

- [54] **TWISTER SPOOL AND METHOD OF WINDING YARN THEREON**
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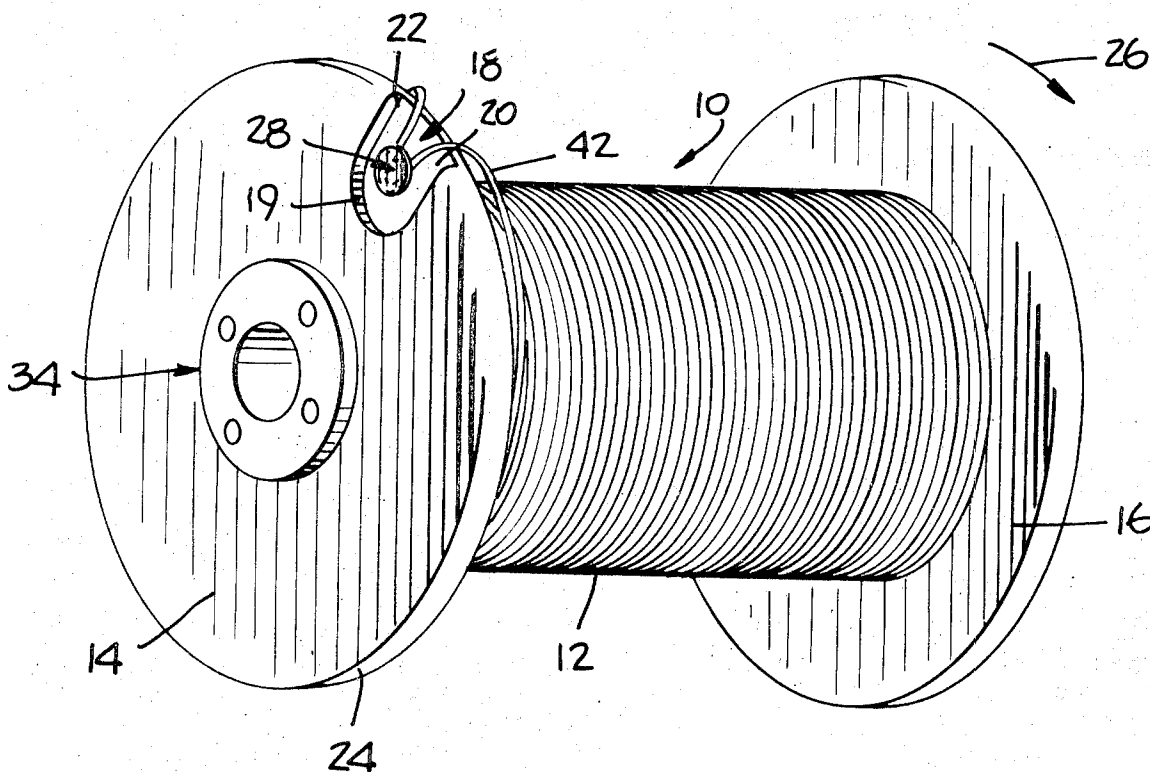
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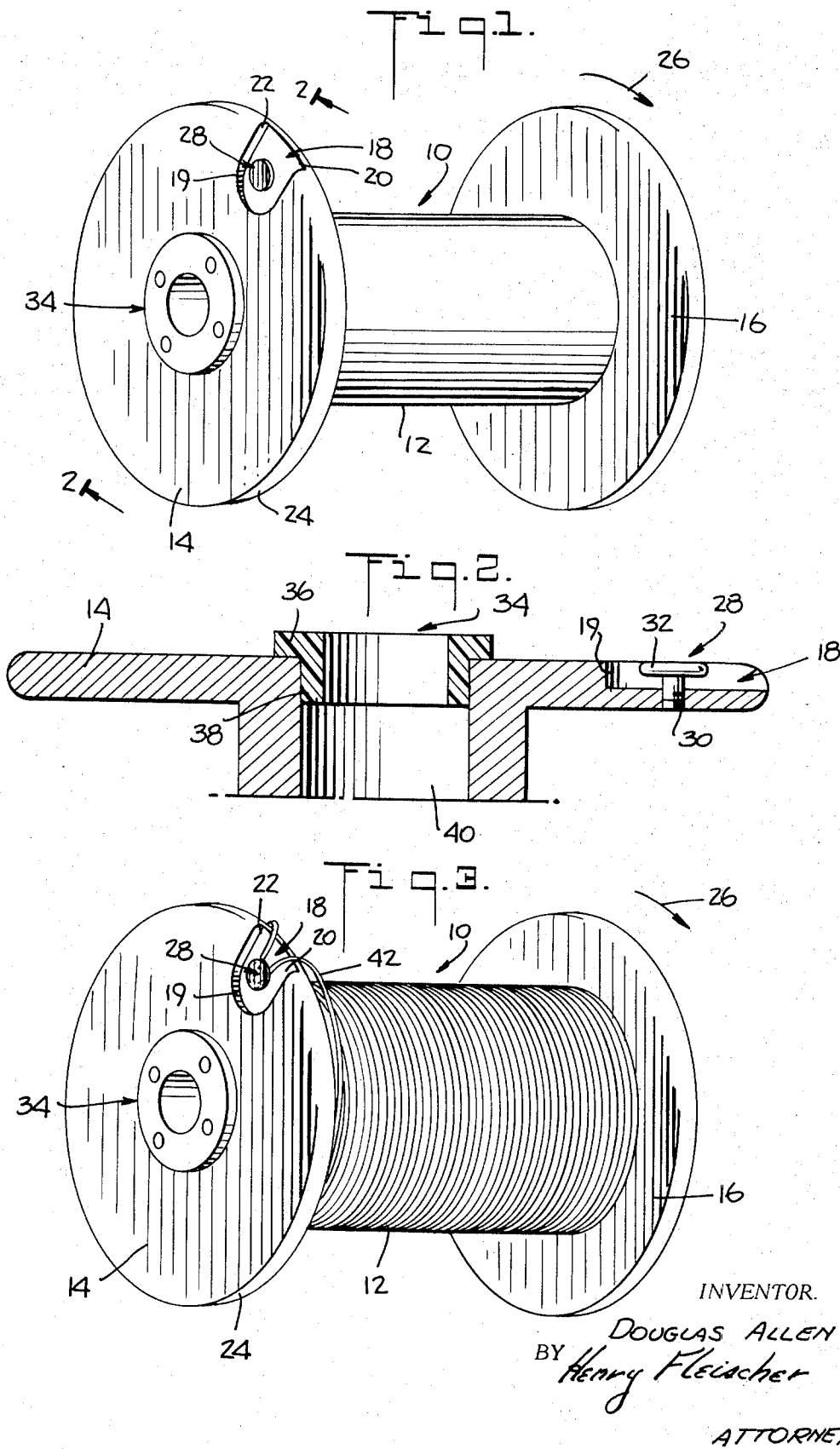
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[57] **ABSTRACT**

