April 12, 1938. G. C. TYCE 2,113,955

YARN CONTAINING STAPLE FIBER AND TO THE MANUFACTURE THEREOF

Filed July 13, 1934

FIG. 1

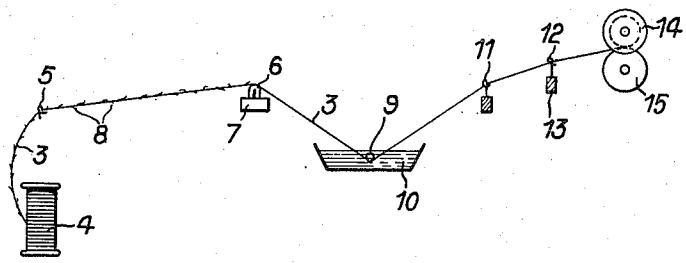
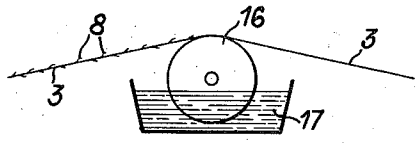


FIG. 2



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YARNS CONTAINING STAPLE FIBER AND TO THE MANUFACTURE THEREOF

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6 Claims. (Cl. 28—1)

This invention relates to spun yarns, that is, yarns containing staple fibers of natural or artificial materials.

Spun yarns may either be produced from natural staple fibers such as wool or cotton or from continuous filaments such as natural or artificial silk. Where continuous filaments are employed these are converted into staple fibers, for example by the cutting action of severing rollers, as described in U. S. Patent No. 1,959,142. The fibrous material produced may be treated as a roving, being spun into the yarn in a subsequent operation, or, alternatively, it may be twisted continuously into the final yarn, e. g. by means of ring or cap-spinning devices.

Spun yarns whether produced from natural or artificial materials, and in the latter case whether produced directly from continuous filaments, or from cut staple fibers are liable to exhibit a certain amount of "beard". That is to say, the ends of the staple fibers of which the yarn is composed protrude from the final product and give the yarn a hairy appearance.

This drawback is particularly noticeable in the case of yarns which are produced from artificial materials liable to electrification, e. g. filaments of cellulose acetate or other organic derivatives of cellulose. Any "beard" that may be produced on the surface of the yarn is caused to protrude stiffly from the yarn at right angles thereto under the influence of electric charges generated on the yarn, and the disadvantage of "beard" is thus rendered particularly noticeable. Furthermore, yarns of cellulose acetate or other cellulose derivatives cannot easily be submitted to a gassing operation such as is commonly employed with cotton yarns to singe off the "beard", since the substance of the fibers of which the yarn is composed tends to fuse before burning, and the gassing, instead of forming a very small amount of light ash on the surface of the yarn, tends to convert the "beard" into small hard beads of molten material.

Another disadvantage of excessive "beard" is that the protruding fibers are apt to be drawn still further out of the yarn, or out of fabrics containing such yarns, whereby the yarn is weakened and the free fibers form an undesirable fluff. It is an object of the present invention to devise a method of disposing of the "beard" on spun yarns, which method shall be applicable to spun yarns generally, including yarns containing organic derivatives of cellulose.

According to the present invention a spun yarn is treated with an adhesive material adapted to cause the "beard" to lie flat along the length of the yarn and to adhere more or less firmly to the body of the yarn. By means of an adhesive, the shaggy appearance of the spun yarn is overcome, the loose bearded ends being neatly disposed of, and yarns of uniformly smooth appearance are produced.

A satisfactory form of adhesive is a liquid material which is a solvent or softening agent for the substance of the yarns. Any convenient solvent may be employed. Thus, for example, with yarns of cellulosic material such as viscose or cuprammonium yarns, Schweitzer's reagent, or a solution of zinc chloride may be employed. In the case of yarns of cellulose acetate or other organic derivatives of cellulose many liquid solvents are available, e. g. acetone, mixtures of ethyl and methyl alcohol, diacetone alcohol, triacetin, ethyl lactate and dioxane. Such solvents are preferably employed in association with a suitable diluent to modify the severity of their action upon the substance of the yarn and to prevent any action approaching actual solution of the material. Thus, for example, a mixture of acetone and water may be employed, convenient proportions for such a mixture being 50% acetone to 50% water by volume. If the period of treatment is shortened, however, a stronger solution of acetone may be employed. On the other hand, where it is desirable to employ a weaker solution of acetone the temperature of the liquid may be raised and/or the time of treatment lengthened. After treatment with the solvent or softening liquid, the yarn is preferably passed through a bath of water or other diluent liquid in order to arrest the action of the solvent or softening liquid, and to prevent undue loss of the solvent materials by rapid evaporation. After washing, the yarn is dried.

