

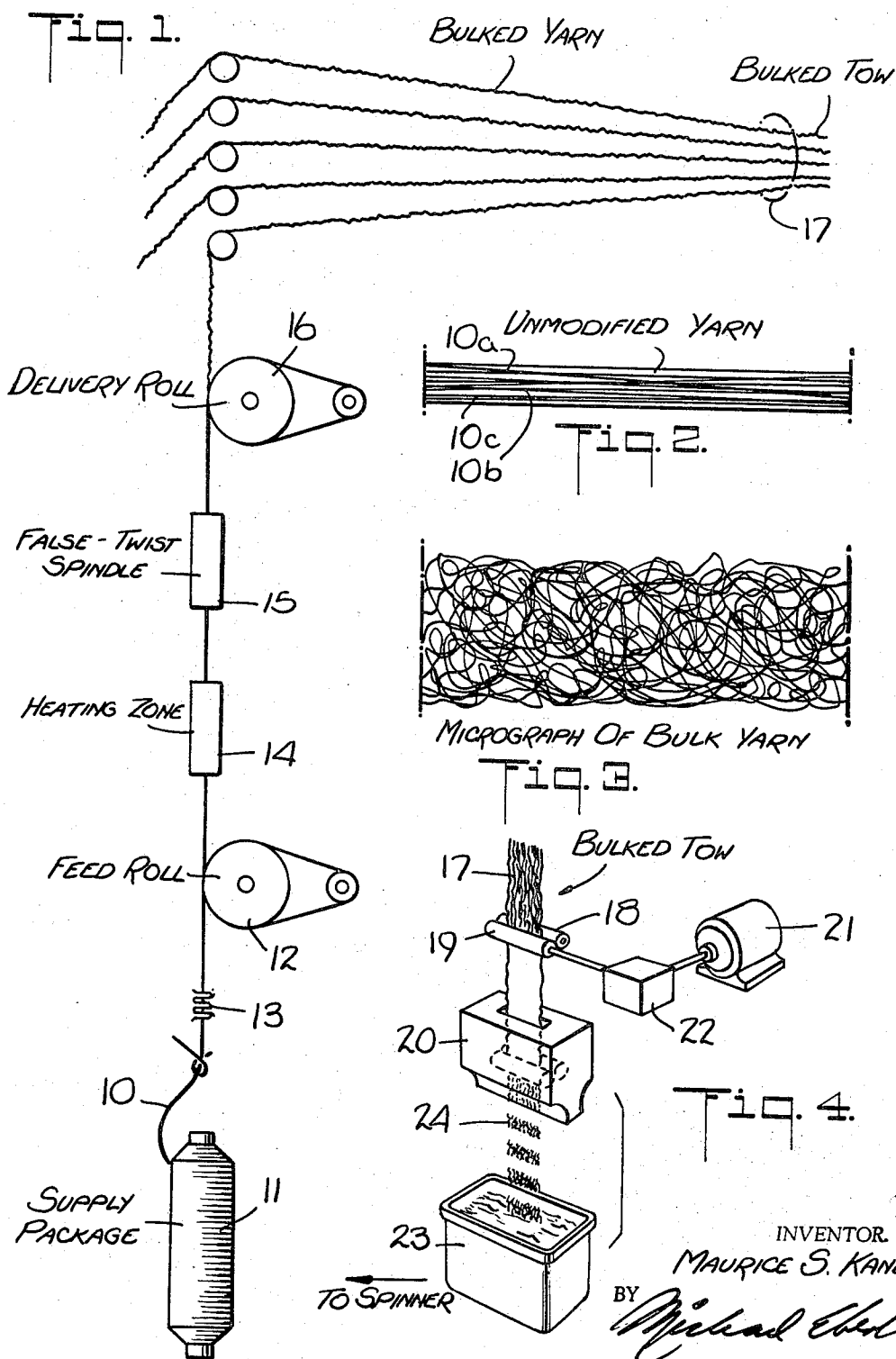
April 23, 1968

M. S. KANBAR

3,379,003

METHOD OF MAKING SPUN YARN FROM FALSE TWIST CRIMPED YARNS

Filed Dec. 28, 1964



1

3,379,003

METHOD OF MAKING SPUN YARN FROM FALSE TWIST CRIMPED YARNS

Maurice S. Kanbar, 2 E. 75th St.,
New York, N.Y. 10021

Filed Dec. 28, 1964, Ser. No. 421,411

4 Claims. (Cl. 57—157)

This invention relates generally to spun yarns, and to methods of fabricating such yarns. In particular, the invention deals with the conversion of synthetic filamentary threads into a unique spun yarn which combines the advantageous physical properties ordinarily possessed only by natural fibers with those characteristic only of synthetic fibers.

