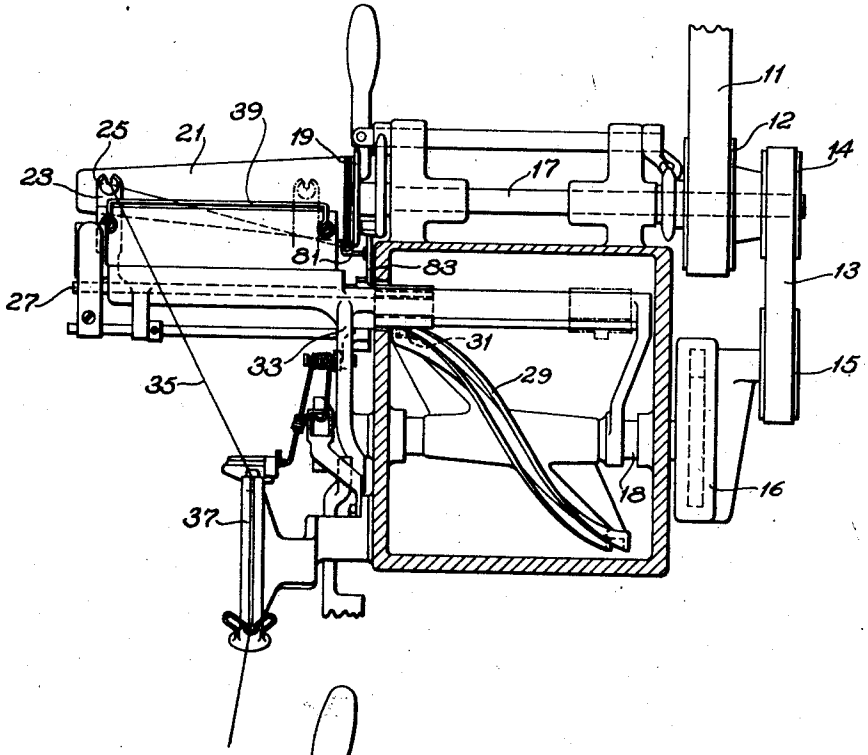
Oct. 27, 1942. R. H. STAFFORD 2,300,073

YARN WINDING

Filed May 22, 1941 2 Sheets-Sheet 1

Fig. 1



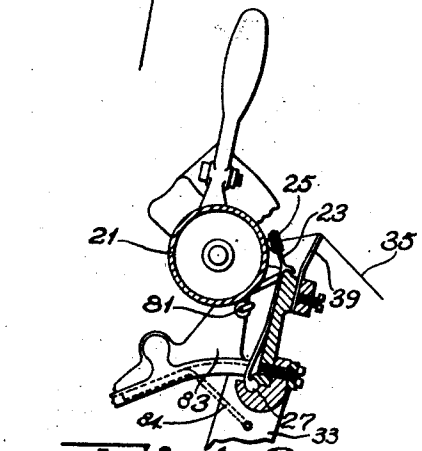


Fig. 2

Robert H. Stafford
INVENTOR.

