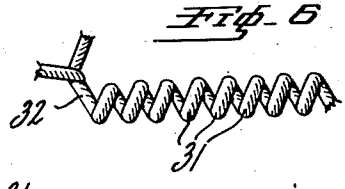
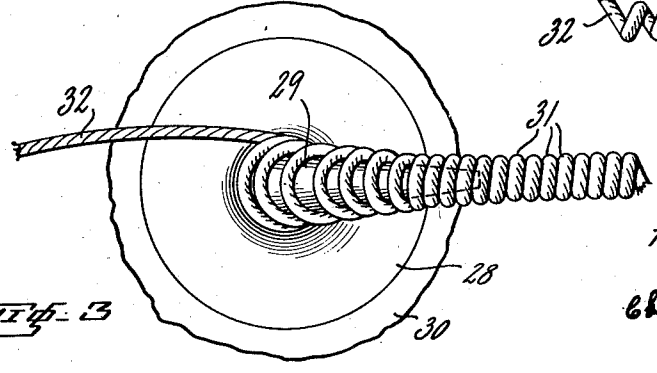


Fig. 3



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APPARATUS FOR MAKING COILED YARN

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5 Claims. (Cl. 57—59)

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This invention relates to novel apparatus for coiling a yarn or other strand, and more particularly to apparatus that is well adapted to make the highly stretchable yarn forming the subject matter of the Foster Patent No. 2,387,320.

The Foster patent points out on page 2 that the all-textile highly stretchable yarn described therein could have the desired coils imparted to the yarn by employing the apparatus shown in the Gammeter Patent No. 1,982,208 so as to wind the yarn helically about the needle shown by Gammeter. As the yarn is coiled about such needle it is progressively removed therefrom, in accordance with the Gammeter disclosure, by a reciprocatory movement that pushes the coils lengthwise of the needle.

The present invention contemplates an improved coiling apparatus whereby as each new coil is formed it crowds the other coils progressively along the needle, and also whereby the needle is bent laterally adjacent a shouldered portion of the needle so that this bent portion serves to direct each new coil into the space provided for the same between the shoulder and bent portion of the needle.

As a result of the construction of the present invention it is unnecessary to move either the needle or its adjacent shoulder during the yarn coiling operation, and as the coils are formed they slide along the bent needle and off the end thereof at a uniform speed, and as above stated, the needle itself serves to direct each new coil into its proper position adjacent the base of the needle. The size of the coils is determined by the size and shape of the needle.

The above cited Foster patent contemplates an all-textile yarn having stretch characteristics or an elastic extensibility ranging from about 50% to 300% and a good "kick" or contractive action. The present invention is well adapted to produce such coiled yarn at high speed and with very little attention on the part of the operator attending a group of winding machines equipped to operate in accordance with the present invention, since the coiled yarn slides continuously off the needle at a uniform speed and is wound up on suitable take up mechanism. If a knot or other enlargement upon the yarn should cause the ballooning yarn to escape from under the bent needle, the present construction will, in most or all cases, automatically correct this by directing a succeeding whirling balloon back into place under the bent needle.

The above and other features of the present invention will be more fully understood from the following description when read in connection with the accompanying drawing wherein;

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Fig. 1 is a vertical sectional view through yarn coiling mechanism constructed in accordance with the present invention.

Fig. 2 shows on a greatly enlarged scale the coil receiving mandrel of Fig. 1.

Fig. 3 is a top plan view of Fig. 2.

Fig. 4 is a view of the mandrel of Fig. 2 having a fixed baffle associated therewith.

Fig. 5 shows a modified type of coil receiving mandrel; and

Fig. 6 shows the yarn after it has been coiled and has been stretched to some extent.

The apparatus of the present invention may be employed to coil a single or a plied yarn or other type of strand, and various types of textile mechanism may be employed to wind the yarn about the mandrel shown at the upper end of the apparatus of Fig. 1, and also shown in Figs. 2 to 5 inclusive.

