

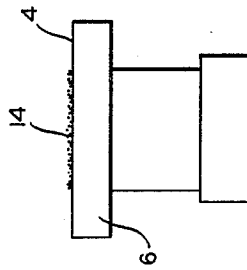
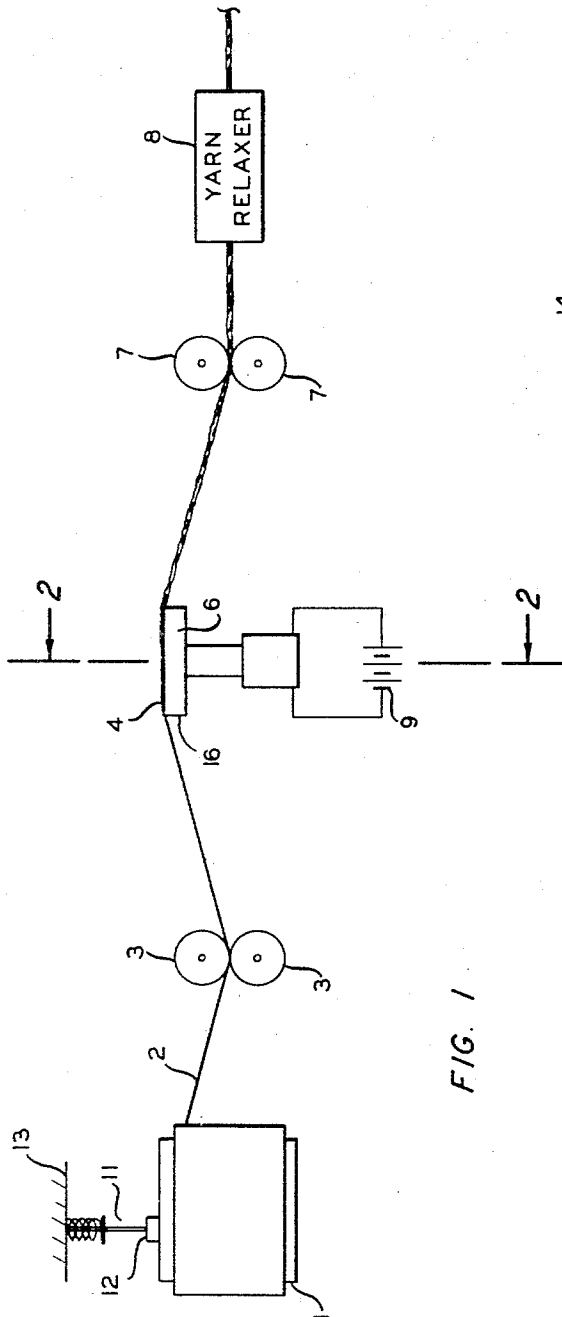
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FILAMENT CRIMPING METHOD

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FILAMENT CRIMPING METHOD

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5 Claims

ABSTRACT OF THE DISCLOSURE

In a method of crimping a synthetic film or yarn by contact with a vibrating surface, the filament being fed to the vibratory crimper is withdrawn from the side of a supply bobbin to prevent twisting of the filament.

This invention relates to methods of and apparatus for crimping filaments. In one aspect, this invention relates to methods of and apparatus for utilizing vibratory energy to texturize synthetic filaments by imparting crimps thereto. In another aspect, this invention relates to texturizing yarns composed of a plurality of filaments wherein vibratory energy is used to impart crimps to the individual filaments in the yarns.

