

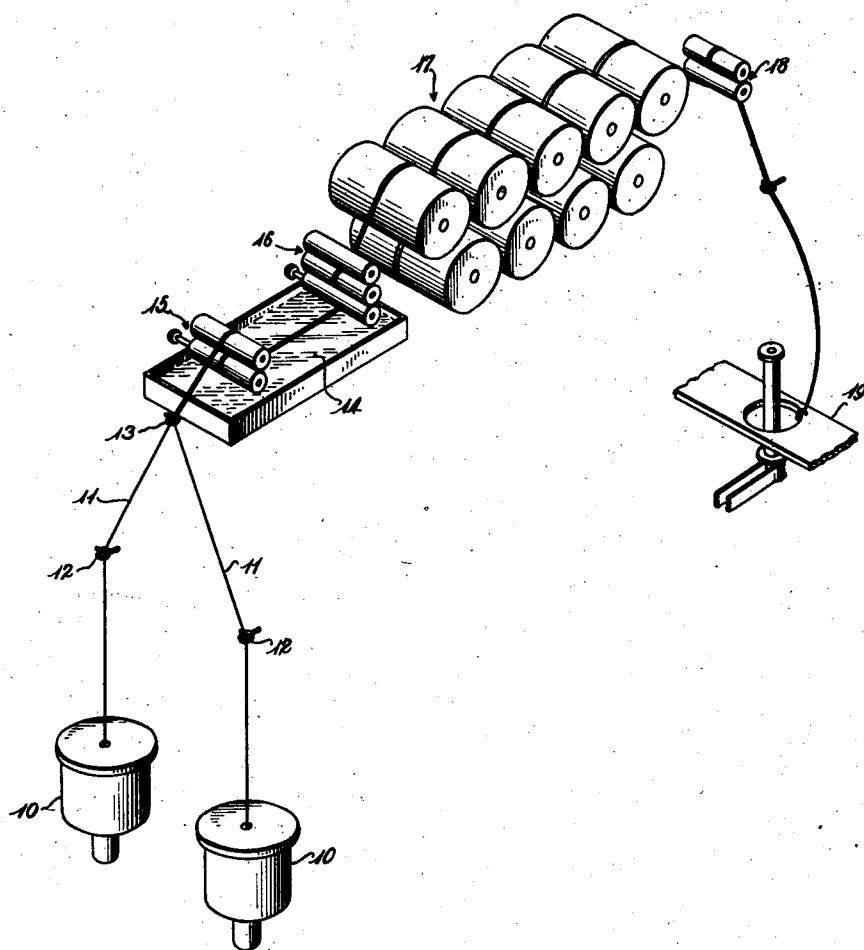
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METHOD AND APPARATUS FOR TWISTING THREAD

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METHOD AND APPARATUS FOR TWISTING
THREAD

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The present invention relates to the handling of freshly spun rayon and more particularly to drawing yarn from a freshly spun cake while further twisting the same and doubling and twisting two or more of these yarns in a continuous operation.

In the normal production of yarns that are ultimately cable twisted from beams for use as reinforcing elements in the manufacture of cord tires and the like, a large number of manipulating operations are involved. After the yarns are extruded, coagulated, stretched, and collected as cakes in a rapidly rotating centrifugal bucket, they are washed, desulphurized and otherwise subjected to the necessary wet treatments in the original cake form whereafter the cakes are dried. These cakes then are usually rewound in the form of cones on a coning machine and the cones transferred to a creel. On the creel the cones are again unwound and the yarns passed through another liquid treating zone, stretched and led through a slasher where they are dried under tension and finally collected on a beam. Finally, the yarns have to be cable twisted from the beams.

It is an object of the present invention to produce cones of cabled yarns of rayon in a simplified manner, in which the yarns are subjected to the desirable treatments although several steps of the normal process are omitted.

A further object of this invention is to produce a cabled yarn directly from two or more freshly spun cakes which have been washed and suitably treated without drying.

An additional object as herein contemplated is to unwind freshly spun, wet cakes that have been washed and, during such unwinding, to rotate the cakes and draw the yarn from the inside thereof whereby an additional twist is introduced into the yarn.

Other objects and advantages will become apparent from the following detailed description when considered in connection with the accompanying drawing wherein the figure represents a diagrammatic view of an apparatus which can be conveniently employed in practicing the present invention.

Referring more particularly to the drawing, the numeral 10 indicates a rotatable bucket, two of which being shown in the figure. Cakes of freshly spun, washed rayon are positioned within the respective buckets and the yarns 11 are withdrawn from the interiors of the cakes. As the yarns are withdrawn, the buckets are rotated so as to impart an additional twist to the individual strands, the initial twist having been given dur-

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ing the spinning operation in which the yarns were initially collected in cake form. The degree of additional twist is dependent on the R. P. M. of the buckets and the rate at which the yarns are withdrawn.