Conventionally, spun yarns are fabricated by a spinner mechanism into which is fed natural fibers in staple lengths, such as wool, the short lengths of fibers being twisted together and interlocking to form a continuous length of spun yarn. Textiles formed of such spun yarn are notable for their softness, resilience and warmth.

Synthetic fibers, such as those formed of nylon, acetate and polyester, are generally produced in continuous filaments, and in past attempts to convert such material into spun yarn, it has been the practice to first cut the filaments into staple lengths which are then fed into the spinner. However, such attempts have not succeeded commercially, for synthetic filaments have a smooth, uncrinkled surface, and in the twisting process they tend to be thrown out of the spinner, for the synthetic threads will not wrap around and interlock with each other.

Attempts have also been made to produce staple yarn by forming a tow of continuous filament synthetic yarns, and then gear crimping the tow, the crimped tow being cut into staple lengths. This method is not effective, for the crimp imparted to the tow lacks permanency, and the resultant fabric does not have the desired properties.

Accordingly, it is the principal object of this invention to provide a technique for converting synthetic filamentary material into spun yarn which when woven into a fabric has the softness and other physical properties heretofore found only in natural fibers, coupled with the washability, abrasion resistance and other qualities inherent in synthetic material.

More particularly, it is an object of the invention to provide a technique wherein individual continuous filaments of synthetic material are first texturized, a group of texturized filaments being brought together into a bulked tow which is then cut into staple lengths and fed into a spinner to form a continuous length of spun yarn.

A significant feature of the invention resides in the fact that each texturized filament has a pronounced crimp or undulation permanently imparted thereto, such that when the filaments are chopped into staple lengths and spun, the fibers interlock effectively, and form a bulked synthetic spun yarn of high quality which has the advantages of natural spun yarn without the attendant drawbacks. For example, unlike natural spun yarns, a synthetic spun yarn in accordance with the invention is unshrinkable and water resistant.

The staple fibers produced in accordance with the invention may be spun and woven into fabric, or felted or otherwise treated to form a non-woven product and the synthetic staple fibers may be used in pure form or intermixed with other staple fibers or continuous filaments to form composite spun yarns having unique qualities.

For a better understanding of the invention, as well as other objects and further features thereof, reference is made to the following detailed description to be read in conjunction with the accompanying drawing, wherein:

FIG. 1 shows schematically a system for producing a

2

tow of texturized filamentary threads in accordance with the invention;

FIG. 2 is an enlarged view of unmodified yarn;

FIG. 3 is a micrograph of one false-twisted yarn made by the system; and

FIG. 4 shows the mechanism for chopping the tow into staple fiber.

The present invention makes use of synthetic materials such as polyamide, vinyl, polyester or acrylic yarns formed of fine continuous filaments. The purpose of the invention is to convert such materials into a form suitable for spinning and thereby produce a spun yarn which exploits the useful characteristics of synthetic materials.

Continuous-filament synthetic yarns have a smooth linear surface but can be rendered highly crinkly by a process known as texturizing or bulking. Bulked or texturized yarns are those which have been treated so as to have greater apparent bulk or volume than their yarn numbers indicate they should. The texturizing process acts to introduce crimps, coils, loops or crinkles into otherwise smooth, continuous filaments, and in the case of nylon or other thermoplastic materials, it exploits the thermoplasticity of the material and its ability to be deformed, heat-set and developed.

While the present invention is not limited to nylon, we shall for purposes of describing the technique, make use of this material as an example of how the invention is carried out. Essentially, the invention takes individual yarns of nylon composed of a multiplicity of fine, smooth and continuous filaments and texturizes the yarn to form a bulked yarn in which the individual filament thereof are crimped or otherwise bulked.

A large number of such bulked yarns is then brought together into a tow, and because of their bulked characteristics, the several yarns intertangle. The tow is then chopped into staple lengths suitable for spinning.

