Oct. 29, 1940. C. K. DUNLAP 2,219,836

CORE FOR YARN PACKAGES

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FIG. E.

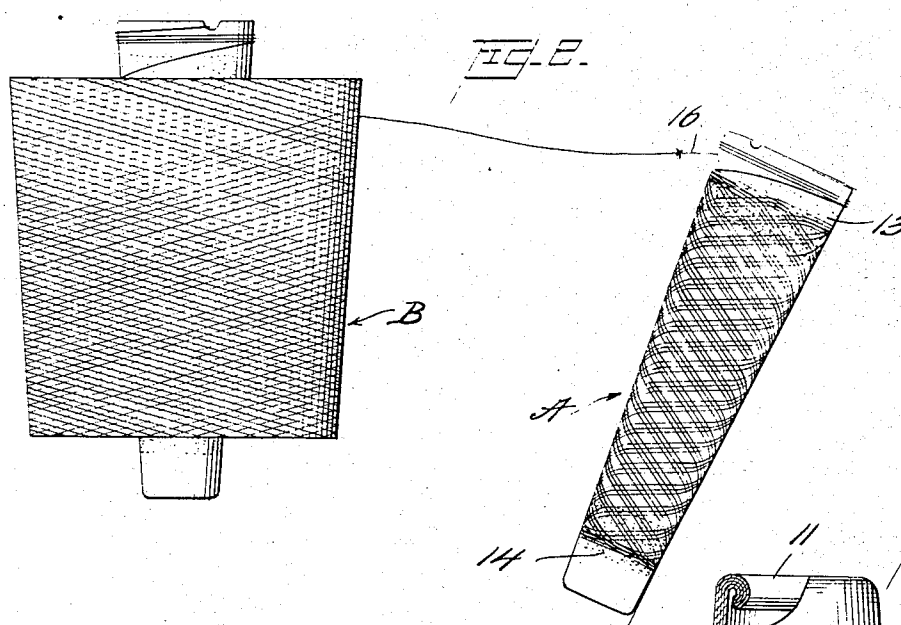
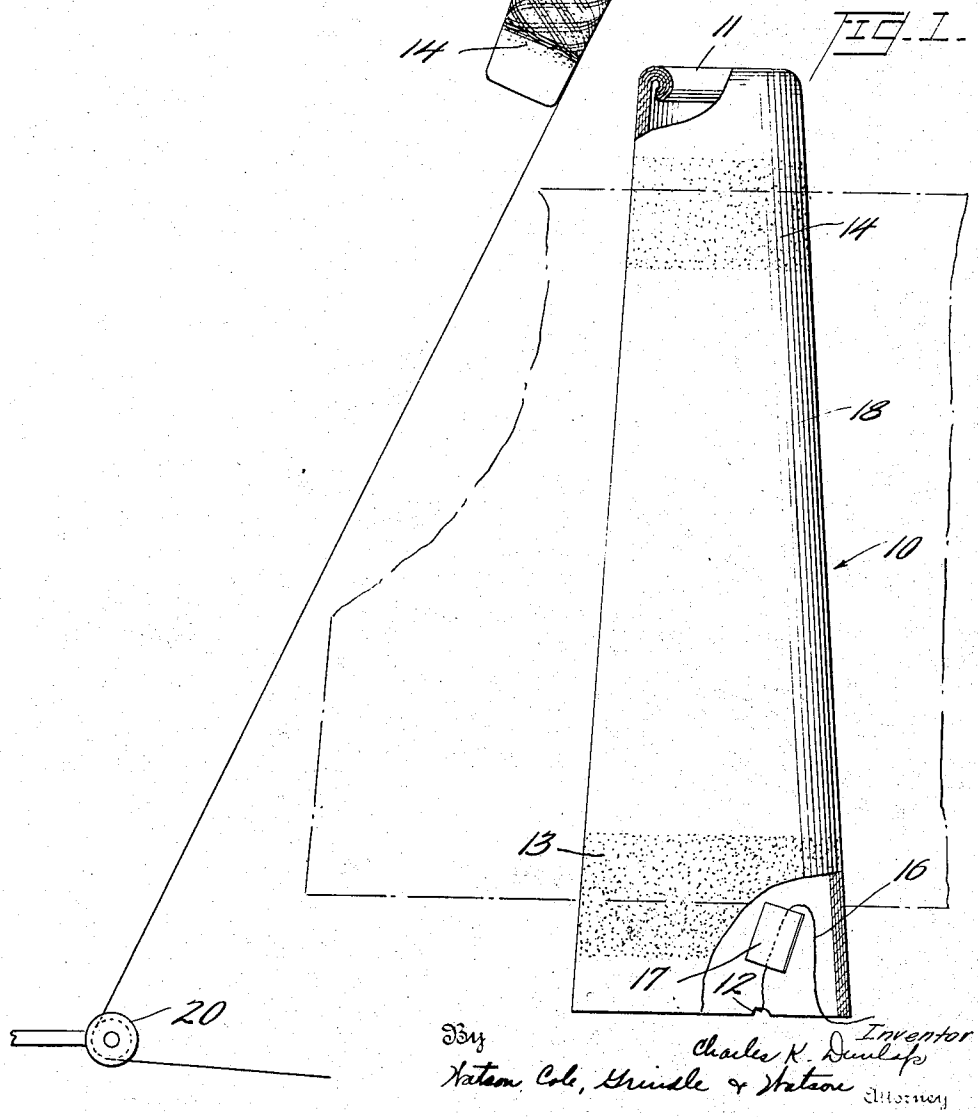


