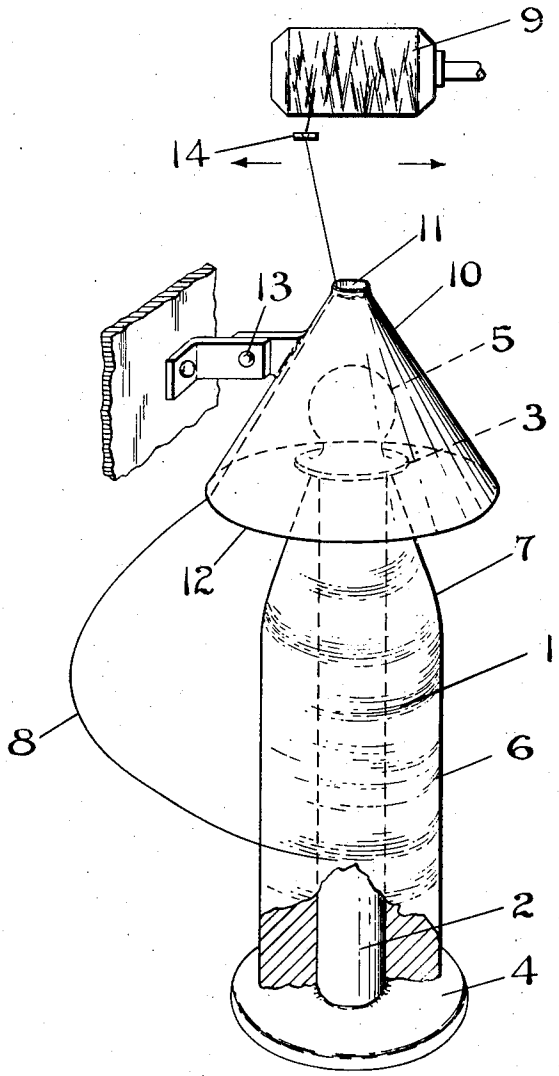
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METHOD AND APPARATUS FOR WINDING

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METHOD AND APPARATUS FOR WINDING

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This invention relates to the art of winding and unwinding thread. More particularly, it relates to a new and improved method and apparatus for unwinding thread over the end of a stationary supply package.

In one common method of rewinding a package of thread, the thread is led off over the end of a stationary supply package or pirn and thence at high speed to another package such as a cone. If the yarn is not carefully, evenly, and cleanly drawn off from the supply package, there is a tendency for "sloughing" to occur, that is, loosening or peeling of thread layers, before their regular turn to be unwound, at the edge where the thread is drawn off. Sloughing is even more apt to occur when the yarn on the supply package is tapered toward the edge from which the yarn is drawn off so that the layer of yarn at this portion is thinner than further down on the package. In such a package, sloughing is apt to occur throughout the tapered portion. A principal cause for this difficulty is that the balloon in the yarn being drawn off is apt to be irregular and sometimes to form a double balloon. These difficulties give rise to knots and other imperfections in the finished thread and necessitate the discarding of a considerable amount of thread.

It is, therefore, an object of this invention to reduce thread imperfections produced during over-end unwinding of thread from a thread supply package such as a pirn. Another object is to prevent substantially all sloughing and to thereby decrease the amount of waste yarn generally incurred during over-end ballooning and unwinding from a thread supply package. Another object is to lower the number of knots in a thread shipping package when the same is made by winding upon a cone or other core a thread taken off over the end of a thread supply package such as a pirn. Another object is to increase the rate of speed at which thread may be successfully unwound from over the end of a thread supply package. Still another object is to accomplish these results where the thread supply package has a portion of the thread supply tapered toward the end from which the yarn is unwound. Other objects will appear hereinafter.

The objects of this invention in general may be accomplished by surrounding the upper portion of the thread balloon, formed in unwinding from over the end of a supply package, with a shield member having an interior cone-shaped surface, said shield member being so positioned that its large diameter end faces towards the thread supply and projects somewhat beyond the free end of the package and the interior surface of said member spaced away from the thread supply.

In the drawing, the figure illustrates a pirn package having thread thereon (partly broken away) tapered towards the upper end, in combination with a shield member in accordance with this invention and customary collecting device.

Referring to the drawing, the stationary pirn 1 is provided with a core 2, a head 3, a base flange 4, and a handle 5 at the free end of the pirn. The pirn has wound upon it a quantity of thread 6. In the embodiment shown in the drawing, the thread supply 6 has an upper tapered portion 7 so that all along this tapered portion the thread has a tendency to slough. The thread 8 being unwound from the quantity of thread 6 is drawn off through a traverse guide 14 and wound, at high speed, on any suitable collecting device 9, such as a cone. In coming off from the thread supply 6 at a high speed, the thread 8 has a tendency to balloon and when this balloon gets out of control, a double balloon is formed which results in the sloughing difficulties mentioned above. In order to overcome this, an inverted funnel-shaped shield member 10 cone-shaped on the interior is placed over the top of the pirn. This funnel-shaped member contains at the apex of the cone an opening 11 serving as a thread guide. The shield member 10 and its opening 11 are preferably centered with respect to the pirn 1, that is, the axes of member 10 and pirn 1 coincide. The position of the shield member with respect to the pirn is preferably such that the rim 12 of the shield member 10 is about ½ inch to 1 inch below the head 3 and about ½ inch to 1 inch away from the thread supply 6.

