Feb. 27, 1968 M. McKEW ET AL 3,370,410

SPINNING DEVICE

Filed Jan. 29, 1965

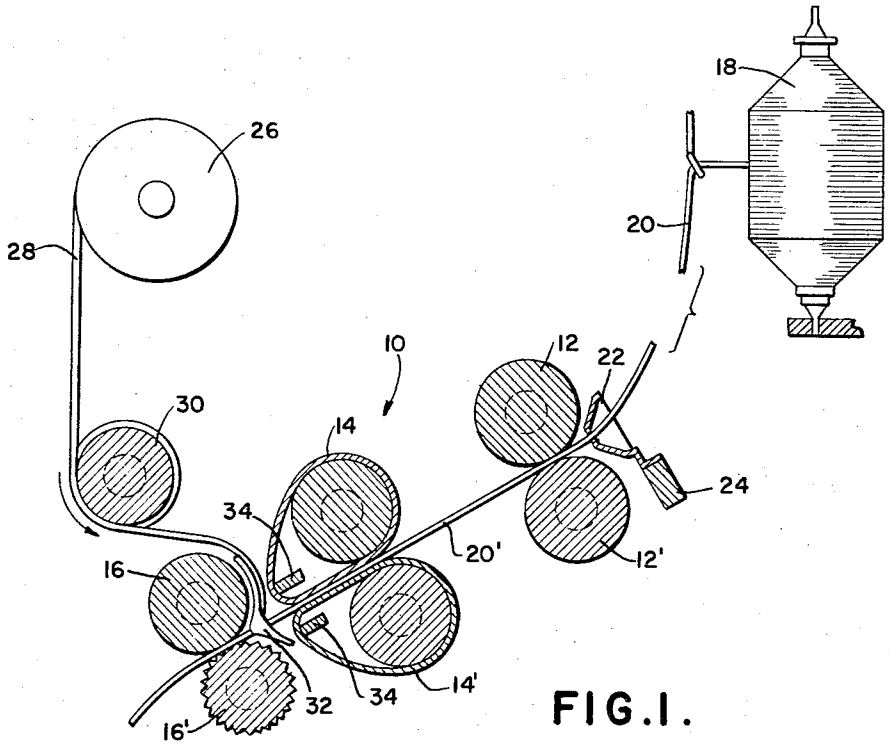


FIG. 1.

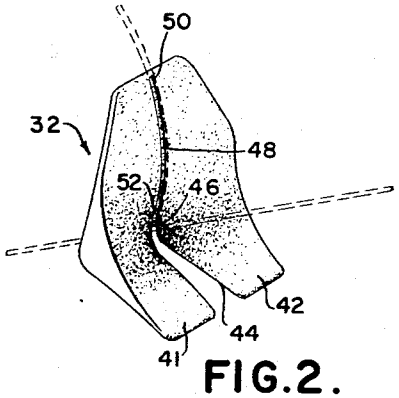


FIG. 2.

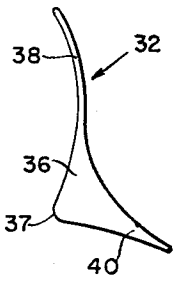


FIG. 3.

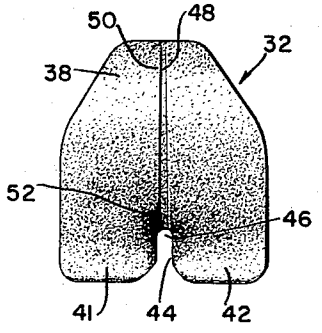


FIG. 4.

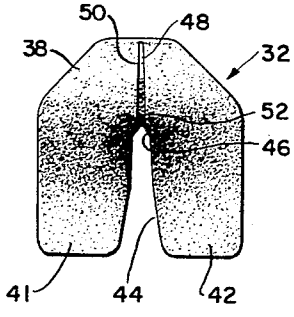


FIG. 5.

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SPINNING DEVICE

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The present invention relates generally to the textile art, and, more particularly, to a yarn guide which is especially suited for use in the preparation of core-spun yarns.

Core spinning is rapidly becoming a very popular form of producing expandible yarns which have the "handle" of natural yarns, contrary to the type of expandible yarns which had been used previously in this field. There are also other drawbacks, in using the previous types of expandible yarns, which are eliminated by using the present type of core-spinning operations, wherein a mono- or multi-filament core, which may be of an elastomeric nature, is utilized and is covered with what is referred to as the sheath which may be a staple fiber, such as cotton, for example. The sheath covers the core yarn so that the final yarn has the handle of the sheath and is, for all practical purposes, not affected by the core, while still retaining the desired extensibility.

In the manufacture of such core-spun yarns, a spandex yarn is usually used as a core. A roving is usually used as the sheath and the combination of the two can be made, for example, on a slightly modified conventional spinning frame in which the roving passes through the drafting system in the usual manner and the core yarn joins the conventionally drafted staple fiber at the front rolls. As they pass through the nip of the front rolls, the sheath yarn is twisted and spun about the core yarn.

One of the problems encountered in core spinning is that the spandex core yarn which has a relatively high coefficient of friction remains in one place after it contacts the front rolls and, since the staple fiber which is being drafted through the drafting system can move to and fro laterally at the front rolls, there sometimes is a distance between the core yarn and the staple fiber as it passes through the front rolls. This is undesirable since inter alia a loose wrapping of the sheath fiber about the core is likely to result. Therefore, in core spinning which has been performed heretofore, although it has been theoretically possible to use a single roving, in practice, at least two rovings have always been used so that the core yarn could be introduced between the two rovings to thereby act as a guide. However, it would be beneficial to be capable of spinning a suitable core-spun yarn using a single roving since this reduces the creeling time and also permits the use of a single heavier roving which provides for higher production in those operations which precede the spinning operation.

