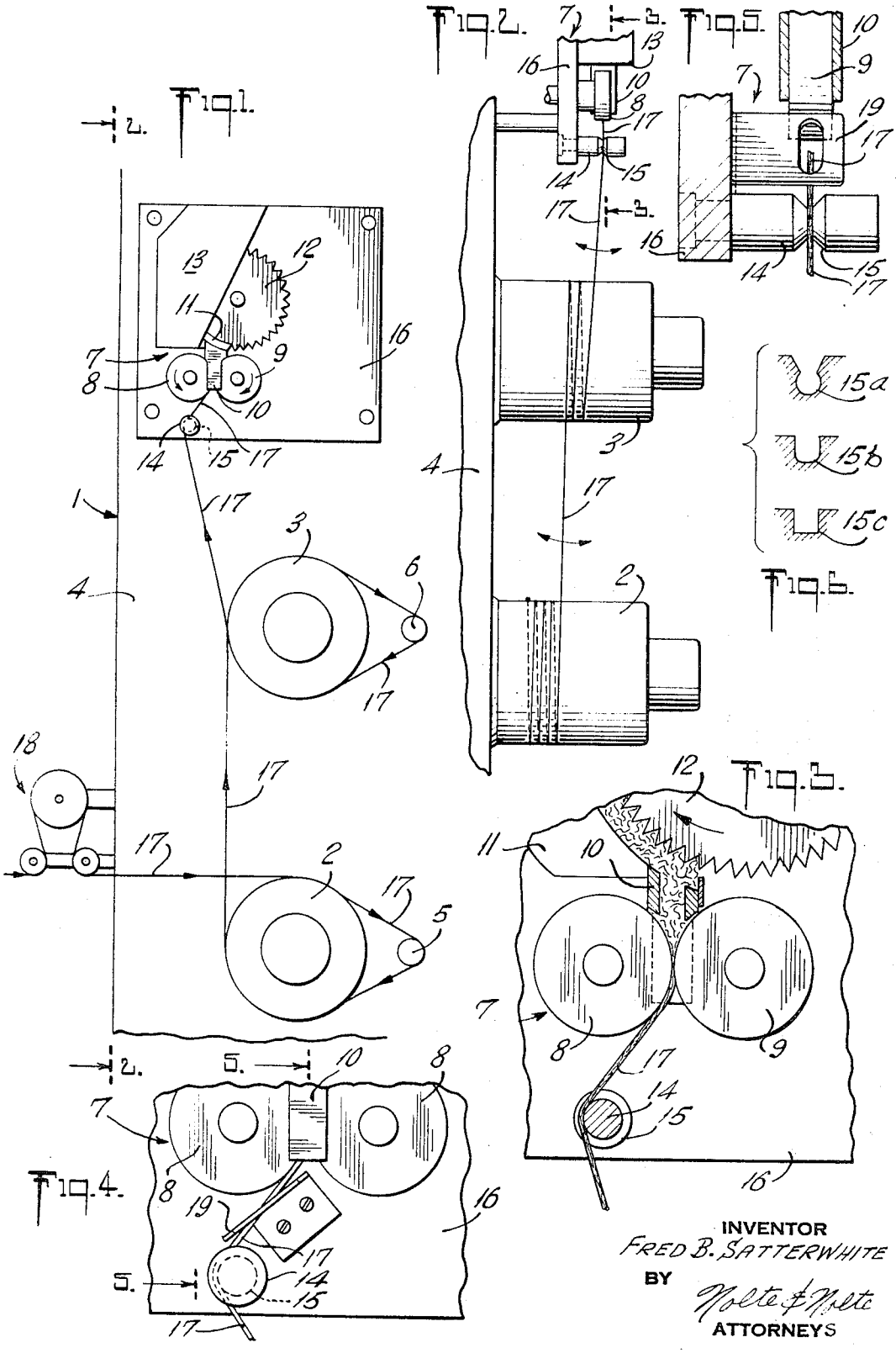
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APPARATUS FOR PROCESSING YARN

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APPARATUS FOR PROCESSING YARN

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ABSTRACT OF THE DISCLOSURE

A method of crimping a single strand of yarn in which the yarn is passed around a roller, then conveyed from the roller to the nip of a pair of feed rollers for feeding the strand into a crimper, and, in said conveying, the strand is deviated from the straight path between the roller and the nip so that the strand engages one of the feed rollers substantially tangentially prior to entering the nip.