In operation, the thread 8 is brought up over the pirn head 3, strung into the interior of the shield member 10 and through the opening 11 to the thread collecting device 9. The unwinding thread forms a balloon, the upper portion of which is slightly compressed and supported on the rim 12 and guided smoothly around on the interior supporting surface of the shield member. By thus leading the thread into the interior of the shield-shaped member instead of keeping it away from the thread supply package by leading the thread onto the exterior of a guide member, as would seem to be the logical way of overcoming the difficulty, the thread may be transferred to a cone shipping package at a speed of 300 yards per minute or higher without the appearance of any substantial amount of sloughing.

In all cases the funnel, coil, or other cone-shaped device should be so positioned that its large diameter opening faces towards the thread supply and projects somewhat beyond the free end of the pirn and spaced away from the pirn package head. It is, of course, only necessary that the interior of the shield member be cone or similar shaped, although the funnel shape is preferred since the least amount of material is used.

The funnel may be made of any suitable material such as glass, Bakelite, hard fiber, vulcanized fiber, paper, metal, etc. In case of paper and metal, it is preferable to lacquer the surface. The funnel or shield-shaped member may be supported in a fixed position or on a pivot 13 so that it can be swung out of the way when desired.

The use of the present invention is particularly advantageous in unwinding thread from a supply package in which a portion of the thread on the supply package is tapered towards the end from which the thread is unwound so that the surface thread layers of the narrow portion are the same thread layers as the sub-surface thread layers of the wider portion. The invention, however, is also advantageous even where such tapered construction is not present since sloughing in the latter case is apt to occur at the edge of the supply package.

The invention may be applied to unwinding of thread of almost any type but its greatest utility lies in the field of synthetic threads which have a smooth, slick surface and are, therefore, particularly subject to sloughing difficulties. As synthetic threads may be mentioned those consisting of regenerated cellulose derived from viscose, cuprammonium or nitrocellulose processes, cellulose esters such as cellulose acetate, cellulose acetopropionate, cellulose acetostearate, cellulose ethers such as ethyl and benzyl cellulose, fibroin, casein, and other protein threads, rubber and the like and those consisting of linear polymers such as described in U. S. Patent to Carothers No. 2,071,251. The denier of the thread may likewise vary upwards from 50 and 75, but generally the invention is more valuable when unwinding a heavy thread having a denier of 150, 300, 500 or more.

The thread supply package may be of any desired type where over-end unwinding is employed, and is substantially stationary, that is, non-rotatable, with respect to the shield member. Likewise, the supply package may be in any desired position such as horizontal or vertical. The thread may be unwound over either the bottom or the top when in a vertical position or over either end when in a horizontal position.

The invention offers a relatively simple and inexpensive improvement whereby the thread may be unwound over the end of a supply package at a greater speed without noticeably impairing the thread quality. For example, thread may be unwound easily at a rate of 300 yards per minute or more and formed into good quality warp beams, skeins, cones, cops, or spool shipping packages on the customary machines. By virtue of substantial elimination of sloughing, the invention also materially reduces the number of thread breaks. In consequence, the number of knots in the cone or like package into which the thread is wound is materially reduced as well as the loss of time and thread arising when sloughing occurs, necessitating the removal of a considerable quantity of thread. It also eliminates the necessity of using a centering guide although a centering guide may, if desired, be used.

By the term "stationary thread supply package" or "stationary support" is meant stationary or non-rotatable with respect to the apparatus as a whole and particularly the cone-shaped member. For example, the apparatus as a whole could move or rotate and still come within the meaning of the term "stationary."

It will be obvious that many changes and modifications can be made in the above described invention without departing from the nature or spirit thereof and it is, therefore, to be understood that the invention is not to be limited except as set forth in the appended claims.

I claim—

1. A method for the over-end unwinding of thread from a stationary supply package, which thread, during the winding thereof, is subject to thread-ballooning thereby causing thread-sloughing or peeling, the step of compressing the balloon of said thread by passing the latter through an inverted, hollow, cone-shaped member positioned over the end of the supply package in such a manner as to partially surround the latter, the open ended apex of the cone-shaped member being positioned above the top of said supply package, and substantially suppressing further ballooning of the thread by passing the same through an opening in said cone-shaped member which opening is substantially smaller than the thread supporting element of said supply package.

2. The method of claim 1 characterized in that the thread on said supply package is tapered towards the end from which the thread is withdrawn.

3. In an apparatus for the over-end unwinding of thread which is subject to ballooning during the unwinding thereof, a stationary support for a quantity of wound thread, said support being free at one end, and an inverted, hollow, cone-shaped member positioned over and partially surrounding the free end of said support, an opening in the apex of said cone-shaped member which opening is substantially smaller than said support, said apex being positioned above the free end of said support, the cone-shaped member being constructed to permit the movement of the thread around the entire internal surface thereof, and means for withdrawing said thread from said support.

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