BY Louis Auerbach

ATTORNEY

Oct. 27, 1942. R. H. STAFFORD 2,300,073

YARN WINDING

Filed May 22, 1941 2 Sheets-Sheet 2

Fig. 3

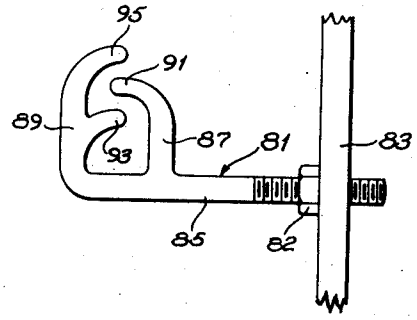


Fig. 7

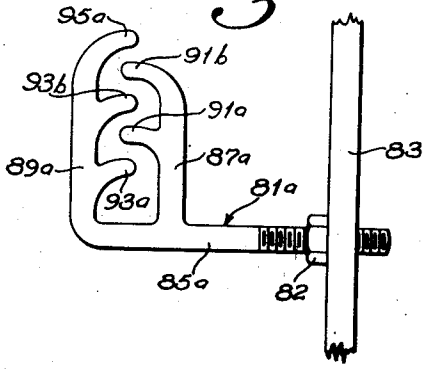
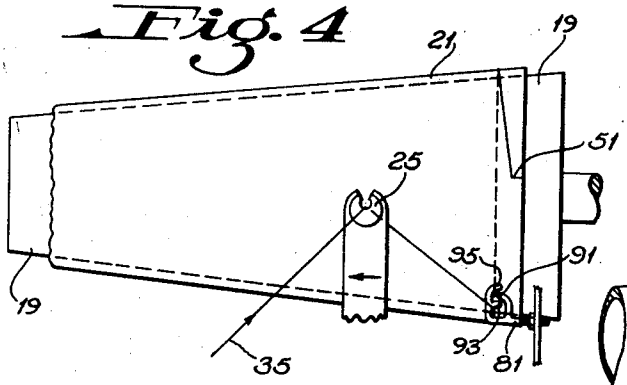


Fig. 4



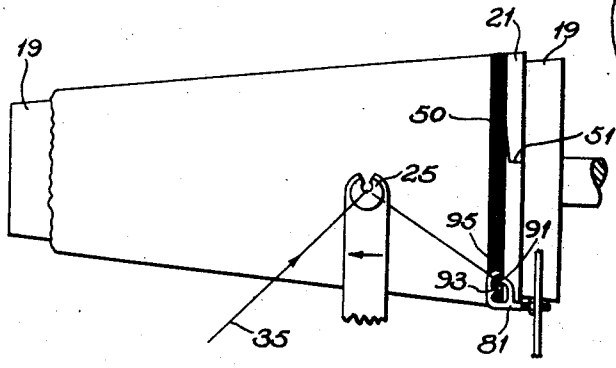


Fig. 5

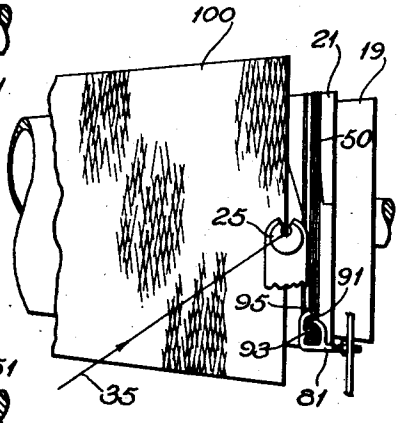


Fig. 6

Robert H. Stafford
INVENTOR.

BY Louis Auerbach

ATTORNEY

Patented Oct. 27, 1942 2,300,073

UNITED STATES PATENT OFFICE

2,300,073

YARN WINDING

Robert H. Stafford, Chesterfield County, Va., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware

Application May 22, 1941, Serial No. 394,612

2 Claims. (Cl. 242—43)

This invention relates to the winding of yarn into a cone or similar type package. More particularly, it relates to an automatically operated means for winding a transfer tail or length of reserve yarn on the end of a cone, tube or other package support before winding the package itself.

In recent years it has been found advantageous to have a reserve length of yarn wound on packages intended for use on warping and knitting machines so that the package can be used in connection with a magazine type of creel and the machine operated in a continuous manner. It has, therefore, become common practice when winding yarn into a package intended for such use to wind the first few turns of yarn about the base of the package support before proceeding with the winding of the main portion of the package. These initial extra windings of yarn thus serve as a transfer tail portion to be tied on to yarn from a second package so that the unwinding of successive packages can proceed in an uninterrupted manner.

Many mechanical devices have been proposed to effect the winding of such a reserve length of yarn or transfer tail portion on the base of the package support. However, these devices proved expensive to construct and install and required frequent adjustment to maintain them in satisfactory operating condition. Therefore, it became common practice for the winding machine operators to wind these few turns of yarn about the base of the package support by hand before the actual winding of the package itself was begun. This was not entirely satisfactory, however, because it was not only time consuming, but often resulted in either the misplacing of these extra windings along the length of the package support, or the winding of a reserve length of yarn that was too short for effective use as a transfer tail.