FIG. I.



By Watson, Cole, Grindle & Watson Attorneys

Inventor
Charles K. Dunlap

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CORE FOR YARN PACKAGES

Charles K. Dunlap, Hartsville, S. C., assignor to Sonoco Products Company, Hartsville, S. C., a corporation of South Carolina

Continuation of application Serial No. 183,888, January 7, 1938. This application January 4, 1940, Serial No. 312,428

2 Claims. (Cl. 242—122)

This application is a continuation of my copending application Serial No. 183,888, filed Jan. 7, 1938.

This invention relates to cores for supporting packages or windings of yarn or thread and pertains particularly to yarn or thread supporting cores fabricated of paper and fashioned into tubular form, either cylindrical or conical.

The paper core for thread or yarn packages or cops has been in the recent past very widely used throughout the textile industry, forming a most economical, lightweight, strong and efficient means for the support of such packages as the yarn is fed therefrom into knitting, weaving, warping, or other machines. Changes in the materials employed in the fabrication of textile fabrics and the speeding up of various processes of or relating to fabric manufacture have from time to time resulted in the provision of new and improved yarn package supporting cores and a number of such cores have heretofore been designed and suggested as being particularly useful in meeting special conditions existing in the textile industry.

The increasing demand for textile fabrics manufactured of thread of artificial nature has given rise to problems heretofore not met with by the textile worker and likewise the present-day tendency in all textile plants to make use of machinery which operates at substantially higher speeds than corresponding machinery heretofore employed again creates a condition which points to the desirability of further improvements in the yarn handling and supporting means employed. For instance warp forming apparatus is now coming into popular favor by means of which warps are wound upon warping beams at speeds heretofore never considered practical and it is likewise becoming common practice to form warps of extreme length, each warp thread comprising several lengthy thread units the ends of which are tied together.

In practicing continuous high-speed warping, in which process a large number of threads are simultaneously withdrawn from thread packages mounted upon a creel, there are two thread packages on the creel for each warp thread passing on to the warping beam. The trailing end of the thread of the packages from which the thread is actually being withdrawn is tied to the leading end of the thread of a second adjacent thread package so that, when the thread of the first package "runs out", unwinding of the thread on the second or full package immediately begins, there thus being no interruption in the warping operation. Satisfactory continuous warping, however, cannot be effected when there are wide variations in tension in the various threads passing to the beam.