The present invention relates to a method of and apparatus for drawing and crimping continuous multifilament thermoplastic yarn or yarn having a thermoplastic component as, for instance, yarn made of nylon, polyester or polypropylene, and more specifically to a method and apparatus of this type in which such yarn is drawn between a pair of godets and is subsequently crimped by stuffer box crimping. Still more specifically, the invention relates to a method of and apparatus for drawing and crimping in which the yarn is drawn by means of heated godets. The invention is also applicable where the yarn is heated upon a single heated godet.

It has been discovered that the yarn moves back and forth in axial direction over the circumferential surface of the godets. It is believed that this movement is due to the fact that the godets are heated, or that the godets have a smooth surface or that the yarn has a smooth finish, for instance because it has been treated with plasticizers, lubricants, detergents and the like. A combination of these factors may also be responsible for this movement. This movement of the yarn will harmfully affect the feeding of the drawn yarn into the stuffer box since the feeding point of the yarn into the nip of the feeding rollers of the stuffer box will vary constantly. This in turn may result in a non-uniform crimp of the yarn.

It is, therefore, an object of the present invention to provide a method of and apparatus for drawing and crimping continuous multi-filament thermoplastic yarn which will eliminate the difficulties encountered heretofore with the feeding of the drawn yarn into the stuffer box.

It is another object to provide a method and apparatus as set forth in the preceding paragraph, which will assure a controlled guiding of the yarn into the nip of the feeding rollers and a proper alignment of the yarn with regard to the feeding rollers of the stuffer box.

The present invention will be more readily understood when studying the accompanying drawings, in which:

FIG. 1 is a partial front view of an apparatus for drawing and crimping yarn, embodying the present invention;

FIG. 2 is a side view as seen in the direction of the arrows 2—2 in FIG. 1;

FIG. 3 is a section taken along the line 3—3 of FIG. 2, illustrating the inventive features on a larger scale than FIGS. 1 and 2;

FIG. 4 is a front view of a device according to a further development of the present invention and slightly modified over that of FIG. 3;

FIG. 5 is a section taken along the line 5—5 of FIG. 4; and

FIG. 6 shows various cross-sectional shapes of the guiding pin in FIG. 5.

According to one embodiment of the invention the drawn yarn is not fed directly from the godets into the nip of the feeding rollers of the stuffer box, but is guided over a pin or roller.

The pin or roller, in this instance, performs a double function. On one hand, it serves as a pivot point for the yarn being fed into the stuffer box and moving back and forth over the circumferential surface of the godets. Without the pin or roller, the yarn will use the nip of the feeding rollers as a pivot point, which will cause non-uniform feeding of the yarn into the space between the rollers.

On the other hand, the pin or roller will guide the yarn onto one of the feeding rollers rather than directly into the nip between the feeding rollers. In this way, this one feeding roller will aid in the proper guiding of the yarn into the nip.

According to another embodiment of the invention, the pin or roller is provided with a circumferential groove for receiving and guiding the drawn yarn. This groove may have various cross sectional shapes and dimensions for accomplishing various purposes. The groove may serve primarily for preventing movement of the yarn over the pin or roller in axial direction thereof. For this purpose, a groove of any desired shape would work satisfactorily, and the size of the groove could be determined by the thickness and width of the yarn so that no filaments of the yarn would remain outside the groove. However, the groove can be so dimensioned that it condenses the individual filaments of the yarn into a small bundle prior to the latter entering the nip between the feeding rollers of the stuffer box or can be so dimensioned that it eliminates stray and wild filaments by feeding the same back into the bundle. Such stray filaments usually stem from the extrusion process, but may also be due to static electricity, especially in yarns made of nylon.

Referring now to the drawing in detail, the apparatus for drawing and crimping yarn, generally designated with reference numeral **1** comprises two godets or draw rollers **2, 3** rotatably mounted in a side wall **4** of apparatus **1**. Roller **3** is rotated at a higher circumferential speed, for instance at two to four times the speed of roller **2**. Associated with each of the draw rollers **2, 3** are separating or idler rollers **5, 6** respectively, mounted on side wall **4** so as to be freely rotatable about their axes which may be adjusted toward and away from a plane parallel to the axes of rotation of draw rollers **2, 3**.