Thermoplastics such as polyamides, polyvinyls, polyolefins, and the like, in the form of a filament or a yarn comprising a plurality of filaments bunched together, can be texturized to increase their bulkiness by imparting a multitude of crimps to the filaments. One way in which this can be accomplished is by passing the filaments individually or plyed together in the form of a yarn into contact with a vibrating surface or edge which can be made to vibrate at an amplitude and frequency sufficient to impart crimps to the individual filaments. Since the effectiveness of the crimp and the speed of operation is dependent at least in part upon the duration and force with which the filaments are held against the vibrating surface, it is desirable for the filaments to make a positive and direct contact with the vibrating surface as they pass over it. One way of assuring good contact between the filaments and the vibrating surface is to employ filaments and/or yarns having zero twist. The practice of using zero twist filaments and yarns in a vibration texturizing method has heretofore been difficult especially when the filaments and/or the yarns are withdrawn from a bobbin or so-called "cake." In some cases, the yarn on the bobbin has an inherent twist. In other cases, an undesirable twist is imparted to the filament or yarn by pulling it from one of the ends of the bobbin. As the filament or yarn is continuously withdrawn from the bobbin, the twist intensity increases between the bobbin and the vibrating surface because the vibrating surface acts as a constriction to the filament or yarn and thus tends to prevent the twists from passing over it. Since this twisted condition of the filament or yarn prevents all of the filaments from contacting the vibrating surface, the filaments in the outermost part of the yarn, with respect to the vibrating surface, never come in contact with the vibrating surface. This results in a partially texturized product of inferior quality. Although the tension of the yarn in passing over the vibrating surface can be increased in an attempt to flatten the yarn so that all of the filaments will contact the vibrating surface, this approach to the problem is only a temporary solution because, as the texturizing operation continues, the twist intensity between the bobbin and the vibrating surface will increase with the result that eventually the twisted part will pass over the vibrating surface. Of course, if the tension on the yarn is increased in an attempt to flatten the yarn so that all of the filaments contact the vibrating surface, the yarn will eventually

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break.

According to this invention, these and other disadvantages in the art of texturizing synthetic filaments and yarns by vibratory energy are overcome by withdrawing the filament or yarn from the side of the bobbin normal to its axis rather than from the end of the bobbin. This technique will prevent the filament or yarn from becoming twisted before it contacts the vibrating surface. Although the advantages of this invention are more readily apparent when a yarn composed of a plurality of filaments is removed from the bobbin rather than a monofilament, the invention is also applicable to texturizing single filaments.

Accordingly, it is an object of this invention to provide an improved technique for texturizing filaments and yarns.

Another object of this invention is to provide a method of introducing a yarn or filament having no twist to a texturizing step.

A further object of this invention is to provide a method and apparatus for withdrawing yarn or filaments from a bobbin and delivering them to a texturizing surface without introducing a twist to them.

Still another object of this invention is to provide a method of texturizing a filament or yarn by vibratory energy which results in the formation of a texturized product of superior quality.

These and other objects of the invention will become apparent to one skilled in the art after studying the following detailed description, the appended claims, and the accompanying drawing wherein:

FIGURE 1 is a schematic illustration of an apparatus for withdrawing and passing a yarn or a filament from a bobbin across a texturizing surface; and

FIGURE 2 is a cross section of the vibration surface taken along the lines 2—2 of FIGURE 1.

Referring now to the drawing, wherein like reference numerals are used to denote like elements, the invention will be described in more detail. Many guides, controls, switches and the like, not necessary in explaining the invention to one skilled in the art, have been omitted from the drawing for the sake of clarity.

In FIGURE 1, a bobbin 1 such as that obtained from a draw winder and sometimes referred to as a "cake" is mounted so yarn 2 can be removed from the side of the bobbin normal to its axis rather than from its end. The yarn 2 is withdrawn from the bobbin 1 and passed between a pair of directional rolls 3, across the upper surface 4 of a suitable vibration means 6, between a second pair of directional rolls 7, and through a yarn relaxing zone 8. The movement of the yarn 2 in this manner can be effected by any conventional pickup machine such as the Leeson No. 959 marketed by the Leeson Corporation of Warwick, R.I. Although the invention is described and illustrated in connection with texturizing a yarn, it is within the spirit and scope of the invention to withdraw a monofilament from bobbin 1 and impart crimps to it in a manner similar to the manner in which crimps are imparted to the yarn.

The vibration means 6 can be any suitable vibrator capable of emitting vibrations in the subsonic, sonic or ultrasonic ranges. An electrically energized vibrator or an electrical transducer in the form of a piezoelectric member or a laminated plate can be energized by a source of electrical power 9 to supply the vibrations desired.