It is well known to those skilled in the art that most of the artificial threads woven into textiles are made up of many small, extremely fine individual strands and are rather fragile, easily frayed and rather easily broken. The same is true of silk and it is known that the problems incident to the handling of silk yarn and yarn of artificial origin, such as rayon, are quite different from those involved in the handling of wool, cotton, and other similar yarns. For instance it is most difficult to maintain a package or winding of silk or rayon on the ordinary paper core and I have heretofore suggested that thread packages of rayon, silk, and the like may advantageously be mounted upon paper cores, the surfaces of which were rendered velvety, or napped, by grinding or abrading the paper surface so as to cause the surface filaments or fibers to be raised from the body of the core and to extend outwardly. A thread core of the type just described is disclosed in my Patent No. 1,634,492, granted July 5, 1927. This type of core has proven to be eminently helpful in the handling of silk and rayon-like threads, preventing slippage of the inner windings of the packages upon the surfaces of the cores and yet eliminating all danger of fraying or breakage of the thread as it is withdrawn axially of the core. Numerous other types of surfaces are known to be satisfactory in one respect, i. e., in preventing slippage of yarn packages, but not in other respects, for instance causing fraying of the yarn, or actual breakage, as it is withdrawn, yarns which are silk-like, such as rayon, being most easily frayed or broken by any slight projection or protuberance from the surface of a supporting core.

The particular object of the present invention is to provide an improved type of paper thread core which, while of general utility, in the textile art, is particularly helpful to those engaged in processing silk or rayon yarns or other yarns of this character and particularly where, as in the case of high-speed continuous warping, the velocity of the thread as it is unwound from the supporting core is relatively great and where it is highly essential that the tension in the delivered yarn be maintained as uniform as possible at all times, even though the packages are "magazined," i. e., the trailing end of one package tied to the leading end of a second package to obtain a continuous feed. In its preferred

form my improved yarn core partakes of the nature of the core previously patented in that certain portions of its thread receiving surface are provided with a velvety nap but, instead of providing this nap over the entire thread receiving surface, it is confined to certain bands or circumferential zones adjacent the ends of the core. That portion of the thread receiving surface which lies intermediate these two end zones or bands is left smooth, or may be even made smooth if, as originally fabricated, it is somewhat rough. The thread package is so wound upon this core that its ends overlie and rest upon the velvety encircling bands toward the ends of the core, whereas the entire mid-section of the core rests upon the smooth intermediate portion of the thread receiving surface—a surface so smooth that it offers very little opposition to the free sliding of threads over it. It is clear that, during the winding operation the end loops of the helical thread or yarn windings, i. e., the reversely curved portions of these windings which are caused or brought about by the reversal of the traversing element of the winding machine from which the thread is moving onto the core, overlie the zones 13 and 14 and indicated in the drawing. These zones are of such character that they retain against slipping and back rolling the end loops mentioned thus making it possible to lay the initial windings on the supporting core in a perfect manner.

With the improved core the yarn package is maintained in position by reason of the engagement of its ends with the circumferentially extending zones or bands of velvety nap but the major portion of the inner surface of the yarn winding rests upon the smooth surface of the core, as previously explained. When the yarn is withdrawn from a package mounted upon a core of the type just described, there is no difference in tension to be noticed until the last few layers are being withdrawn and here the tension increases slightly. However, due to the fact that the thread or yarn is being removed from a surface which is largely quite smooth the increase in tension is considerably less than it would be if the yarn were being removed from a core the entire surface of which had been given increased thread retaining capacity, or which embodied areas of increased thread retaining capacity intermediate the end zones. Furthermore the tension existing in the thread being withdrawn is more uniform when the improved core is used. Thus when the entire surface of the core is the same so far as its yarn retaining characteristic is concerned considerable variations in tension of the yarn being removed from the last few layers are observed because of the fact that the end loops offer less resistance to removal than the intermediate portions. By placing the end loops upon the zones of relatively high thread retaining capacity, however, the tension required to remove the end loops is caused to approximate that necessary to remove the helical winding lengths which lie between the end zones. It is highly advantageous to eliminate these tensional variations as well as to lower the average tension. Tension which must necessarily be exerted upon a yarn winding to withdraw its last few layers from the surface of a core such as now proposed is very appreciably less by actual measurement than the tension required to withdraw the last few windings from a core having a nap over its entire thread receiving surface, as suggested in my prior patent, and hence the present core is more suitable for use in processes such as continuous high-speed warping, than cores constructed in the manner suggested previously.