After the yarns 11 are passed through their respective guides 12, they are brought together and led through a single guide 13 and thence through a liquid treating bath 14. Positioned in the treating bath 14 are two sets of rollers 15 and 16, the lowermost roller of each set being positively driven and submerged in the treating bath. When the yarns are first threaded up, they are passed over the upper roller of the roller set 15 and therearound between the upper and lower roller and are then passed to and under the lowermost roller of roller set 16 where they are passed 180° around the lowermost and middle roller and in contact with a portion of the periphery of the top roller where they are led to slasher rolls 17. During passage of the yarns through the slashing rolls, they are dried under tension.

Finally, the yarns 11 are propelled through feed rollers 18 and thence to a ring twister 19 at which point they are twisted together to form a cable or ply and collected in package form.

As mentioned above, the yarn is further twisted by rotating the bucket as it is withdrawn therefrom. Therefore, the rotation of the bucket will be in the same direction as that of the bucket in which the yarn was originally spun and collected. When the several yarns are twisted together to form a cable at the ring twisting device 19, the direction of rotation depends on whether it is desired to have the cable twist in the same or opposite direction from the yarn twist. In this particular case, the ring twister is rotated in the opposite direction so as to provide a cable twist in the opposite direction from the yarn twist.

The yarns in the cakes being wet, are capable of being stretched in the treating bath 14 by rotating the set of rollers 16 at a higher peripheral speed than the set of rollers 15. The elongation is reduced by the said stretch, and drying the yarns under tension as they pass through the slasher 17, effects a low elongation in the end product.

In case it is not necessary to dry the yarns prior to collection, the process can be still further simplified. The slasher or other drying medium can be omitted and the yarns stretched either between the rollers or at the ring twister by the weight of the traveler as the yarns are passed directly to the ring twister. The cable could then be dried in package form.

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If no further twist is required in the yarns, or, in other words, if a low yarn twist of three to four turns per inch is sufficient, then it is not necessary to rotate the buckets during withdrawal of the yarns. The yarns can be withdrawn merely by means of roller set 15. Moreover, in this method of operation, the size of the cable package is not restricted because the ends of several cakes can be tied together and as soon as one cake in the series has been unwound the next cake will commence unwinding.

Example.—In the preparation of one standard cable used in reinforcing cord tires and the like, the following set of conditions was employed: Two buckets containing freshly spun wet cakes of viscose rayon having an initial twist of $2\frac{1}{2}$ turns per inch were rotated at 8000 R. P. M. in adjacent relationship. (The cakes having been initially formed in buckets rotating in a clockwise direction, these buckets were also rotated in a clockwise direction.) The first set of rollers in the wet treating bath were driven at a peripheral speed of 695 inches per minute and the second set at a peripheral speed of 730 inches per minute. The slasher and feed rollers in advance of the ring twister were driven at a peripheral speed of 730 inches per minute and the twisting spindle was rotated at 8030 R. P. M. in a counter-clockwise direction. The resulting cable contained two plies (yarns) each with an initial twist of 14 turns per inch and the cable had 11 turns per inch in the opposite direction.

Of course, the yarn twist can be varied by changing the R. P. M. of the buckets and/or changing the take-up speed of the feed rollers 15. The stretch can be varied by changing the relative speeds of the several feed rollers. The cable twist can be easily varied by changing the R. P. M. of the twisting spindle.

Various other modifications may be made without departing from the spirit and scope of the present invention, e. g., if the yarn has been sufficiently treated in the initial cake form, the liquid treating bath can be omitted.

What is claimed is:

1. A method of producing cabled yarns from

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freshly spun cakes of rayon that have been washed in cake form which comprises positioning at least two such cakes in adjacent relationship, drawing the yarns from the insides of the respective cakes while rotating the same to increase the twist thereof individually, stretching the yarns and passing the same together under tension through a drying zone whereby the yarns are dried and a low elongation is effected and finally twisting the yarns together during collection to form a package consisting of cabled yarn.

2. A method of producing cabled yarns directly from freshly spun cakes of initially twisted rayon from which the impurities have been removed by wet treatment in the original cake form which comprises positioning at least two such wet cakes in rotatable buckets arranged in adjacent relationship, withdrawing the yarns from the interiors of the respective cakes and increasing the individual twist thereof by rotating the buckets during withdrawal of the yarns, passing the yarns together through a wet treating zone, stretching the yarns and drying the same under tension whereby a low elongation is effected therein and finally cable twisting the yarns during collection to form a package consisting of cables in a dry state.

3. An apparatus for the preparation of twisted cables of rayon which comprises a yarn source consisting of at least two cakes of freshly spun initially twisted rayon from which the impurities have been removed, means for supporting and rotating the cakes, means for withdrawing the yarns from the respective cakes at a predetermined rate and in fixed relation to the R. P. M. thereof to impart an additional twist to the individual yarns, means for passing the yarns together through a liquid treating bath, said means also acting to stretch the same, means for drying the yarns under tension whereby a low elongation is effected and means for cable twisting the yarns during collection whereby a package of cables in the dry state is obtained directly from the freshly spun wet rayon cakes.

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