May 17, 1966 W. G. FAW ETAL 3,251,097

METHODS FOR PRODUCING BLENDED YARN

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FIG. 2.

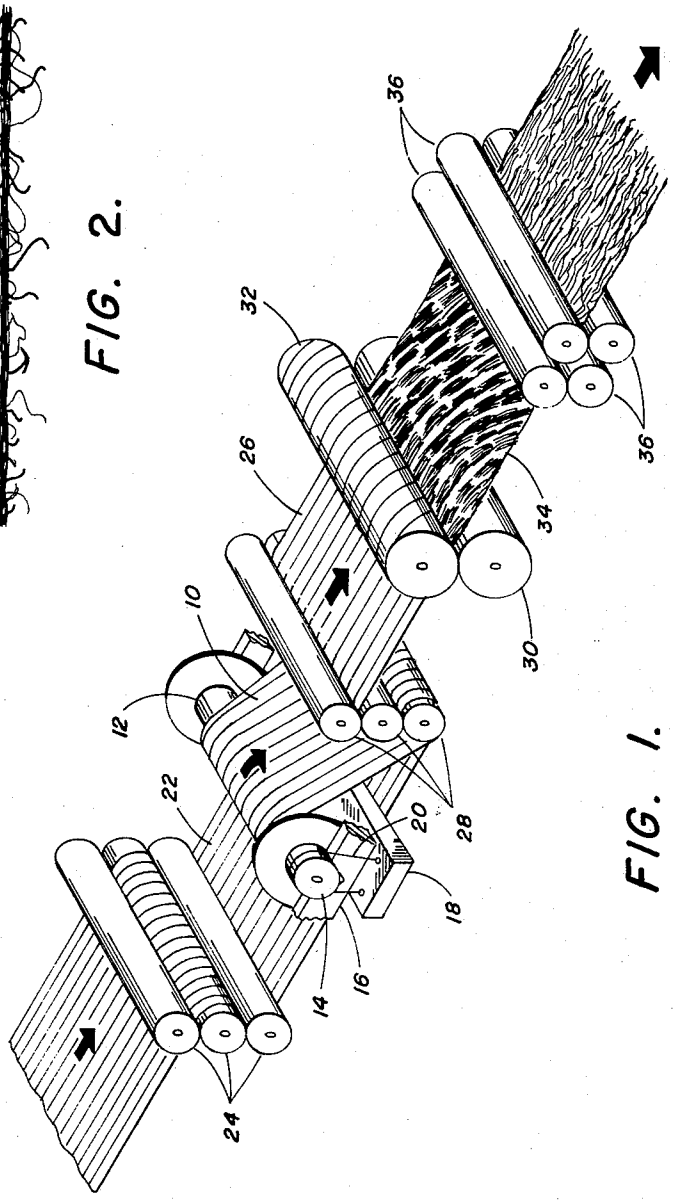


FIG. 1.

WENDELL G. FAW
RICHARD C. FORRESTER
INVENTOR.

BY R. Frank Smith
Abram W. Hatcher
ATTORNEYS

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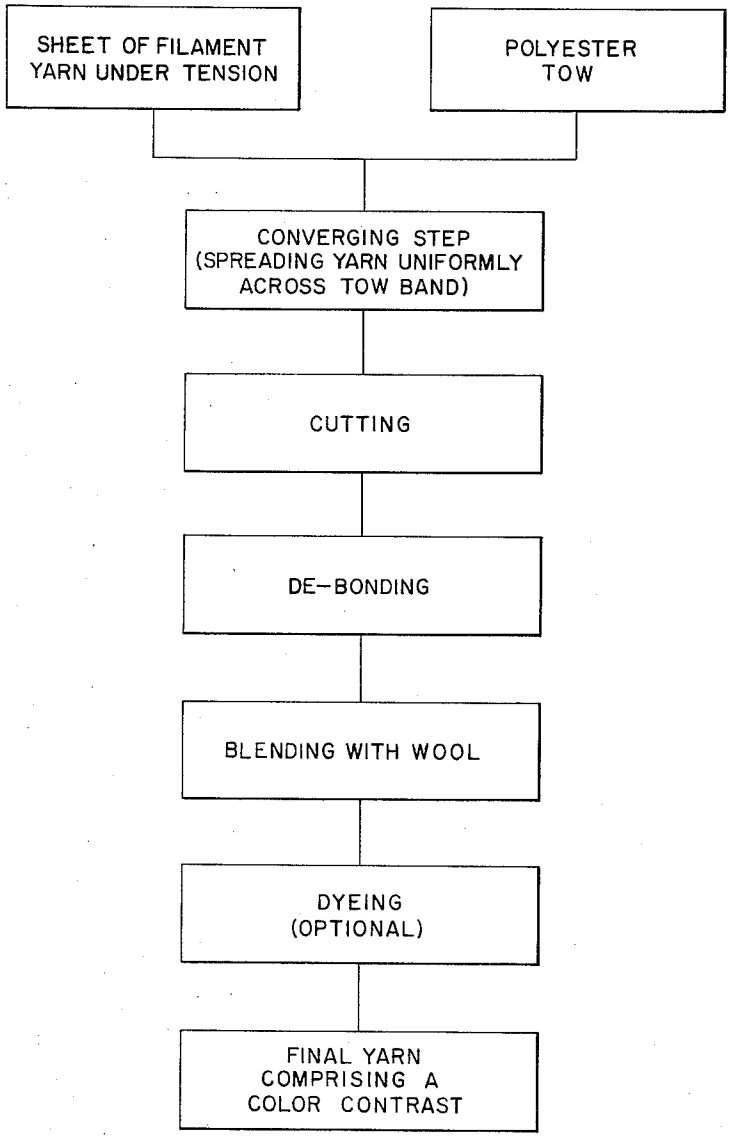