A spool and method for winding thereon yarn made by a twister. The spool is adapted to form a loop of yarn designating when a predetermined length of yarn has been wound on the spool.

5 Claims, 3 Drawing Figures





TWISTER SPOOL AND METHOD OF WINDING YARN THEREON

BACKGROUND OF THE INVENTION

This invention relates generally to a spool for winding thereon ply yarn, and more particularly concerns a spool and method of winding yarn so as to indicate when predetermined lengths of yarn have been wound on the spool.

It is customary in manufacturing a ply yarn to take two or more single yarns in the form in which they leave the spinning machine and to double and twist them into a ply yarn in one process, on a machine known as a twister. The conventional twister includes a plurality of bobbins fully wound with single yarn. In operation, the requisite number of ends of single yarn necessary to produce the desired number of doublings are passed from the bobbins, between rollers, through a traveler, and onto the spool of the twister. A conventional traveler is mounted on a ring which is a track therefor. The spool is disposed within the aperture of the ring, and is mounted on a spindle driven by a suitable motor. The traveler is revolved rapidly around the ring by means of the spindle, which, simultaneously therewith, rotates the spool. The difference between the circumferential speed of the traveler and the speed of rotation of the spool causes the ply yarn formed thereby to be wound on the spool.

Heretofore, conventional spools included a tubular or cylindrical member having a pair of circular flanges attached thereto at opposed ends thereof. The spool is mounted on a spindle, as hereinbefore described, and rotated at a substantially constant speed so as to wind the ply yarn onto the spool. The typical twister has a suitable yardage clock mounted on the rollers so as to count the number of revolutions of the rollers as the yarn passes therethrough for continuously measuring the length of yarn wound onto the spool. After the desired length of ply yarn is wound onto the spool, e.g., a full spool has about 20,000 yards of ply yarn wound thereon, the full spool is removed from the twister and is replaced with an empty spool. Whereupon, the previous operations are repeated and a new length of ply yarn is wound onto the empty spool. During this interim, the full spool is transferred to a winder.