The recently issued U. S. Patent No. 2,193,117 discloses a simple and effective automatic means for winding a transfer tail, or a reserve length of yarn, on the base of a package support. According to this patent, the yarns to be wound on to the package support are passed first through the eye of the traversing thread guide serving to wind the yarn on to the main portion of the package support and then through the bight of a small open-faced hook mounted in a stationary manner on to the main frame of the winding machine. This hook was of such a shape and was so mounted with respect to the traversing thread guide that it would retain the yarn up to the time when the thread guide first reached that end of its stroke near the base of the package support. At such a time, the hook would automatically release the yarn to the guide and the winding of the main portion of the yarn package would proceed in the usual manner. Thus, if at the start of the operation the thread guide was so positioned as to initially move away from the base of the package support and yarn retaining hook, the hook would retain the yarn during the major portion of one complete reciprocation, or back-and-forth stroke, of the traverse guide, after which it would release the yarn to that guide.

Since in the conventional cone winding machine the traverse guide makes one complete reciprocation for every five revolutions of the winding spindle and package support mounted thereon, it follows that this device enables one to place a maximum of five windings about the base of the package support before the main portion of the yarn package is wound. However, if the thread guide should not be so positioned, fewer than five turns of yarn would be wound about the base of the package support to serve as the transfer tail means. For example, if, at the start of the winding operation the thread guide is near the end of its stroke, the transfer tail will be so short as to be practically worthless. Thus, the method provided by this process is not only limited as to the maximum length of transfer tails that can be formed, but if the operation is not carefully and closely controlled, a transfer tail of undesirably short length will be formed. Moreover, such a method cannot be used with winding machines wherein the diameter of the package support is very small or wherein the package support makes a smaller number of revolutions for each reciprocatory movement of the traverse guide.

It is, therefore, an object of this invention to provide an improved automatic means for winding at least a required minimum length of reserve yarn on the end of a core, or other package support, whereby the difficulties of operation and deficiencies of the previously proposed automatic means will be avoided.

It is also an object of this invention to provide such a means that can be used to advantage with various types of cross-winding machines, regardless of the diameter of the package support, or of the number of revolutions made by the package support per reciprocatory movement of the thread guide.

Other objects of the invention will appear hereinafter.

The device of the present invention comprises, generally, a fixed yarn guide positioned adjacent one end of the yarn supporting core, the said guide being provided with a plurality of successive yarn guiding prongs, adapted to guide the yarn on one end of the core. The yarn will be released successively from the said prongs in successive reciprocations of the yarn traverse guide. After release from the last of said successive yarn guiding prongs the yarn will be wound on the core in the conventional manner.

The following description of the invention will be more readily understood if taken in connection with the accompanying drawings in which:

Figure 1 is a side elevational view, with parts in section, showing the essential portions of a winding machine provided with a tail-winding mechanism constructed and arranged in accordance with this invention.

Figure 2 is an end elevational view with parts in section of a portion of the device shown in Figure 1.

Figure 3 is an enlarged elevational view showing a tail-winding guide constructed in accordance with the invention.

Figures 4, 5 and 6 are diagrammatic elevational views illustrating the details of operation of the invention.

Figure 7 is an enlarged elevational view showing a modified form of a tail-winding guide constructed in accordance with this invention.

Referring to the drawings, Figures 1 and 2 illustrate a conventional cone winding machine of the precision wind type. The winding machine is provided with driving means consisting of belt 11, pulley 12, belt 13, pulleys 14 and 15 and gear reduction mechanism 16, which elements are connected to each other in a known manner to rotate the cone shaft 17 and cam shaft 18.

The cone shaft 17 is adapted to drive the spindle 19 on which is positioned the cone core or cone support 21. A thread traverse member 23 is positioned adjacent the cone support 21 and is arranged to reciprocate longitudinally of the support 21 to traverse the yarn along the same. The traverse member 23 is provided with a slotted thread guide 25 which is preferably constructed in such a manner that it may ride on the cone support, or on the underlying thread layers on the cone support during the entire winding operation. The thread traverse member 23 is connected to a traverse bar 27 which in turn is connected to cam 29 by means of cam follower 31. The rotation of cam 29 will thereby reciprocate the traverse bar in a known manner. The traverse member 23 is usually assembled with a weighted means 33, and the whole assembly pivoted in such a manner that the thread guide 25 is very lightly positioned against the underlying thread layers as the cone builds up with a uniform pressure. The thread 35 is passed from a supply bobbin or the like (not shown) through a tensioning means 37 over a thread guiding bail wire 39 through the thread guide 25 on to the cone support 21.

