

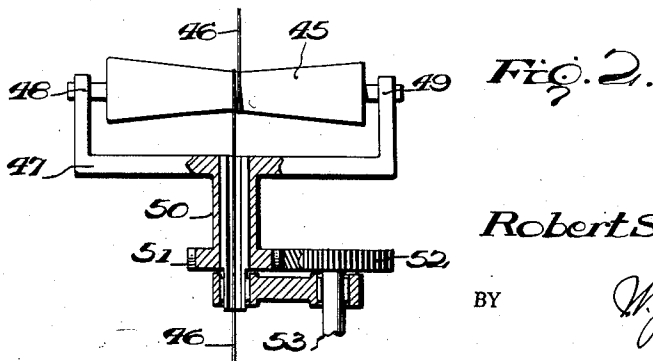
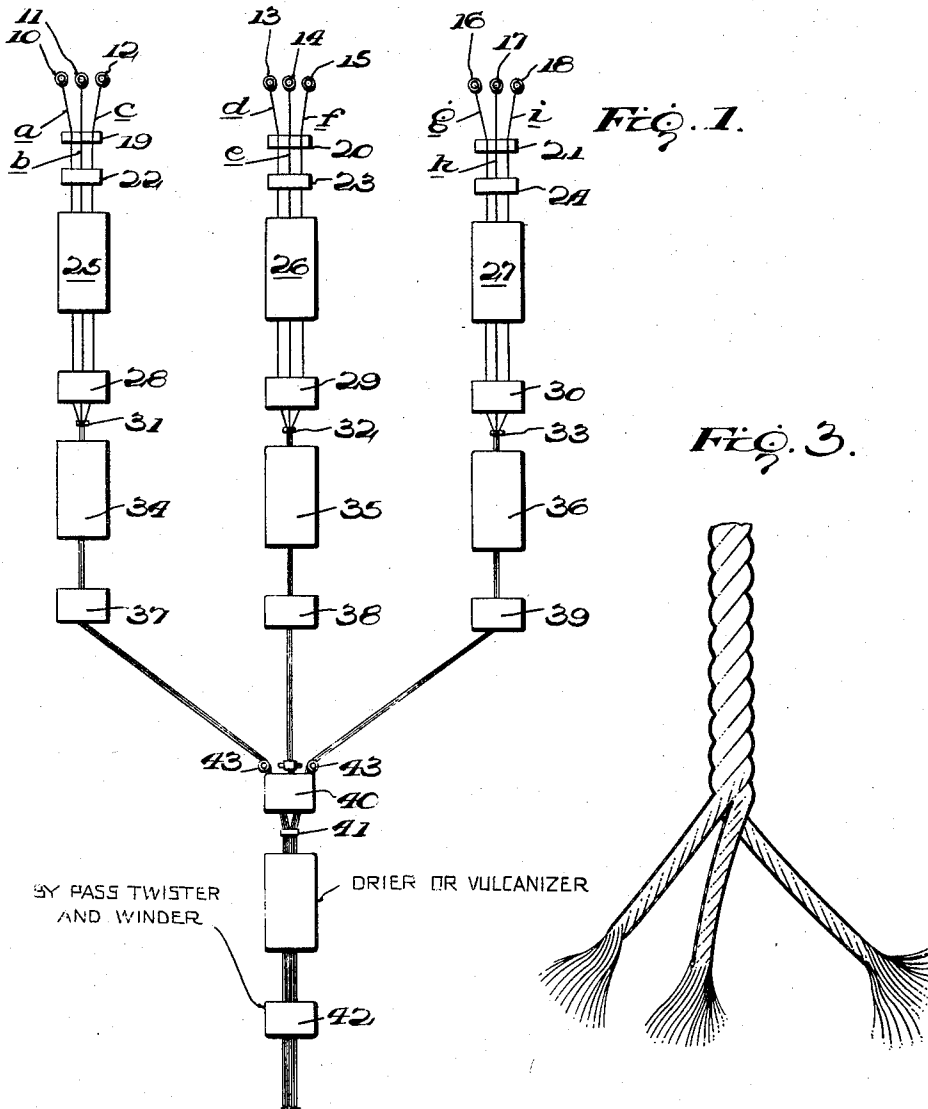
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STABILIZED MULTI-PLY YARNS

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STABILIZED MULTI-PLY YARNS

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No. 557,912

2 Claims. (Cl. 57—153)

The present invention relates to multi-ply yarns.

This application is a division of my pending application Ser. No. 446,505, filed July 29, 1954.

The particular object of the invention is to provide a multi-ply yarn embodying two or more plies, each ply being coated with an elastomeric coating of such cohesiveness and tenacity as will bond the fibers together and the plies together to make a continuous stabilized yarn. Other objects will be apparent from the following description of the yarn and of an apparatus and method of making it.