Conventional winders are designed to rewind intermediate lengths of ply yarn from the twister spool onto cones. Typical cones depending on their size, are capable of having from about 2,400 yards of yarn to about 10,000 yards of yarn wound thereon. Generally, winders have no means for indicating the length of yarn wound onto the cone. Consequently, the operator manually measures the quantity of yarn unwound from the spool so that he may sever the yarn at the appropriate length. In this manner, the operator insures that the full cone has substantially the correct yardage wound thereon.

This method is generally inaccurate, and the amount of yarn wound on the cones varies from cone to cone, and operator to operator. Furthermore, a considerable amount of time is wasted in manually measuring the yardage accumulated on the cone and in severing the yarn wound thereon from the remaining yarn wound on the spool. Also, this method does not readily permit the utilization of automated procedures. For example, the operator manually measures the length of yarn wound on the cone, severs the yarn wound thereon from the

yarn remaining on the spool, removes the full cone, and replaces the full cone with an empty cone so as to reinitiate the cycle. Thus, a considerable amount of time and labor is wasted by the lack of automation, thereby resulting in ensuing higher product costs.

In order to overcome many of the disadvantages associated with conventional spools heretofore utilized, it has been desirable, in accordance with the present invention, to provide a spool in which predetermined lengths of yarn may be designated thereon for permitting intermediate lengths of yarn to be rewound therefrom.

Accordingly, it is a primary object of the present invention to provide a spool that indicates when predetermined lengths of yarn have been wound thereon.

With more particularity, it is an object of the present invention to provide a spool wherein the yarn wound thereon is divided into a plurality of separate, measured, intermediate lengths.

Another object of the present invention is to provide a spool which automatically stops unwinding when correct lengths of yarn have been wound therefrom.

A further object of the present invention is to provide a spool which is relatively economical in the use and manufacture thereof.

SUMMARY OF THE INVENTION

Briefly stated, and in accordance with the present invention, there is provided in a conventional twister a spool for winding thereon ply yarn. This is accomplished in the present instance by winding ply yarn about the spool in such a manner that at least one loop of yarn extends therefrom for designating that a predetermined length of yarn has been wound thereon.

Thus, in accordance with the preferred procedure, the yarn is wound onto the spool until the length of yarn wound thereon corresponds to the desired length of yarn that is necessary to be rewound subsequently thereto. Thereupon a loop, extending substantially outwardly therefrom, is formed in the yarn. Then, the yarn is, once again, wound onto the spool until a new required length of yarn has been wound thereon. Whereupon a second loop is made in the yarn indicating the length of yarn that has been wound on the spool between successive loops of yarn. The aforementioned procedure continues until the spool is fully wound with yarn having a plurality of loops extending therefrom for designating measured intermediate lengths thereof.

Pursuant to the preferred procedure of this invention, the yarn wound on the spool is severed at each loop so as to form a plurality of intermediate lengths of yarn wound on the spool. Moreover, each of the lengths of yarn correspond to the correct length of yarn that is to be rewound subsequently thereto. In this way, the spool will unwind until the first intermediate yarn has been unwound therefrom, whereupon the spool stops unwinding automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention will become apparent upon reading the following detailed description and upon reference to the drawings, in which:

FIG. 1 is a perspective view of a spool constructed in accordance with the present invention;

FIG. 2 is a fragmentary, enlarged sectional elevational view taken along the line 2—2 of FIG. 1 in the direction of the arrows;

FIG. 3 is a perspective view of the spool of FIG. 1 having yarn wound thereon in accordance with the method of the present invention.

While the present invention will be described in connection with a preferred embodiment and method of use thereof, it will be understood that it is not intended to limit the invention to that embodiment and method of use thereof. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

DETAILED DESCRIPTION OF THE INVENTION

Referring more particularly to the drawings, wherein like reference numerals have been used throughout to designate like elements, FIG. 1 illustrates the preferred embodiment of a spool that may be used in a conventional twister for winding thereon ply yarn. FIG. 2 is a fragmentary sectional view of the FIG. 1 spool showing the novel structure provided thereon for forming loops of yarn at intermediate lengths, as the yarn is wound onto the spool. Finally, FIG. 3 shows the spool with yarn having a loop therein wound thereabout. FIG. 1 will be discussed in conjunction with FIG. 2 in order to provide a description of the construction of the spool. While FIG. 3 will be referred to primarily when the method of winding the yarn onto the FIG. 1 spool is described.