Preferably, the texturizing of the continuous-filament nylon yarn is carried out by the so-called false-twist process which sequentially carries out twisting, heat-setting and untwisting, thereby providing a continuous operation. The yarn 10, as shown in FIG. 1, is a multi-filament nylon taken from a yarn package 11 and is fed by feed rolls 12 at a controlled tension which is determined by a suitable tensioner 13, through a heating zone 14. From the heating zone, the heat-softened yarn passes into a false-twist spindle 15, the yarn being drawn therefrom by a delivery roll 16. The twist between the false-twist spindle and the feed rolls is set into the yarn by heating and cooling before it passes through the false-twist spindle.

The principle of operation is as follows: If a stationary multi-filament yarn is held at both ends and twisted in the center by a hollow false-twist spindle, then equal amounts of twist with opposing directions of spirality will be imparted on each side of the spindle. While each half of the yarn, if considered separately, appears to have a real twist therein, the algebraic sum of twist of the yarn through the length thereof as a whole is zero. With the false-twist spindle rotating continuously but with the yarn passing forward, the system reaches a state of equilibrium wherein no twist exists after the yarn has passed through the tube. This happens because of the cancelling out of the twist on the delivery side of the tube.

Thus when equilibrium is reached, there are constantly twisted filaments on the intake side of the rotating spindle, and untwisted filaments on the output side thereof. Since the heater is on the input side of the spindle, with enough space left for cooling between the twisted yarn passing through the rotating spindle, the three basic steps of twisting, heat-setting and untwisting are carried out simultaneously.

In FIG. 2, there is shown in enlarged view an unmodi-

fied multi-filament yarn formed of continuous nylon filaments 10a, 10b, 10c, etc., such as 70-denier, 34-filament yarn. When this yarn is false-twisted, the resultant structure, as shown in the micrograph in FIG. 3, is composed of individual filaments which are looped, curled, twisted, tangled or otherwise distorted to form a bulked yarn of relatively high volume.

The bulked yarns from a battery of identical false-twist systems are brought together in a tow 17 and because of the looped and curled nature of the yarns, the yarns tend to intertangle.

As shown in FIG. 4, the tow 17 of texturized filaments is then conveyed by feed rolls 18 and 19 to and through a chopper 20, rolls 18 and 19 being driven by a motor 21 through a suitable gearing arrangement 22 in order to achieve the desired tow velocity. Chopper 20 may be of any conventional construction, and serves to cut the continuous tow into staple lengths 24 which are collected in a container 23.

From the container, the staple lengths of synthetic fibers may be processed in a spinner in the usual manner of cotton or wool, and formed in either pure or mixed state with other staple fibers or continuous filaments into a spun yarn. Thus by combining in a 50-50 or other ratio wool and bulked nylon staple made in accordance with the invention, the resultant composite staple yarn has the appearance and hand of wool coupled with the physical properties imparted thereto by the nylon.

While there has been shown a preferred method of fabricating synthetic spun yarn in accordance with the invention, it will be appreciated that many changes and modifications may be made therein without, however, departing from the essential spirit of the invention as defined in the annexed claims.

What I claim is:

1. The method of forming spun yarn, comprising the steps of:

(A) individually texturizing a plurality of multifilament synthetic plastic yarns by the false-twist process to form bulked yarns,

(B) collecting the bulked yarns into a tow,

(C) chopping the tow into staple lengths, and

(D) spinning the staple lengths to interlock the bulky fibers into a continuous length of spun yarn.

2. The method as set forth in claim 1, wherein said yarns are formed of nylon.

3. The method as set forth in claim 1, wherein said staple lengths of synthetic yarn are combined in the spinning step with staple lengths of natural fiber.

4. The method of forming a composite staple material comprising the steps of

(A) individually texturizing a plurality of multifilament nylon yarn by the false-twist process to form bulked yarns,

(B) collecting the bulked yarns into a tow,

(C) chopping the tow into staple lengths, and

(D) intermingling said nylon staple with wool staple to form a composite staple whose appearance is mainly determined by the wool.

References Cited

UNITED STATES PATENTS

2,346,258	4/1944	Hooper	28-72
2,733,122	1/1956	Herele et al.	28-72
2,908,944	10/1959	Benninga et al.	19-32
3,017,684	1/1962	Pittman	28-72
3,107,412	10/1963	Hall et al.	28-72
3,129,485	4/1964	Shattuck	28-1
3,221,385	12/1965	Stanley	28-72
3,255,580	6/1966	Garner et al.	57-140

JOHN PETRAKES, *Primary Examiner*.