All of the mechanism shown in Fig. 1 of the drawing, with the exception of the mandrel 10 and adjacent parts, may be of well known construction and similar to apparatus employed heretofore for covering wire or a rubber thread. As shown in Fig. 1 the various parts are supported by the base plate 11 adapted to support at intervals along its length a number of winding units only one of which is shown in the drawing. This base plate 11 is shown as having a round hole adapted to receive the sleeve 12 that has a laterally extending flange 13 which is secured to the plate 11 by the bolts 14. Within the sleeve 12 is adjustably mounted the hollow spindle 15 which is a fixed spindle that is clamped in the desired position of adjustment within the sleeve 12 by the set screw 16.

Upon this hollow fixed spindle 15 is rotatably mounted a tube-supporting mandrel 17, which in the construction shown, is shaped like an inverted cylindrical cup having the flat upper end 18 upon which rests the body portion of the flier 19 and this body portion has extending outwardly and downwardly therefrom the yarn receiving pigtail 20. This cup shaped mandrel 17 is provided near its lower end with the laterally extending flange 21 and below this flange is formed a whirl 22 adapted to receive the driving belt 23. This mandrel 17 is supported to rotate about the spindle 15 by the upper bearing 24 and lower bearing 25, and this mandrel 17 is adapted frictionally to receive the paper cylinder or tube 26 upon which is wound the mass of yarn 27.

The hollow fixed spindle 15 has mounted at its

upper end, in accordance with the present invention, the mandrel 10. This mandrel is shown as having a slotted lower end portion or shank whereby this end portion may be expanded slightly or pinched to provide a tight frictional fit within the hollow spindle 15 to secure it firmly in the desired position. Near the upper end of this mandrel 10 is provided a shoulder 28 having extended upwardly therefrom a tapered needle 29 a substantial portion of which is bent laterally as best shown in Fig. 2. The upper end of the spindle 15 has mounted thereupon about the mandrel 10 the yarn guiding hood 30 which helps to guide the yarn to its coiling position on the neck of the mandrel 10.

The mandrel 10 is preferably formed of steel and the shoulder 28 and bent tapered needle 29 should be carefully formed with a smooth surface and then hardened and polished so that the coils 31 of the yarn 32 will slide lengthwise of this needle as they are formed.

The operation of the apparatus shown in Fig. 1 is such that when the yarn package 27 is rotated at high speed by the belt 23 the length of yarn passing from the package to the pigtail 20 and up towards the mandrel 10 will balloon or fly outwardly as shown into a position in which it lies almost at right angles to the central axis of the spindle 15 so that this ballooning yarn will wind about the base of the needle 29 adjacent the shoulder 28. This shoulder preferably has the concave configuration shown as such a construction will induce the last formed coil to crowd the previously formed coils along the needle until they escape from the outer laterally extending end of this needle as clearly shown in Fig. 2. The coiled yarn 31 upon leaving the needle 29 may be wound upon any suitable take-up means such as a reel or the take-up spool 33. The coiled yarn is self-feeding, that is, it feeds itself off the tip of the needle without having to be pulled off by the take-up mechanism; hence, it may be reeled up at any convenient tension or at any desired degree of extension or contraction of the coils. The tension with which the yarn 32 is wound about the base of the needle 29 will depend somewhat upon the speed at which the package rotates and somewhat upon the number of weights 34 that are provided on top of the flier 19, and the tension upon this yarn is preferably such that it will slip around the needle 29 with a snubbing action which causes the coils 31 to decrease in size as they advance along the tapered needle, as will be apparent from Fig. 2. The final size of the coils 31 may be controlled by the shape imparted to the needle 29, and if the outer end of this needle comes to a sharp point as shown in Fig. 5 the coils will have a smaller opening therethrough than if the needle has a blunt outer end as shown in Fig. 2.