Turning first to FIG. 1, there is shown a spool, designated generally at 10, which may be made of steel or other suitable material, that includes a tubular or cylindrical member 12 having a first substantially circular flange 14 attached at one end thereof, and a second substantially circular flange 16 attached at the opposed end thereof. Flanges 14 and 16 may constitute integral parts of cylindrical member 12, or they may be separate parts suitably affixed as, for example, by being welded to cylindrical member 12. Flange 14 includes a substantially semicircular recessed portion, designated generally at 18. Recessed portion 18 is disposed substantially along a radius of flange 14 and is spaced from the center thereof. The leading end portion 20, in the direction in which the spool 10 is rotated (shown by arrow 26), and the trailing end portion 22 of the recessed portion 18, both intersect the outer perimeter 24 of flange 14.

As is shown more clearly in FIG. 2, a finger, designated generally at 28, is preferably centrally located within recessed portion 18. Finger 28 is disposed therein so as to be spaced from the periphery 19 of recessed portion 18, thereby providing clearance for yarn looped thereover. The finger 28 includes a substantially cylindrical post 30 having a substantially circular head 32 attached at one end thereof. The opposed end of post 30 is secured to flange 14 within recessed portion 18 by suitable means, e.g., in threaded engagement therewith.

A hollow projecting member, or collar designated generally at 34, having a substantially annular plate 36 fastened to a pipe 38 at one end thereof, extends outwardly from the center of flanges 14 and 16. Referring now to FIG. 2, pipe 38 is adapted for sliding engagement with bore 40 of spool 10. Projecting member 34 slides into bore 40 until the underside of plate 36 abuts

the upperside of flange 14. FIG. 2 depicts projecting member 34 in substantial axial or concentric alignment with the longitudinal axis of spool 10 when mounted in bore 40 thereof. The projecting member 34 is adapted to receive a spindle (not shown) or other means for holding on the desired machine (i.e., a winder or twister, or the like) for the purpose of rotating the spool 10 so as to wind yarn thereon or unwind yarn therefrom. Furthermore, projecting member 34 may be fastened to flange 14 by suitable means, such as a plurality of bolts (not shown) passing through plate 36 and in threaded engagement with flange 14.

Pursuant to this invention, spool 10 is mounted on the spindle of the twister and ply yarn formed by the twister is wound about cylindrical member 12 of spool 10. A suitable counting device (not shown) detects or measures the length of yarn wound onto cylindrical member 12. For example, a conventional twister has a suitable yardage clock mounted on the rollers thereof. The yardage clock counts the number of revolutions that the rollers make as the yarn passes therethrough. The number of revolutions of the rollers corresponds to the length of yarn wound on spool 10, and the display of the yardage clock is calibrated accordingly. Hence, the yardage clock provides a continuous measurement of the length of yarn being wound onto spool 10. After a predetermined length of yarn has been wound onto cylindrical member 12 of spool 10, as indicated by the counting device, the operator loops the yarn about finger 28 and resumes winding yarn onto cylindrical member 12. The aforementioned operation is repeated periodically so as to indicate when predetermined lengths of yarn have been wound onto cylindrical member 12. As previously mentioned, yarn is looped over head 32 and around post 30 of finger 28. In this way, head 32 prevents yarn from sliding off post 30 and back onto cylindrical member 12 during subsequent winding of yarn thereon. Hence, it is clear that in this manner a loop may be formed periodically in the yarn, as it is being wound onto spool 10. The loop extends outwardly from yarn wound on spool 10 and indicates a plurality of measured intermediate lengths of yarn wound thereon. After spool 10 has the desired length of yarn wound thereon, the yarn is severed at the loops therein. Generally, the yarn is manually severed by an operator, as for example, by having the operator cut the yarn with a suitable knife or scissors. Thereafter, spool 10 is transferred to a suitable winder (not shown).