Warping at lower speeds is of course improved by the use of the core described and likewise yarn may be fed more satisfactorily to knitting, weaving and other textile machines with the improved results which follow from more uniform tension.

Likewise the improved core may be fabricated at less cost. This follows from the fact that, as less of its paper wall is ground away or abraded in manufacture, less paper may be used in its fabrication, i. e., the blanks from which it is made are smaller than the blanks from which the earlier type of paper cone are made, for cones of the same strength and service-ability. Further the apparatus employed in the manufacture of the cone may be less expensive and there is less dust hazard involved. Finally, the improved cone has the added and important advantage that it will absorb less oil from the yarn and less water from the atmosphere than the core of my earlier patent, the smooth surface of the present core intermediate the napped bands, being much more resistant to the penetration of both oil and water.

The improved core may be fabricated in various ways and likewise may be varied somewhat in its details of construction without departure from the invention. For instance, the core encircling zones or bands may be created by encircling the core with bands of an adhesive substance and applying to the bands of adhesive, while the adhesive is wet, a fibrous substance such as ground wood fiber, this fiber adhering to the surface of the core and forming the desired thread retaining nap after drying of the adhesive.

In the accompanying drawing one embodiment of the invention is disclosed and will be now more particularly described.

In the drawing:

Figure 1 is a side elevation of a preferred form of the improved yarn core, partly broken away, the outline of portion of a thread package being indicated in chain lines; and

Figure 2 is a view showing rather diagrammatically two yarn packages disposed with relation to each other in the approximate positions which they occupy in magazine creeling or high-speed warping, one package having been run out save for a few remaining windings or layers of thread and the other package being as yet complete or full.

While the improved thread core may be cylindrical it will be in most cases fabricated in the form of a cone, such as illustrated in the drawing. As a preliminary step the semi-circular paper blank is cut from a paper web, this blank being then coated upon one or both sides with a suitable adhesive and then wound into conical form upon a conical mandrel, in well-known manner. While the character of the paper from which the core is made may vary widely, I prefer to use kraft paper or what is known as "gray board," a paper which is a mixture of stock formed from old newspapers and wood fiber, some 75% thereof being old newspaper stock and the remainder wood fiber. The paper is preferably used in the form in which it is taken from the forming machine and, if one side is rough, as for instance when it is formed upon a loosely woven cloth, this roughened side is turned inside so that the exterior surface of the completed core is

smooth. I may employ other types of papers if desired, particularly where a nap is desired which is either longer or shorter than the average nap. The softer the paper, the longer the nap which may be raised by abrasion or grinding and hence in some instances a relatively hard dense paper may be preferred to a very soft paper.

The small end of the core thus formed, which is indicated at 10, is then preferably inturned and polished, as indicated at 11, and a notch 12 is formed in its edge at the larger end. The wall of the core may be two or more plies in thickness depending upon the nature of the paper used but in any event the core must embody a sufficient number of plies or convolutions to ensure that it has sufficient mechanical strength.

After being thus formed, the core is allowed to dry and, when fully dried, is subjected to a grinding operation. In this operation two bands or circular zones indicated at 13 and 14, respectively, are subjected to the action of grinding belts, grinding wheels, or equivalent apparatus, so that the natural smoothness of the surface is destroyed and replaced by a soft velvety nap which comprises outwardly projecting filaments or fibers of the paper. The widths of the two bands 13 and 14 may be varied but, generally speaking, these bands are made as narrow as possible, it being only necessary that they be sufficiently wide to receive and underlie the end portions of the yarn package. As previously stated, the end loops should overlie the end zones and the end zones likewise are preferably sufficient in area to prevent slipping of the package on the core. The inner windings of the thread applied to the core after it has been thus completed are illustrated rather diagrammatically in Figure 2 and it will be seen from this figure and also from Figure 1 that it is only the ends of these inner layers which overlie the napped surfaces 13 and 14, the main bulk of the thread resting upon the smooth surface of the core intermediate the zones 13 and 14.