The purpose in bending the needle 29 laterally adjacent the shoulder 28 is to cause this laterally bent portion of the needle to direct each new coil into the space between the shoulder and laterally extending portion of the needle, so that the coils will not pile up one on top of the other, but each new coil will be formed about the needle near the base thereof in position to crowd the previously formed coils lengthwise of the tapered needle. As a result of the present invention the coiling mechanism shown and described works smoothly with very little attention upon the part of the machine attendant, and if the ballooning yarn 32 should escape from under the bent needle 29 it will very frequently rearrange itself in the proper coiling position without any attention by the machine operator. If the ballooning thread fails to do so the operator can easily direct the yarn into the proper coiling position by holding his hand for a moment in the path of the ballooning yarn, or if desired a baffle plate or bar 35 may be mounted in a position adjacent the bent needle 29 as shown in Fig. 4 to direct the yarn to its proper coiling position.

In order to impart the desired high stretch characteristics to the present yarn it is important that the yarn be given a relatively high twist before it is wound upon the package 27 and that the package 27 be rotated in such a direction that it will coil the yarn about the needle 29 in the same direction in which the yarn is twisted so that as these coils are straightened out by a pull upon the yarn the effect will be to increase the twist of the straightened yarn, to thereby increase its contractive action.

The yarn 32 may be formed of cotton, rayon, nylon or other textile material, and the length of the laterally extending portion of the needle 29 may be varied within a wide range depending largely upon the taper of the needle, the smoothness of its outer surface and the smoothness of the yarn being coiled.

It will be seen from the foregoing that various types of core covering units can be equipped with the mechanism herein disclosed to form a coiled yarn or strand.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. Apparatus for making a coiled coreless yarn, comprising a fixed spindle provided at one end with a mandrel having a shoulder and a tapered needle, means for winding yarn about the needle adjacent said shoulder so that the coils abut one another and each new coil crowds the other coils along the needle, and said needle being bent laterally adjacent the shoulder to direct each new coil into the space between the shoulder and bent portion of the needle and also to direct the coiled yarn in a lateral direction from said spindle.

2. Apparatus for making a coiled coreless yarn, comprising a fixed upright spindle having journaled thereupon a revolving carrier for a yarn package, a mandrel mounted at the upper end of said spindle and having a shoulder and a tapered needle, means for rotating said carrier to wind yarn about the needle adjacent said shoulder so that the coils abut one another and each new coil crowds the previously formed coils along the needle, and said needle being bent laterally adjacent the shoulder to direct each new coil into the space between the shoulder and bent portion of the needle and also to direct the coiled yarn in a lateral direction from said spindle.

3. Apparatus for making a coiled coreless yarn, comprising a fixed spindle provided at one end with a mandrel having a shoulder and a tapered needle, means for winding yarn about the needle adjacent the shoulder so that the coils abut one another and each new coil crowds the other coils along the needle, said needle being bent laterally adjacent the shoulder to direct each new coil into the space between the shoulder and bent portion of the needle, and a fixed baffle for directing the ballooning yarn under the bent needle.

4. Apparatus for coiling a strand, comprising a fixed spindle provided with a mandrel having a strand guiding shoulder and a tapered needle, means for winding a strand about the needle adjacent the shoulder so that the coils abut one

another and each new coil crowds the other coils along the needle, and said needle being bent adjacent the shoulder to direct each new coil into the space between the shoulder and bent portion of the needle.

5. Apparatus for coiling a strand, comprising a fixed spindle provided with a mandrel having a shoulder and a tapered needle, means for winding a strand about the needle adjacent the shoulder so that the coils abut one another and each new coil crowds the other coils along the needle, and said needle being bent adjacent the shoulder

so as to resist to a degree the free sliding of the coils along the needle and to direct a ballooning strand under this bent portion of the needle.

THOMAS J. RHODES.

REFERENCES CITED

The following references are of record in the file of this patent:

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