Draw rollers **2, 3** may be heated in any convenient manner, for instance, electrically, as described in my copending U.S. patent application Ser. No. 532,642.

The apparatus furthermose comprises a stuffer box crimper generally designated **7** and described more in detail in U.S. Patent 3,212,157. This stuffer box crimper includes a stuffer box chamber confined by two driven rollers **8** and **9**, a guide member **10** (see FIG. 3), an arcuate element **11** and a toothed wheel **12**. The crimping apparatus also includes a setting chamber **13** with which the crimping chamber communicates.

In conformity with the present invention a guide roller **14** is interposed between godet **3** and rollers **8** and **9** and spaced from the direct connecting line between the circumferential surface of godet **3** and the nip of rollers **8** and **9** by a distance of approximately ¼" to ½". Guide roller **14** is provided with a groove **15** and is rotatably journalled in a side wall **16** of crimper **7**. It is to be understood that roller **14** need not be rotatable but would operate completely satisfactorily if held stationary in wall **16**.

A yarn **17** from a supply package (not shown) passes first over a tensioning device **18**, then over the first draw roller **2** and idler roller **5** in a plurality of wraps and

from there over the second draw roller **3**, and idler roller **6**, also in a plurality of wraps. Yarn **17** is drawn between draw rollers **2** and **3** since roller **3** is driven at a higher circumferential speed than roller **2**. After the drawing process between rollers **2**, **3** the yarn is passed through groove **15** of roller **14** and onto the circumferential surface of nip roller **8**. From here the yarn is passed into the nip between rollers **8** and **9** and into the stuffer box where the actual crimping operation takes place.

It may be added that, in general, by varying the shape and/or dimensions of groove **15** the bundle of filaments can be given various characteristics as to shape and compactness, as may be desired for the actual crimping process. Thus, for instance, by forcing a bundle of yarn of circular cross section through a triangular groove the outer portions of the bundle may be folded over the central part of the bundle. Three different shapes of groove **15** are shown at **15***a*, **15***b* and **15***c* in FIG. 6.

Another feature of the invention consists in that the groove in the pin or roller will prevent the yarn as a whole, or individual filaments of the yarn, from slipping off the feeding rollers. For the same purpose and as an additional safety feature, the drawing and crimping apparatus according to the invention may be equipped with a slotted plate or a small guiding tube arranged between the pin or roller and the feeding rollers of the stuffer box.

According to the embodiment illustrated in FIGS. 4 and 5, a plate **19** connected to side wall **16** is arranged between guide roller **14** and the nip rollers **8**, **9** as an added safety feature to prevent with certainty yarn **17** from laterally slipping off rollers **8**, **9**.

It is contemplated that the pin or roller may be used as tensioning device for the yarn between the godets and the feeding roller in order to take up slack which may be caused by non-uniform feed through the rollers **8**, **9**.

Advantageously, the pin or roller may be modified and employed for applying moisture to the yarn. After passage of the yarn over the heated godets, the yarn has lost a large portion of its moisture content. Without restoring the moisture content, some filaments of the yarn may adhere to the feeding rollers and interfere with the proper feeding process and crimping process, which, in turn, may lead to a non-uniform texture of the yarn.

It is, of course, to be understood that the present invention is, by no means, limited to the particular constructions set forth above but also comprises any modifications within the scope of the appended claims.

What is claimed is:

1. A apparatus for crimping yarn, comprising roller means adapted to receive a strand of yarn therearound, crimping means, a pair of feed rollers for feeding yarn from said roller means into said crimping means, means interposed between said roller means and said feed rollers for guiding yarn passing from said roller means to said feed rollers and for deviating said yarn from a straight path between said roller means and said feed rollers, and additional guiding means arranged between said guiding and deviating means and said feed rollers for preventing slippage of yarn passing from said guiding and deviating means to said feed rollers, from said feed rollers.

2. An apparatus according to claim **1**, in which said additional guiding means comprises a slotted plate.

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