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METHOD OF PRODUCING STIFFENED YARN
AND FABRIC

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This invention relates to improvements in a stiffened cord, braid, tape or fabric and methods of producing the same.

Organic derivatives of cellulose such as cellulose acetate and cellulose nitrate have been used to produce artificial threads which have been spun together to form yarns that are made up into fabric. It is known that such fabric may be stiffened by applying a stiffening agent and certain solvents, softening agents or swelling agents have been used for this purpose. The solvent tends to remove the finish from the artificial threads or yarns. The finish may be restored by applying a suitable lacquer but when the lacquer is applied to a fabric, particularly a knitted or open-work fabric the result is an uneven coating which is not desirable.

It is also known that natural yarns of cotton or the like may be combined with artificial yarns to impart strength to the fabric, but heretofore the natural and artificial threads have not fully commingled by spinning the threads in such a manner that the respective threads are uniformly distributed in the yarn and thereby in the fabric.

It is an object of my invention to spin the natural and artificial threads together by arranging the artificial threads substantially alternately with respect to the natural threads whereby the subsequent action of the stiffening agent will be more uniform and will lock the fibres together throughout the cross-section of each yarn.

Further, I propose to restore the finish to the stiffened yarn or cord by applying lacquer thereto while the yarn or cord is in a soft limp state under the action of the stiffening solvent. Also for open-work articles the lacquer is applied before the yarn or cord is worked up into a tape, braid or fabric, thereby avoiding the uneven coating which results when the lacquer is subsequently applied.

Further objects and advantages of my invention will be more readily apparent from the following disclosure of specific embodiments of my invention.

The yarn or cord is manufactured in various ways. In the first method of procedure artificial filaments or fibres obtained from organic derivatives of cellulose are twisted together into threads and the threads are twisted together into a yarn or cord. In another method, instead of using all artificial filaments, natural fibres such as cotton, silk or wool may be commingled with the artificial fibres to form threads, and the threads are twisted together to form the yarn or

cord. In still another method twisted artificial fibres in the form of threads are commingled with twisted natural fibres in the form of threads and the threads are twisted together to form the yarn or cord. Finally, particularly when a relatively large size yarn or cord is desired, yarns wholly artificial may be twisted together with yarns wholly composed of natural fibres.

The threads are spun in the usual spinning machine, and the size of the desired cord determines the number of threads to be combined. Preferably the natural and artificial threads are alternately disposed as they are fed from the spinner if the number of the natural and artificial threads is the same. If a stiffer cord is desired more of the artificial threads are added or vice versa, in which case it is desirable to arrange the threads as they are fed to be spun in such a manner that the artificial threads are substantially evenly distributed with respect to the natural threads.

The yarn cord prepared as above described is then dipped in or drawn slowly through a bath of solvent such as acetone or the like. The solvent will act uniformly throughout the cord causing a coalescence or welding together of the threads. The action of the solvent on the artificial threads produces stiffening of the cord and the degree of stiffening may be controlled by varying the proportion of artificial threads or by varying the strength of the solvent bath or by controlling the period of contact with the solvent.

It is desirable to coat the yarn or cord with lacquer to further stiffen the cord and restore its finish. In my method the cord is passed directly from the solvent bath into a lacquer bath or only a short period of drying is permitted whereby the cord is soft and limp as the lacquer is applied. The lacquer may adhere better if this method is followed. However, certain advantages of my improvements may be obtained even if the yarn is fully dried and stiffened before applying the lacquer. I prefer to draw the yarn or cord, after it leaves the lacquer bath, through a die which smooths the lacquer coating and forms the cord to a uniform size.

The stiffened yarn or cord prepared as above described may be used for trimming shoes, bags or the like, or it may be knit, woven or braided into tape, braid or fabric, particularly open-work fabric.

Instead of stiffening the yarn or cord before it is worked into an article, the yarn or cord in the limp state may be knit, woven or braided into

a flat or tubular tape or braid or a closely knit or woven fabric which is then dipped in a bath of solvent for the artificial filaments so as to soften the filaments and produce coalescence with the natural filaments. The article is passed directly from the solvent to a bath of lacquer or only a short period of drying is permitted although if desired the lacquer may be applied after the article is fully dried. A satisfactory smooth surfaced, stiffened tennis tape may be made by this method, or a fabric may be obtained which may be split up to make various articles.

I claim:

1. The method of making a stiff cord material which consists in forming filaments of organic derivatives of cellulose, twisting together several filaments to form a thread, spinning a plurality of threads to form a yarn, imparting stiffness to the yarn by treating the yarn with an organic solvent, applying a lacquer coating to the stiffened yarn and finally passing the yarn through a die to form a smooth surfaced stiff cord.

2. The method of making a stiff cord material which consists in spinning together a plurality of twisted threads to form a yarn, a number of the threads of the yarn being composed of natural fibers and the remainder of the threads being composed of artificial fibres consisting of organic derivatives of cellulose, the artificial threads being substantially evenly disposed with respect to the natural threads during the spinning operation, passing said yarn through a bath of an organic solvent for the artificial thread material to impart stiffness to the yarn, passing the stiffened yarn through a bath of lacquer to deposit a thin coating of lacquer thereon, and drawing the lacquered yarn through a die to form a smooth-surfaced cord.

3. The method of making a stiffened knitted fabric which consists in spinning together a plurality of threads to form a yarn substantially alternately composed of natural threads of the class comprising cotton, silk and wool and artificial threads of organic derivatives of the class comprising organic esters and organic ethers, applying an agent effective to produce coalescence

of the natural and artificial threads and subsequent stiffening of the artificial threads, applying a thin coating of lacquer to the stiffened yarn, drawing the yarn through a die to form a smooth surfaced cord and finally forming the cord into an open-work fabric.

4. The method of making a stiffened cord which consists in spinning together a number of threads to form a yarn, at least part of said thread being composed of organic derivatives of cellulose, passing said yarn through a bath of solvent to soften the threads and passing said yarn through a bath of lacquer immediately after removal from the bath of solvent whereby as the yarn is dried it becomes stiffer due to the action of the solvent, and the finish is restored by the lacquer.

5. The method of making a stiffened cord which consists in spinning together a number of threads to form a yarn, part of said threads being composed of natural fibres and part of said threads being composed of artificial fibres, applying a solvent to said yarn which will act upon the artificial threads to soften the fibres thereof, applying a lacquer coating to said yarn while it is in a softened state and finally drying said yarn to produce the stiffened cord.

6. The method of forming a stiffened braid or tape which consists in spinning together alternately disposed threads composed of natural fibres and fibres of organic derivatives of cellulose to form a yarn, forming the yarn into a relatively narrow tape, applying a coalescing and stiffening agent to the braid and finally applying a thin lacquer coating to the braid.

7. The method of forming a stiffened fabric which consists in spinning together a number of threads to form a yarn, at least part of said threads being artificial threads composed of an organic derivative of cellulose, forming said yarn into a closely-woven fabric, dipping the fabric in a solvent for the artificial threads to soften the threads, dipping the fabric while in a softened state into a bath of lacquer and finally drying the fabric to obtain a smooth-surfaced, stiffened fabric.

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