A constant tension brake means 11 is mounted to impose a drag on the bobbin 1 as it rotates. The brake means 11 can be in the form of a spring-biased plunger 12 which can be adjusted with respect to support 13 to provide the desired braking force. This will prevent the yarn from spinning off the bobbin 1 during periods of deceleration.

In the practice of the method of this invention, the free

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end of the yarn 2 is passed between directional rolls 3, across vibration means 6, through directional rolls 7, yarn relaxer 8, to a suitable pickup machine which will serve to withdraw the yarn 2 from the bobbin 1 and pass it across the vibration means at the speed desired. The directional rolls 3 and 7 can be driven and regulated as desired to advance the yarn and control the tension of it. A second set of rolls (not shown) mounted in proximity with directional rolls 3 can be used to draw the yarn if desired. By withdrawing the yarn 2 from the side of the bobbin 1 in accordance with this invention, no twist will be imparted to the yarn as it travels from the bobbin to the vibration means 6. If the yarn 2 is wrapped on the bobbin 1 with a quarter-turn or similar twist per inch, it will be withdrawn from the bobbin by the method of this invention with about the same amount of twist was imparted to it when it was placed on the bobbin. Similarly, if a yarn 2 with no twist is taken directly from a spinneret wind-up package and passed through draw rolls (not shown) before being texturized by the vibration means 6, it will pass over the vibrating surface with no twist provided it is removed from the side of the wind-up package in accordance with this invention.

As indicated in FIGURE 2, one advantage realized by removing the yarn 2 from the side of the bobbin 1 rather than from its end is that the individual filaments 14 become separated and each of them comes in contact with the upper surface 4 of the vibration means 6. This will cause all of the filaments to be individually subjected to the vibrations with the result that a substantially equal amount of crimp is imparted to all of the filaments in the yarn.

Removal of the yarn from the bobbin 1 in this manner not only results in a better crimp in the individual filaments but also reduces the tendency of the yarn to break as it contacts the leading edge 16 of the vibration means 6. As hereinbefore indicated, if the yarn becomes twisted by removing it from the end of the bobbin and the tension is increased to overcome this condition, the leading edge 16 and the extra tension employed can cause the yarn to rupture.

Although the brake means 11 can be adjusted and synchronized with the pickup mechanism to provide a yarn tension of varied magnitude, it is generally preferred to withdraw the yarn under tension of at least about 5 grams. Tensions as high as 1600 grams or more can be employed if desired.

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The yarn relaxer 8 can be in the form of a heated chamber into which steam can be passed for the purpose of setting the crimp imparted to the individual filaments. This is an optional feature of the invention, the use of which is dictated by the type of yarn desired.

Although the invention has been described in considerable detail, it must be understood that such description is for the purpose of illustration only and that many variations and modifications can be made without departing from the spirit and scope of the invention.

I claim:

1. In a method of crimping a substantially untwisted yarn containing a plurality of synthetic filaments by vibratory energy including the steps of withdrawing said yarn from a bobbin and passing the thus withdrawn yarn into contact with a single vibrating surface to allow vibratory energy emanating therefrom to contact one side of said yarn to impart crimps to said yarn, the improvement comprising withdrawing said yarn from the side of said bobbin whereby twisting of the yarn is prevented and the filaments of said yarn are separated wherein each individual filament of said yarn contacts said vibrating surface to effect the subjection of each of the thus separated filaments to the vibrating energy emanating from said vibrating surface to impart a substantially equal amount of crimp in each of said filaments.

2. A method in accordance with claim 1 wherein said yarn is withdrawn from said bobbin under tension of at least about 5 grams.

3. A method in accordance with claim 1 further comprising recovering a substantially untwisted yarn having substantially equal crimps in each filament of the recovered yarn.

4. A method in accordance with claim 1 further comprising heating the thus crimped yarn to relax said yarn.

5. A method in accordance with claim 1 further comprising heating the thus crimped yarn to set the crimps.

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