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METHOD OF MANUFACTURING YARN AND THE PRODUCT THEREOF

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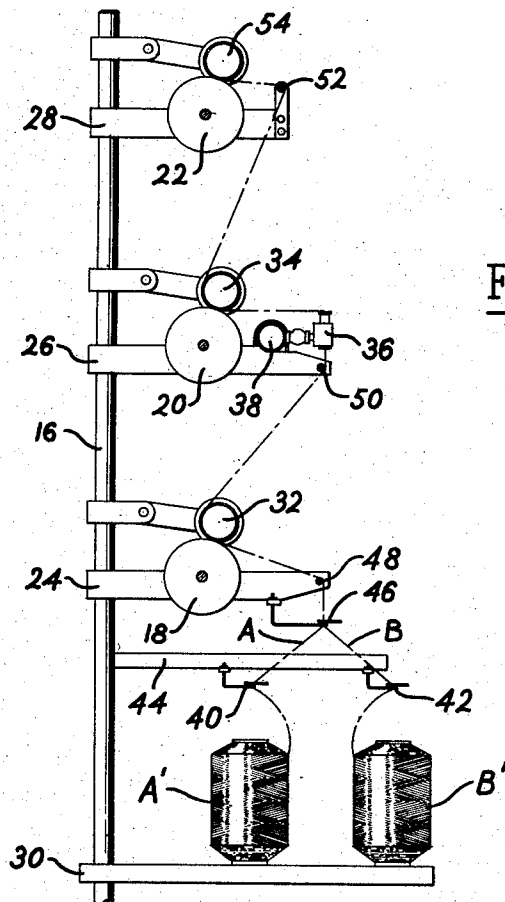


Fig. 1

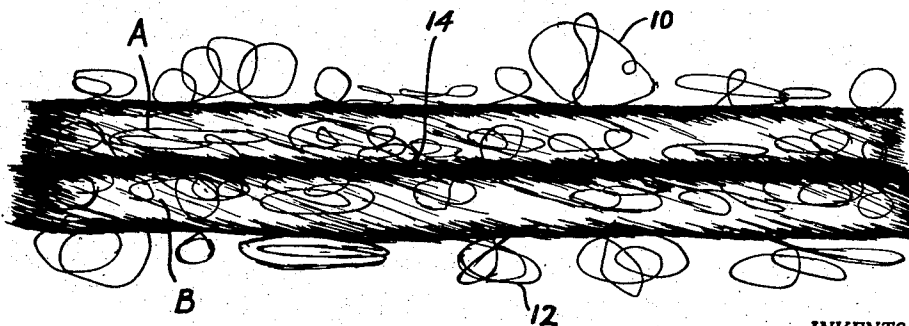


Fig. 2

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METHOD OF MANUFACTURING YARN AND THE PRODUCT THEREOF

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The present invention relates to a plied yarn and to the method by which it is manufactured.

Prior to the present invention, yarns have been plied by drawing two or more strands of yarn from their separate supplies, bringing the strands together and twisting them together to form a unitary plied strand. The primary disadvantage of the prior art methods of plying yarn has been the slow speed at which strands could be plied due to the speed limitations of the twisting spindles.

One object of the present invention is to provide a method of plying a plurality of strands of yarn at high speed.

Another object of the present invention is to provide a method of plying yarn without imparting twist thereto.

Another object of the present invention is to provide an untwisted plied yarn.

Another object of the present invention is to provide an untwisted plied yarn wherein the component yarn strands are made up of continuous filaments.

Other objects of the present invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the product possessing the features, properties and the relation of components, and the processes involving the several steps and the relation and the order of one or more of such steps with respect to each of the others, which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing wherein:

Fig. 1 is a somewhat diagrammatic view of the one form of apparatus capable of practicing the method of the present invention; and

Fig. 2 is a view illustrating the plied yarn of the present invention.

The plied yarn of the present invention comprises two or more twisted strands of continuous filament yarn lying close together in side by side untwisted relation one to the other, each strand of yarn having a plurality of its individual filaments extending therefrom in the form of loops, and having a plurality of the loops from each of the component strands being intertwined and entangled in the loops of the other strand or strands to thereby hold the plurality of strands together. A plied yarn according to the present invention is illustrated in Fig. 2 of the drawing and comprises two twisted strands A and B of continuous filament synthetic yarn. A plurality of the filaments forming strands A and B have been drawn in random fashion from the body of those strands to form loops as illustrated at 10 and 12. Loops 10 of strand A and loops 12 of strand B are entangled with each other, as illustrated at 14, between the two strands A and B to securely lock said two strands together. Strands A and B can be any synthetic continuous fila-

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ment yarn as for example, regenerated cellulose, cellulose acetate, nylon, acrylic fiber, polyester fiber, etc. Strands A and B can be identical or they can be of different diameter or denier, they can both be the same type yarn or they can be different types of yarn as for example, one strand can be viscose rayon and the other nylon or any desired combination of strands. It will be understood that not all of the filaments in the strands are drawn out into loops in any one unit length. However, all of the filaments are formed into loops in a given number of unit lengths of the strands. That is to say, each strand always includes a core of unlooped filaments and all of the filaments forming the strands take their turn in the core.