Before the thread is to be wound on the surface of the cone support which is to contain the built-up layers of thread, a length of reserve yarn or a so-called "transfer tail" is wound on the base of the cone support which is not to be covered by the yarn layers. This may be achieved by means of the tail-winding means 81 which is fixedly positioned in the frame member 83. The frame member 83, to which the means 81 is attached, is preferably the traverse frame dog segment of the winding machine which is a conventionally used element in precision winding machines to provide a rest for the traverse frame dog 84 which will prevent the thread traverse guide from gouging into the package during the winding operation. The tail-winding means when so positioned may be considered as substantially stationary. The tail-winding means can, however, be fixedly positioned to almost any fixed part of the winding machine, if desired.

Referring to Figure 3 of the drawings, the tail-winding means 81 comprises a support bar 85 positioned parallel to the axis of the thread supporting core. The support bar 85 may be fixed to the frame member 83 by means of a nut 82 or the like. The support bar 85 is provided with two upwardly projecting fingers 87 and 89. Finger 89 is provided with two hook-shaped prongs 93 and 95. The bights of the hook-shaped prongs are directed toward the outwardly projecting end of the thread supporting core. The finger 87 is provided with one hook-shaped prong 91 slightly interleaved with the hook-shaped prongs 93 and 95.

Referring to Figures 4, 5, and 6 of the drawings, it will be noted that the contour of the hook-shaped prongs 93 and 95 is such that the thread will slip from these hook-shaped prongs when the button guide 25 is positioned substantially in its extreme position of reciprocation towards the base of the core. The hook-shaped prong 91 will prevent the yarn from slipping from both hooks 93 and 95 at the same time, that is to say, during the same reciprocation of the traverse guide.

The yarn supporting core 21 is provided with a slot at the base thereof, as clearly shown at 51 in Figures 4 and 5. The thread 35 is fixedly positioned in the slot 51 by pulling it thereinto before the supporting core is placed on the winding spindle.

The operation of this device is preferably carried out as follows: The end of the thread 35 is inserted in slot 51 in the base of the thread supporting core 21, and the core placed on the winding spindle 19 so that the slot is a little to the right of the tail-winding means, as viewed in Figures 4, 5, and 6. The thread is hooked over the hook-shaped prong 93 and then is brought through the button thread guide 25 in the usual manner. In order to wind the maximum quantity of yarn into the transfer tail of the yarn package, the button guide 25 should be located slightly forward of its extreme right-hand position and traveling toward the left as shown by the arrow in Figures 4 and 5. The button guide will now pass to the left, as shown in the drawings, to its extreme left-hand position of traverse and then return to its extreme right-hand position of traverse at which time the yarn will be disengaged from the hook-shaped prong 93 and into contact with hook-shaped prong 91, the latter prong guiding the yarn into the bight of hook-shaped prong 95. By this time, the traverse button guide 25 will again have moved an inch or more on its left-hand traverse and the yarn will be held by the hook-shaped prong 95 until the button guide has again reached its extreme right-hand position of traverse. At this time the yarn will be disengaged from prong 95 and the yarn will be wound in the conventional manner to form a yarn package 100 as shown in Figure 6 of the drawings. Substantially the same pro-

cedure will be used in the winding of cylindrical packages.

It will be noted that by use of the tail-winding means of the present invention, the yarn winding operation may be begun with the traverse button guide in any position or direction, of its traverse, to wind a transfer tail at least equivalent to the number of turns made by the yarn support during one complete back and forth reciprocation of the button guide. Consequently, the positioning of the button guide, or its direction of movement, is not essential to the winding of a required transfer tail on to the yarn supporting core. Inasmuch as the spindle of the usual winding machine makes five complete revolutions for each back and forth reciprocation of the traverse guide, the transfer tail **50** of a yarn package wound in accordance with the present invention will always contain from approximately 5 to approximately **10** complete turns of the yarn about the yarn supporting core. In the case of the usual cone core support, which has a diameter of 2 inches at its base, the transfer tail will contain from approximately 30 to 60 inches of yarn. This will prove to be ample for use in tieing into the outer end of a second yarn package on a magazine creel used in subsequent textile operations.