At the winder, yarn on spool 10 is unwound and rewound, simultaneously therewith, onto cones (not shown). Each of the intermediate lengths of yarn wound on spool 10 is rewound on corresponding cones. Thus, a plurality of cones are usually necessary to rewind all the lengths of yarn wound on spool 10. The first length of yarn is unwound onto the first cone, whereupon spool 10 automatically stops unwinding. Thereafter, the first cone (which is now fully wound) is replaced with a second, empty, cone and the second length of yarn is rewound thereon. The aforementioned procedure continues until all the intermediate lengths of yarn wound on spool 10 have been rewound onto their respective cones.

The manner of operation of spool 10 may be more readily understood upon reference to FIG. 3 which illustrates a ply yarn 42 being wound about cylindrical member 12 and looped over finger 28. Spool 10 is

mounted on the twister (not shown) for permitting winding ply yarn 42 formed by the twister upon the cylindrical member 12. The guide wires of the conventional twister act to guide the advancing ply yarn 42 onto spool 10. The spindle (not shown) rotates spool 10 in the direction of arrow 26. As spool 10 rotates, ply yarn 42 advances and is wound about cylindrical member 12. The typical twister has a suitable counting device, such as the yardage counter previously described, in association therewith for detecting or measuring the length of ply yarn 42 wound about cylindrical member 12. When a desired length of ply yarn 42 has been wound onto cylindrical member 12, the operator forms a loop in the yarn 42 so as to indicate the length of yarn wound thereon.

In the preferred method of winding yarn 42 onto spool 10, the operator passes yarn 42 over flange 14 at leading end portion 20 of recessed portion 18, after the desired length of yarn 42 has been wound onto cylindrical member 12. Yarn 42 is then passed around post 30 and under head 32 of finger 28 (FIG. 2). Thereupon, yarn 42 is passed back over flange 14, at trailing end portion 22 of recessed portion 18, and onto cylindrical member 12 so as to permit the next length of yarn to be wound onto cylindrical member 12. This procedure is repeated, at periodic intervals of length, until spool 10 has the required length of yarn 42 wound thereon. Ply yarn 42 is severed at the loops formed therein so as to divide yarn 42 into a plurality of measured intermediate lengths. Yarn 42 is usually severed manually by the operator who utilizes a suitable knife or scissors to accomplish this. Thereafter spool 10 is placed on a suitable winder so that each intermediate length of ply yarn 42 may be removed or rewound onto a corresponding cone.

The invention will be further explained in conjunction with the following example wherein spool 10 holds 20,000 yards of ply yarn 42 which is to be rewound onto cones or packages each holding only 5,000 yards of ply yarn 42. Each of the cones will, therefore, be capable of holding only 25% of yarn 42 wound on spool 10. Hence, yarn 42 must be divided into four equal lengths of yarn, each length being 5,000 yards. In order to accomplish this, ply yarn 42 is wound onto cylindrical member 12 of spool 10 until the counting device (yardage clock) indicates that 5,000 yards have been wound thereon. Whereupon, the operator loops yarn 42 about finger 28, as hereinbefore described, and then continues winding yarn 42 onto cylindrical member 12. After the counting device indicates that 10,000 yards of yarn 42 have been wound onto cylindrical member 12, the operator, once again, loops yarn 42 about finger 28, and, thereupon, continues winding yarn 42 onto cylindrical member 12. Similarly, when the counting device indicates that 15,000 yards of yarn 42 have accumulated, the operator repeats the looping procedure and then continues winding yarn about cylindrical member 12 until 20,000 yards have accumulated thereon. In the illustrative example only three loops of yarn are formed, i.e., one after 5,000 yards, a second after 10,000 yards and a third after 15,000 yards. After these loops of yarn are formed and 20,000 yards of yarn 42 have been wound onto cylindrical member 12, the operator cuts yarn 42 at each loop of yarn with a suitable knife or scissors. In this way four 5,000 lengths of yarn 42 are formed on spool 10.

Spool 10 and the first, empty, cone (which holds 5,000 yards of yarn 42) are then mounted on the winder. Yarn 42 is, thereupon, unwound from spool 10 and rewound, simultaneously therewith, onto the first cone. After about 5,000 yards of yarn 42 have been rewound from spool 10 onto the first cone, the first break or cut in yarn 42 is reached. This automatically terminates unwinding of yarn 42 from spool 10. The first cone is removed from the winder and a second, empty, cone is placed thereon. The aforementioned procedure is repeated for the remaining three cones. At the end of the operation each of the four cones have about 5,000 yards of ply yarn 42 wound thereon and spool 10 is empty. It should be noted that it is not necessary for the intermediate lengths of yarn to be of equal length (5,000 yards). Any desired intermediate lengths may be formed by the aforementioned procedure, these lengths (5,000 yards) being chosen equal in order to simplify the illustrative example.