FIG. 3

WENDELL G. FAW
RICHARD C. FORRESTER
INVENTOR.
BY R. Frank Smith
Abram W. Hatcher
ATTORNEYS

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METHODS FOR PRODUCING BLENDED YARN

Wendell G. Faw and Richard C. Forrester, Kingsport, Tenn., assignors to Eastman Kodak Company, Rochester, N.Y., a corporation of New Jersey

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6 Claims. (Cl. 19—145.5)

This invention relates to the creation of special effects in yarn produced from cut tow. More particularly it relates to a method and apparatus for combining a sheet of yarn ends with a band of tow to produce a blended yarn having special effects created therein.

Staple yarns are produced conventionally by cutting or crushing continuous filament tow into desired lengths. Blends of tow with another fiber may be prepared by use of a special blending attachment such as a group of driven rolls designed to feed a staple fiber such as wool to cut tow. The tow with added different fiber may then be shuffled together to form the desired blend. Another way of forming such a blend is that shown in U.S. Patent 2,964,900 wherein is disclosed the blending of a ribbon of drawn fibers with a ribbon of filamentary material by passing the two in superimposed relationship between a pair of driven rolls followed by twisting. Although such methods of blending two different types of fibrous material have proved generally satisfactory, they require rather elaborate and expensive blending devices to be used in conjunction with known converter systems. Therefore development of a simple one-step method and apparatus for blending two or more different types of fibers to create a special-effects textile product represents a highly desirable result. After extended investigation we have found such a novel method and apparatus for blending a sheet of yarn ends or the like with a band of continuous filament tow or the like.

This invention has for one object to provide a method and apparatus for blending sheets of two or more different kinds of fibers. Another object is to provide a composite staple yarn resulting from blending two or more different types of fibers. Further objects will appear hereinafter.

In its broader aspects our invention involves spreading out uniformly across the width of a band of continuous filament tow a sheet of yarn ends. The sheet of yarn ends is superimposed on or laid beneath the band of tow by means of a beam. Sufficient tension is applied through a braking device which creates friction on a flange of the beam or support shaft to which the beam is keyed to maintain the ends coming from the beam as a straight parallel sheet. The tow with yarn ends blended uniformly therewith then travels through a set of tensioning rolls and on to a cutter. The cut blended staple product may then pass through de-bonders and shuffle rolls, across an apron and through a crimper to collecting means.

By our manner of blending different fibrous materials we create in the yarn special effects such as contrasts in or alternations of color, feel, physical properties, chemical properties or luster. The materials blended may, for example, be of essentially the same chemical structure but a different denier per filament and total denier, or they may be of different chemical structure and of the same denier per filament and total denier. As examples but not in limitation of this invention, some types of fibers or yarns which may be blended by this method and apparatus are those which have various cross-sections, such as O, C, Y, X, V, I, hollow, flat or multilobal; zero, low or high twist yarns; lofted, loopy or entangled yarns; novelty yarns, such as bouclé, ratiné or slub types; metallic yarns or ribbons; yarns with different degrees of crystallization for differential dye effects; yarns of various polymers, such as polyurethane, elastomers, polyolefins, polyesters, acetates,

acrylics, modacrylics or viscose; and yarns of a plurality of colors.

A further understanding of our invention may be obtained from the drawing which forms a part of this application.

In the drawing.

FIG. 1 is a semi-schematic diagrammatic representation in perspective of the process and apparatus of this invention.

FIG. 2 depicts the blended yarn of this invention.

FIG. 3 is a block diagram or flow chart illustrating the method of this invention.