Referring to Figure 7 of the drawings, the tail-winding means **81***a* comprises a support bar **85***a* positioned parallel to the axis of the core, and is provided with fingers **87***a* and **89***a* similar to the means described in Figure 3 of the drawings. The finger **89***a* is provided with three hook-shaped prongs **93***a*, **93***b* and **95***a*. The finger **87***a* is provided with hook-shaped prongs **91***a* and **91***b*. The prong **91***a* is interleaved with prongs **93***a* and **93***b*, and the prong **91***b* is interleaved with prongs **93***b* and **95***a*. It will be readily apparent that this modified form of tail-winding means operates in an identical manner to that described in Figures 3, 4, 5 and 6 of the drawings except that three reciprocations of the button guide will be necessary to finally slip the yarn from the last hook-shaped yarn guide prong **95***a*. This type of tail-winding means may be used in cases where the package support possesses a smaller diameter, or in cases wherein the package support makes a smaller number of revolutions for each complete reciprocatory movement of the traverse guide. Such a situation requires the yarn to be wound on to the transfer tail portion of the package during more than two complete reciprocation cycles of the traverse guide. The invention contemplates the use of tail-winding means provided with any number of hook-shaped prongs to provide the requisite number of turns about the yarn supporting package for the formation of the transfer tail.

This invention provides a means of winding a transfer tail portion of any desired predetermined minimum length into a yarn package.

The invention operates to form such a transfer tail portion in an entirely automatic manner. It is extremely simple to thread up and does not require careful positioning of the traverse guide at the start of the winding operation. Thus, the guide reduces operator fatigue and lowers operating costs. Furthermore, it insures the proper positioning of the transfer tail portion of the package support.

The guide provided by this invention is easily constructed and can be readily installed on conventional winding machines. Furthermore, once installed, the guide does not require continued adjustment to maintain it in operating condition.

The type of guide provided by this invention can be used to wind a reserve length of yarn into a transfer tail portion of any desired minimum length on any type of winding machine wherein the yarn is traversed along the length of the package support. The invention does not require that the package support employed possess a certain diameter. Nor does it require that the package support complete a certain number of revolutions for every complete reciprocatory movement of the traverse guide.

Since it is obvious that many changes and modifications can be made in the above-described details without departing from the nature and spirit of the invention, it is to be understood that the invention is not to be limited to the details described herein except as set forth in the appended claims.

I claim:

1. In an apparatus for the winding of thread packages, a thread package core, means for rotating said core, a thread guide, means for reciprocating said thread guide along said core, a fixed tail-winding means positioned adjacent the base of said core, said tail-winding means comprising a support bar positioned parallel to the axis of said core, a pair of substantially parallel upwardly projecting fingers mounted on said bar, a plurality of interleaved, hook-shaped prongs on said fingers, the bights of the hook-shaped prongs of one of said fingers directed toward the outwardly projecting end of the core, each of the last-named prongs adapted to guide the thread on to the base of said core beyond the traverse of the thread guide while the latter is threaded and operated in its normal capacity, the last-named hook-shaped prongs being sufficiently shallow to just release the thread when the reciprocating thread guide moves the thread to approximately the end of its traverse stroke adjacent the base of the core, the hook-shaped prongs on the other of said fingers adapted to guide the yarn to the next successive hook-shaped prong of the first named finger during the reversal of the traverse stroke adjacent the base of said core, whereby the thread will be released from one of said last-named prongs each time the thread is moved to approximately the end of its traverse stroke adjacent the base of the core.

2. In an apparatus as defined in claim 1, a traverse frame dog which prevents said thread traverse guide from gouging into the thread package, a traverse frame dog segment in which said dog rests, said segment and dog positioned adjacent the base of said core, and said tail winding means fixedly positioned in said segment.

ROBERT H. STAFFORD.