Hence, it is evident that the spool of this invention is adapted to achieve the various aims and objectives hereinbefore set forth. In recapitulation, the spool, when fully wound with yarn, has a plurality of loops extending, at periodic intervals of length, therefrom. These loops function as markers for indicating predetermined lengths of yarn that are to be subsequently rewound onto cones. A plurality of intermediate lengths of yarn are formed on the spool by severing the yarn at each of the loops so formed. In this manner measured intermediate lengths of yarn may be unwound automatically from the spool and rewound onto corresponding cones. Furthermore, the spool of this invention substantially reduces production costs and may be readily manufactured.

Thus, it is apparent that there has been provided, in accordance with the present invention, a spool and method of use thereof that fully satisfies the objects, aims and advantages set forth above. While the invention has been described in conjunction with a specific embodiment and method of use thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art in light of the foregoing description. For example, although in the preferred embodiment of this invention only one recessed portion including a finger mounted therein is constructed and arranged on one of the flanges of the spool, it is evident that a plurality of such recessed portions having corresponding fingers therein may be constructed and arranged on either one or both flanges of the spool. Accordingly, it is intended in the appended claims to embrace all such alternatives, modifications, and variations as fall within the spirit and broad scope of this invention.

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

1. In a method of winding an advancing yarn onto a twister spool, the steps comprising guiding the advancing yarn onto the spool; rotating the spool so that the yarn is wound onto the spool; forming a loop of yarn extending substantially outwardly from the spool when a predetermined length of yarn has been wound upon the spool; winding at least one additional prescribed length of yarn upon said spool such that said loop is between and continuous with the successive lengths of yarn; and severing the yarn at each loop formed therein so as to divide the yarn into a plurality of intermediate lengths of yarn wound about the spool.

2. A method of winding an advancing yarn, as recited in claim 1, further comprising the step of detecting when the predetermined length of yarn has been wound onto the spool so as to form the loop of yarn thereat.

3. A method of winding an advancing yarn, as recited in claim 1, wherein said step of forming a loop of yarn comprises the steps of:

passing the yarn wound on a cylindrical member of the spool over a flange thereof, at the leading end portion of a recessed portion therein;

placing the yarn around a finger disposed within the recessed portion of the flange; and

returning the yarn over the flange, at the trailing end portion of the recessed portion, onto the cylindrical member of the spool.

4. A method of preparing a plurality of yarn packages of predetermined lengths of yarn each, said method comprising winding an initial segment of yarn of prescribed length upon a supply spool, isolating the trailing end portion of the initial segment of yarn as a constrained loop accessible from outside the yarn mass upon completing winding of the prescribed length thereof, winding an additional segment of yarn of prescribed length upon the supply spool, the additional segment of yarn initiating at the constrained loop and being continuous with the initial segment through the intermediary of the constrained loop, severing the additional segment of yarn at the trailing end portion thereof upon completing winding of the prescribed length thereof, severing the additional and initial yarn segments from one another at the constrained loop

such that the yarn is divided into a plurality of independent lengths corresponding to the number of enwound yarn segments, unwinding each of the independent lengths of yarn from said supply spool, and re-winding the independent lengths of yarn into respective packages.

5. A spool upon which yarn is wound, said spool comprising: a cylindrical body portion terminating in a pair of axially opposite ends; a pair of spaced flanges integral with and extending transversely of said opposite ends, respectively; each of said flanges including an endmost face axially directed away from the other, and a peripheral surface merging with a respective endmost face of each of said flanges; at least one of said flanges being provided with a recess extending inwardly of and communicating directly with both the respective endmost face and peripheral surface thereof; and loop-holding means for isolating at least one yarn loop from between two continuous yarn segments commonly enwound about said cylindrical body portion and separated from one another through the intermediary of said loop; said loop-holding means being disposed in said recess and constraining said loop such that said loop overlies said peripheral surface, extends inwardly of said recess and is free from projecting axially beyond said endmost face; said loop-holding means including a post member around which said loop extends; said post member extending transversely of said endmost face and axially terminating at the latter.

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