The method of plying the yarn of the present invention comprises the steps of drawing a plurality of strands of twisted continuous filament yarn from supplies thereof at a uniform predetermined rate and bringing said strands together in untwisted relation. The strands thus assembled are fed at said constant predetermined speed to a bulking step wherein many of the filaments laying along the surfaces of the strands are plucked out from those strands and some of the loops are entangled with loops from the other strands to thereby bind those strands together. It will be understood that as the strands pass through the bulking step different filaments are drawn out into loops so that after a given length has passed through said step all of the filaments have loops therein somewhere along their length. It will also be understood that forming loops in the filaments shortens the strands at the same time that it increases their bulk. Therefore, the two strands emerge from the bulking step at a speed slower than the speed at which they are fed thereinto. The plied strand is drawn away from the bulking step at a speed equal to the speed the shortened yarn would normally take. The bulked and plied yarn is next stretched to a predetermined proportion of its length prior to bulking to standardize the diameter or denier thereof and to remove any irregularities that might be introduced thereinto by the bulking and plying step. After the stretching step the plied strand is wound into a package.

One form of apparatus that can be employed to practice the above described method of manufacturing the yarn of Fig. 2 is diagrammatically disclosed in Fig. 1. The apparatus comprises an upright standard 16 fixed to any convenient base, not shown. Three rolls 18, 20 and 22 are supported on standard 16 by brackets 24, 26, and 28 which rotatably support the shafts upon which said rolls are mounted. Rolls 18, 20 and 22 are positively driven by any convenient means and roll 18 rotates at a speed about 20% faster than roll 22 and at a speed about 35% faster than roll 20. A shelf 30 provides a support for yarn packages A¹ and B¹. Pressure rollers 32 and 34 are pivotally carried by standard 16 for engagement with rolls 18 and 20 respectively. An aspirator 36 is carried by bracket 26 and is connected to air supply pipe 38.

The apparatus of Fig. 1 carries out the above described process in the following manner. Strands A and B from packages A¹ and B¹ are drawn from said packages through guide eyes 40 and 42 carried by arm 44 in turn carried by standard 16. The two strands are then brought together and pass through guide eye 46 carried by bracket 24 and over rod 48 also carried by bracket 24. The two strands then pass around pressure roller 32 between said roller and roll 18 to permit said roll 18 to draw said strands from their respective packages. The strands next pass around guide rod 50 beneath the inlet to aspirator 36 and then pass through said aspirator. The suction of aspirator 36 draws said strands from roller 32

and discharges them out its upwardly directed discharged opening. Immediately upon being discharged from aspirator 36 the strands are pulled to the side to cause them to take a bend of substantially 90° by passing between pressure roller 34 and positively driven roll 20. After passing around roller 34, the now plied strands travel upwardly and pass around guide rod 52, supported by bracket 28, and are wound into a package on mandrel 54 which is pivotally carried by standard 16 and is driven by maintaining the periphery of the winding package in contact with roll 22. The turbulence in the jet of air emerging from aspirator 36, and drawing the strands out of said jet by causing them to bend through substantially 90°, causes the rapidly moving air to draw the fibers out into loops and to entangle the loops of adjacent strands.

The process and product of the present invention have been described herein as applied to the bulking and plying together of two strands. It will be appreciated that more than two strands can be plied together by the above described method.

Since certain changes may be made in the above product and processes without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description, or shown in the accompanying drawing, shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A plied yarn comprising a plurality of multi-filamentary strands, wherein the filaments in each strand are twisted together, assembled in substantially parallel, juxtaposed contacting relationship throughout the entire length thereof to form a unitary structure free of twist as a whole, the filaments in said strands having loops

at random intervals therein, loops in the filaments in each strand being entangled with loops and filaments in another strand to bind the strands together, said strands essentially retaining their individual identity.

2. The method of plying a plurality of individually twisted, multi-filamentary strands comprising the steps of bringing said strands into side-by-side, contacting relationship whereby each pair of strands has a common interface, forming loops in the filaments of said strands at least in the region of said interface and entangling loops from the strand on one side of said interface with loops and filaments of the strand on the other side of said interface to bind the strands together without destroying the essential identity of the strands, and winding the yarn thus plied together into a package.

3. The method of claim 2 wherein the yarn after plying but before winding is stretched to standardize its diameter and to remove irregularities therefrom.

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