In FIG. 1 a sheet **10** of yarn ends is conducted from beam **12** (which may be 9⅞" flange x 13" barrel length) supported by shaft **14** fitted into support bearing **16** such as a notched shaft support or a bearing assembly. A weight **18** is suspended by band **20** from support shaft **14** as means for automatic control of tension applied to yarn sheet **10** to superimpose it uniformly on a band **22** of continuous filament tow introduced from tension rolls **24**. The resulting blend **26** is a band of tow having a uniform layer of a yarn sheet spread evenly across the full width of the tow band. The combined sheet **26** of tow and yarn after passing over tension rolls **28** next passes over anvil **30** under cutter roll **32**, thereupon becoming a blended staple yarn product **34**, which may then pass between debonders **36** prior to further processing.

In FIG. 2 a small number of occasional high denier filaments are seen protruding slightly sufficiently to create the desired combination of a substantially smooth surface and frictionally adhering yarn product.

In an alternate construction beam **12** may be mounted below tow band **22**. In this embodiment the sheet of yarn ends is spread out on the bottom surface of the tow band instead of being superimposed thereon from the top. In still another alternate construction, the sheet of ends may be formed by feeding ends from more than one beam and thereafter superimposing said sheet of ends on tow band **22**.

The following examples are illustrative of our invention.

Example I

A yarn blending apparatus such as shown in the drawing was used in this example. A beam consisting of 300 ends of 4 D/F, 300/75/2 oz. acetate yarn (5 colors) was used to furnish special color effects in a poly(1,4-cyclohexylidenedimethylene) terephthalate-wool blend. Two samples were made. The first was a converter blend of 3 percent cellulose acetate, 48 percent 64 single-ply wool and 49 percent 3 D/F poly(1,4-cyclohexylidenedimethylene) terephthalate. This sample was combed to produce greater opening of the acetate and a subtle, uniform color effect. The second sample consisted of poly(1,4-cyclohexylidenedimethylene) terephthalate and cellulose acetate blended at the converter to which wool was added during gilling to produce a final blend of 2 percent acetate, 51 percent 64 single-ply wool and 47 percent 3 D/F poly(1,4-cyclohexylidenedimethylene) terephthalate. This second sample was not combed and produced less opening of the colored yarn and a harsher color contrast.

Both samples were woven as filling with a filament polyester warp to determine the overall effect. Careful examination of the fabric showed the combed sample to have a somewhat more uniform shade. In both samples novel effects of hand, color and the like for worsted fabrics were produced.

Example II

A yarn comprising a blend of 95 percent 3 D/F 2" cut bright cellulose acetate staple and 5 percent 35 D/F 1½" cut black crystal staple was made using apparatus such

as depicted in the drawing, woven into fabric and used in sport jackets. The blended yarn had the following characteristics.

(1) A blend of high and low denier synthetic organic staple fibers.

(2) The low denier fiber had a denier per filament of less than about 12.

(3) The high denier fiber was of a denier per filament of 2 to 20 times that of the low denier per filament fibers.

(4) The yarn surface was substantially uniform or smooth with only an occasional protruding higher denier fiber, that is, not more than 20 percent higher denier fiber at most protruding less than ¼". This resulted in a durable, form-holding smooth fabric.

From the foregoing it is thought to be apparent that by our invention we have provided novel special-effects blended yarn by combining by beam feeding a sheet of one form or type of continuous filaments with a sheet of another form or type of continuous filaments and cutting the resulting blend into a staple product.

Although the invention has been described in considerable detail with particular reference to certain preferred embodiments thereof, variations and modifications can be effected within the spirit and scope of the invention as described hereinabove, and as defined in the appended claims.

We claim:

1. A method of blending continuous filamentous material comprising

(1) passing from a yarn supply a sheet of continuous filament yarn comprising a plurality of ends of man-made polymeric fiber of a plurality of colors,

(2) controlling the tension on said sheet of yarn as it passes from said yarn supply by braking,

(3) introducing to a cutting zone a band of continuous filament tow of polyester filaments,

(4) spreading out said sheet of yarn coming from said yarn supply uniformly from side to side across the width of said band of continuous filament tow entering said cutting zone,

(5) cutting said band of tow with sheet of yarn spread uniformly thereacross into a special effects blended yarn and

(6) subsequently blending said special effects blended yarn with wool to form a final yarn comprising a color contrast.

2. The method according to claim 1 wherein the man-made polymeric fiber is cellulose acetate.

3. The method according to claim 1 wherein at least a portion of the sheet comprises metallic yarns.

4. The method according to claim 1 wherein the color contrast is developed by dyeing the final yarn.

5. The method according to claim 1 wherein the yarn supply comprises at least one supply beam.

6. The method according to claim 1 wherein the continuous filament yarn is twisted.

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ROBERT R. MACKEY, *Primary Examiner.*

DONALD W. PARKER, *Examiner.*