While solvent or softening liquids may be used for the purpose of the present invention in connection with yarns of cellulosic material, such as artificial yarns of regenerated cellulose staple fibres, it is of particular advantage in connection with yarns of organic derivatives of cellulose, examples of which are the cellulose esters, e. g. cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, and the cellulose ethers such as ethyl or benzyl cellulose.

Another convenient form of adhesive material which is suitable for the purpose of the present invention and which is applicable to spun yarns generally of whatever material, is a wax, natural or artificial, or a mixture of waxes. The wax may be applied either in the solid or in the molten

form or at any intermediate consistency. Thus, the yarn may be caused to run over and in contact with a block of the wax to be applied, or over a wick supplied with molten wax. Or again, the wax may be applied in solution in a solvent which is preferably inert not only to the wax employed, but also to the substance of the yarn. The wax acts as an adhesive and causes the "beard" to lie back along the length of the yarn and to remain set in that position.

Adhesive materials as described above may be applied at any suitable stage in the manufacture or use of the staple fiber yarns, for example, continuously with the direct conversion of continuous filaments into a staple fiber yarn.

By way of example, the manner of carrying out the invention will now be described in greater detail with reference to the accompanying drawing, in which Figure 1 is a side elevation of a form of apparatus for carrying out the invention, and Figure 2 shows an alternative detail of Figure 1.

In Figure 1, a spun yarn 3 is drawn from a bobbin 4 and led through a guide 5 disposed above and in line with the axis of the bobbin 4. The yarn 3 is drawn over a wick 6 which is fed from a reservoir 7 with a liquid which is a solvent or softening agent for the substance of the yarn 3. As will be seen, on the left of the wick 6 the yarn 3 exhibits "beard" consisting of fibers protruding from the yarn and indicated diagrammatically at 8. The liquid applied by the wick 6, however, moistens the beard, causing it to lie flat along the length of the yarn, and, being a solvent or softening agent for the substance of the yarn, renders the beard adhesive and causes it to stick to the body of the yarn, so as to give the smooth product indicated on the right of the wick 6.

After leaving the wick 6, the yarn 3 is passed under a guide rod 9 in a washing bath 10 by means of which the solvent material applied by the wick is washed out. On leaving the bath 10, the yarn passes first through the stationary guide 11, and then through the traversing guide 12, mounted on the traversing bar 13 of a winding device. The traversing guide 12 traverses the yarn from end to end of the bobbin 14 which is rotated by means of a driving roller 15, contacting with the surface of the yarn on the package 14, so as to draw the yarn at a constant speed.

As an alternative to the wick 6 and the reservoir 7, a roller 16 as shown in Figure 2 may be provided, dipping into a bath 17 containing a solvent or softening agent for the substance of the yarn 3. The roller 16 picks up the solvent or softening agent, and transfers it to the yarn. Instead of a solvent or softening agent, other adhesive materials may be employed, for example, a wax or wax mixture. Thus, paraffin wax, beeswax, carnauba wax, stearic acid, ceresin or mixtures of such bodies may be employed, or a mixture of 60% hardened whale oil and 40% ground nut oil. These waxes may be dissolved in suitable solvents such as benzole or kerosene or lighter petroleum fractions, e. g. a petroleum fraction boiling between 100° C. and 105° C., or again, the waxes may be applied in a molten form. Where wax, either molten or in solution, is employed, the guide rod 9 and bath 10 illustrated in Figure 1 may be dispensed with, since the waxes are inert to the substance of the yarn 3 and will not exert any harmful effect thereon by prolonged contact.

What I claim and desire to secure by Letters Patent is:—

1. A method of treating yarn containing staple fibers, which comprises softening any beard on the yarn by applying to the yarn a liquid which has a softening action upon the substance thereof, and causing the beard to adhere to the body of the yarn.

2. A method of treating yarn containing staple fibers of an organic derivative of cellulose, which comprises softening any beard on the yarn by applying to the yarn a liquid which has a softening action upon said derivative of cellulose, and causing the beard to adhere to the body of the yarn.

3. A method of treating yarn containing staple fibers of cellulose acetate, which comprises softening any beard on the yarn by applying to the yarn a liquid which has a softening action upon said cellulose acetate, and causing the beard to adhere to the body of the yarn.

4. A method of treating yarn containing staple fibers of cellulose acetate, which comprises softening any beard on the yarn by applying to the yarn a mixture of acetone and water, and causing the beard to adhere to the body of the yarn.

5. A method of treating yarn containing staple fibers, which comprises softening any beard on the yarn by applying to the yarn a liquid which has a softening action upon the substance thereof, causing the beard to adhere to the body of the yarn and subsequently removing the liquid from the yarn by washing.

6. A method of treating yarn containing staple fibers, which comprises softening any beard on the yarn by applying to the yarn a liquid which has a softening action upon the substance thereof, causing said beard to lie flat along the length of the yarn and to adhere to the body of the yarn, subsequently removing the liquid from the yarn by washing, and then drying the yarn.

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