Prior to winding, an end of the thread, which is indicated at 16, is secured to the inner face of the core by means of a sticker, as indicated at 17, and then carried through the notch 12 in well-known manner so that this end of the yarn may be readily found at any time thereafter. The winding or package may be of any desired size and yarn of any character may be wound upon the core. Yarns which are notoriously most difficult to handle, however, such as rayon or other artificial yarn, and silk, are firmly supported when in package form upon the improved core, there being no danger of slippage of the package when the ends thereof overlie the napped zones 13 and 14. The yarn package so mounted may be readily unwound, being withdrawn axially of the core in the customary manner and even the last few windings or layers of yarn may be withdrawn quite freely, with but slight increase in tension. This follows from the fact that only a small portion of the last layers of yarn are withdrawn from the napped surfaces 13 and 14 and the major portion is withdrawn without any substantial resistance from the intermediate smooth section 18. Likewise, as pointed out previously, not only is the average tension reduced in amount, but fluctuations in tension are minimized so that the yarn may be fed to knitting, creeling, weaving and other textile machines in a superior manner, resulting in improved and more uniform textile products.

Hence thread cores of the type described are particularly useful in continuous high-speed warping. In practicing this process of warping thread packages are disposed upon a creel in pairs, as indicated in Figure 2, and the yarn from one package is conducted over a thread guide 20 and thence to a warping beam. The trailing end 16 of the thread wound on the package first to be used, which package is indicated at A, is released from the holding member or sticker 17 of the associated supporting cone and is tied to the leading end of the thread of thread package B, a full package mounted upon a similar core. When package A completely runs out, package B is then unwound and of course, to maintain the operation continuous for a further time, a fresh package is placed where package A was formerly located and its leading end connected to the trailing end of package B, etc.

From four hundred to seven hundred yards of yarn are removed by a high-speed creeling beam, per minute, and at this rate of consumption the average thread package will only last from one to three hours. Hence the yarn "runs out" on one or the other of each pair of associated packages rather frequently. Inasmuch as it is highly essential to continued high-speed operation that there be no breaks at any time, and also vital that there shall be no substantial variations in tension, cores of the type described are of particular usefulness when employed in such a process. As has been previously pointed out, there is much less fraying of the delicate fibrous yarn when it is rapidly withdrawn from a core of the type described than when withdrawn from any other type of cone known to me, and the yarn goes to the warping beam in better condition. There is less wastage of material, less stoppage of the warping process and in general great economies are effected in time and cost where cores of the type shown and described are made use of.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A supporting core for a yarn cop or package comprising a tubular member fabricated of paper the exterior surface of which is adapted to be engaged by the innermost windings of a yarn package, said yarn engaging or receiving surface being in part smooth so as to provide little frictional resistance to the slippage of yarn thereover but including two spaced core encircling zones of velvety fibrous yarn retaining nap, these zones being located, respectively, at the ends of an intermediate smooth surface and in position to underlie the end portions of a yarn package mounted on the core, the zones being of sufficient width, measured longitudinally of the core, to receive and retain against slipping and rolling the end loops of the innermost thread windings of a thread package when the winding of a package is begun and to facilitate unwinding of the package by increasing the amount of tension required to remove the end loops so that it approximates that which is necessary to remove the intermediate lengths from the smooth surface of the core, thereby tending to render more constant the tension in the thread during removal of the innermost windings, the average tension required to remove these windings from the core being less than that which is necessary when the entire thread receiving surface is provided with a thread retaining nap.

2. A supporting core for a yarn cop or package comprising a tubular member the exterior surface of which is adapted to be engaged by the inner-

most windings of a yarn package, said yarn engaging or receiving surface being in part smooth so as to provide little frictional resistance to the slippage of yarn thereover but including two spaced core encircling zones located, respectively, at opposite ends of an intermediate smooth surface and in position to underlie the end portions of a yarn package mounted on the core, those areas of the surface of the core which lie within said zones being formed to receive and retain against slipping and rolling the end loops of the innermost thread windings of a thread package when the winding of a package is begun and to facilitate unwinding of the package by increasing the amount of tension required to remove the end loops so that it approximates that which is necessary to remove the intermediate lengths from the smooth surface of the core, thereby tending to render more constant the tension in the thread during removal, from the core, of the innermost windings thereof.

CHARLES K. DUNLAP.