In the accompanying drawings forming a part of this specification,

Fig. 1 is a diagram in the nature of a flow sheet showing how a nine-ply yarn is made from three strands each consisting of three fibers or filaments;

Fig. 2 is a diagrammatic view in side elevation of a by-pass twister assembly such as may be used with the apparatus of Fig. 1; and

Fig. 3 is an enlarged sectional elevation of a fragment of a yarn made in accordance with the invention.

Referring first to Fig. 1, nine spools 10-18 inclusive are shown from which nine fibers *a, b, c, d, e, f, g, h, i* are drawn by means of rotating tension rolls arranged in pairs, designated respectively 19, 20 and 21. From the tension rolls the fibers pass to primer baths 22, 23, 24 respectively (if primer baths are necessary for the particular fiber being worked with), then the fibers pass to driers 25, 26, 27 respectively, and then to coating tanks 28, 29 and 30, respectively. After coating, the three fibers of each group are brought together by the corresponding twister eye 31, 32, 33, or in lieu of the twister eyes, the fibers of each group (*abc*) (*def*) (*ghi*) may be combined to form a single strand while traveling through an elongated drier (34, 35, 36) by the twisting action of a by-pass twister 37, 38, 39. The preferred by-pass twister is shown in Fig. 2 and will be described hereinafter. The three three-ply twisted strands then pass into a single coating tank 40 to be coated, then they travel through a twister eye 41, and through a drier or vulcanizer to a level winder or by-pass twister 42 if the coated strand is to be united with other strands to form yarns containing more plies.

It should be explained that the continuous operation diagrammatically illustrated in Fig. 1 would not be possible unless means were provided to permit the coated and twisted strands to move beyond the by-pass twisters 37, 38, 39 for subsequent treatment. Each by-pass twister functions as a fixed point, the other fixed points being the spools 10-18 in the creels. The twist is imparted by the rotation, in a horizontal plane, of spool 45 (Fig. 2). Referring again to Fig. 1, the tendency to untwist is overcome by setting the elastomeric resin of the coatings while the strands are under tension, and this setting takes place prior to the time that the coated strands reach the by-pass twisters. The stress set up in the coating material

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which is bonded to the strand compensates for the forces which tend to cause untwisting. The twisted coated strand on reaching spool 45 (Fig. 2) slips as it is pulled around the spool and in effect spool 45 acts as the initial fixed point together with the directional guiding sheaves 43 on top of coating tank 40. Such an arrangement is only possible where the strands of a multi-ply yarn are firmly bonded and held in situ by a resin which possesses sufficient elasticity, tenacity and cohesiveness to compensate for the tendencies of non-treated twisted strands to untwist.

In the arrangement of Fig. 1, the twist imparted by by-pass twister or level winder 42 is the reverse of the twists imparted by by-pass twisters 37, 38, 39. Thus the primary plying imparts, let us say, an S-twist and then in one continuous operation a Z-twist is imparted in the secondary plying. Such an operation, it will be clear, is only possible when the strands of the primary plying are coated with an elastomer that has been bonded to the fibers. Furthermore, the elastomer must be set before the strands reach the twister or twister-winder 42 for the secondary plying. To accomplish the desired result, provision must be made to cause the yarn to slip around the twister spool 45 so that in effect the initial fixed point is transferred to the twister spool. In some cases it may be necessary to use a lubricant on the spool in order to insure this slippage.

The by-pass twisters, as shown in Fig. 2, each consist of an idler spool 45 about which coated strand 46 is wrapped at least one full turn, so that the idler spool is rotated on its axis, a plate 47 supporting spool 45 by means of bearings 48, 49, a hollow shaft 50 supporting plate 47, the coated strand 46 passing up through hollow shaft 50, and gearing 51, 52 driving the hollow shaft from a source of power (shaft 53). Spool 45 preferably is of least diameter at its middle and of greatest diameter at either end to cause the strand to return constantly to the middle of the spool as the strand travels in the direction indicated by the arrow.

The final product is shown in Fig. 3.

What I claim is:

1. A stabilized multi-ply yarn including a primary ply and a secondary ply, the twist of the secondary ply being the reverse of the twist of the primary ply; an elastomeric coating impregnating the primary ply and applied to the yarn fibers while the fibers are under tension, and said coating having an elasticity, cohesiveness and tenacity such as will bond the fibers together to completely check the tendency of the primary twist to unwind; and an elastomeric coating covering the secondary ply and uniting the two plies.

2. A stabilized multi-ply yarn including a primary ply and a secondary ply, the twist of the secondary ply being the reverse of the twist of the primary ply; a primer coating on the primary ply; an elastomeric coating adhered to the primary ply because of the primer coating and applied to the yarn fibers while the fibers are under tension, and said coating having an elasticity, cohesiveness and tenacity such as will bond the fibers and plies together to completely check the tendency of the primary twist to unwind.

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