Furthermore, in practice, the traverse mechanisms which have previously been used to reduce wear throughout the drafting system, have been disconnected because such traversing would move the staple fibers to and fro laterally through the drafting system and thus through the front rolls, whereas the core yarn which has a high coefficient of friction would remain in one place as it passes through the front rolls. The effect of this is that at times the two yarns will not be spaced as closely together as is desired and also that the wear on the front rolls is much greater than is desirable.

With this in mind, it is a main object of the present invention to provide a guide device which eliminates the above-mentioned disadvantages of the prior art and allows core-spinning with a single roving as well as permitting the use of the usual traverse mechanism.

Another object of the present invention is to provide a device which guides the yarns and which is disposed in close proximity to the nip of the front rolls to thereby provide for accurate guiding of the yarns into this nip.

A further object of the invention is to provide a guide device of the character described which is of relatively simple and inexpensive construction and which does not disturb the normal functioning of apparatus on which it is utilized.

An even further object of the present invention is to provide such a guide device which does not interfere with the threading of the yarns through the device either initially or when the ends are broken so that the time required by the machine tender to perform the normal operations on the device is not lengthened by the use of the present invention.

These objects and others ancillary thereto are accomplished in accordance with preferred embodiments of the invention wherein a guide device is constructed which is generally V-shaped, with one leg being longer than the other and with the two legs being curved to conform to the curvature of the front rolls so that the apex of the V can approach the nip of the front rolls. The upper leg of the V is provided with a groove for guiding the core yarn, whereas the lower leg of the V is provided with a slot so that the staple yarn can pass therethrough with a minimum of contact with the guide. This slot through the lower leg also passes through the apex of the V-shaped guide so that the two yarns may run through this opening together. The guide is not attached to the device but merely sits adjacent the nip and is supported by the front rolls. Any lateral movement of the yarns will also cause the guide to move laterally.

Additionally objects and advantages of the present invention will become apparent upon consideration of the following description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a schematic side view through the drafting system of a conventional spinning frame illustrating the feed for the core yarn and the use of the present invention.

FIGURE 2 is a perspective view of the guide forming the present invention and indicating in phantom lines how the yarns are guided by the invention.

FIGURE 3 is a side elevational view of the guide of the present invention.

FIGURE 4 is a front elevational view of the guide.

FIGURE 5 is a top view of this guide.

The type of core yarns which may be utilized can take many forms but it is generally found that a spandex yarn is utilized and an example of such a yarn, for example, is Lycra which is produced by Du Pont. The sheath fiber is usually a staple fiber, such as cotton, or wool, and may even take the form of a synthetic staple.

With more particular reference to the drawings, FIGURE 1 shows a drafting system generally indicated as **10** which includes a pair of back rolls **12**, **12'**, a pair of intermediate aprons or belts **14**, **14'**, and a pair of front rolls **16**, **16'**, the lower of which may be fluted. A spool **18** of roving **20** of a staple fiber is provided on a creel in the usual fashion and the end of roving **20** passes through a polished trumpet **22** which is mounted on a traverse bar **24**. The package or spool of spandex **26** unwinds to provide the core yarn **28**. This passes through some type of tensioning device which, in the example shown, comprises a grooved roller **30** which is disposed forwardly of the front rolls **16**, **16'** and rotates in the direction indicated.

The guide **32** forming the present invention guides the core yarn **28** and, at the same time, guides the ribbon of drafted fibers **20'** which is fed from the aprons **14**, **14'** toward the front rolls **16**, **16'** and which ribbon is formed from the roving **20** of staple fiber.

The operation regarding the passage of the roving end through the device is normal in that the end **20** of roving

is unwound from the spool 18 and passes under a roving rod (not shown) and the end of roving then passes through a polished trumpet 22. The traverse bar 24 on which the trumpet 22 is mounted slowly traverses laterally back and forth so that the end of roving 20 which enters the back rolls 12, 12' will not immediately wear a groove in one spot in the rolls since the wear will be distributed over a transverse length of the roll. This is also true for the aprons 14, 14' and to a lesser extent to the front rolls 16 and 16'.

The linear speed of the aprons 14, 14' is slightly greater than that of the back rolls 12, 12' to provide an initial straightening and slight tensioning but with only a minimum draft provided. On the other hand, the linear speed of the front rolls 16, 16' is considerably greater than that of the aprons 14, 14' so that draft occurs between the nip of the front rolls 16, 16' and the aprons which engage the roving. These aprons are provided with apron or belt bars 34 which are adjacent to each other and are rounded in the front and may, if desired be of triangular form so as to provide a gentle gripping of the ribbon of fibers at a point relatively close to the nip of the front rolls, and the belt passes over these belt bars.

As the core yarn 28 is fed to the nip of the front rolls and as it has a high coefficient of friction, this yarn more or less remains in engagement with the same portion of the front rolls, even though the traverse mechanism is utilized to move the ribbon of staple fibers to and fro. Thus, in core-spinning which had heretofore been performed, many times there was a spacing between the core yarn and the sheath fibers during the spinning operation; to attempt to eliminate this the traverse mechanism would be disconnected. However, even with the traverse mechanism disconnected there is still a tendency for the ribbon of staple fibers to move slightly to and fro laterally as it passes through the front roll, whereas there is little or no tendency for the core yarn to do this, and thus the spacing between the two yarns would take place to some extent even when the traverse mechanism was not utilized. Since the guiding means used previously could not approach the nip of the rolls and since such guide was stationary whereas there was nevertheless a traverse bar provided, this natural tendency toward a spacing of the yarns from time to time could not be prevented.

However, the guide of the present invention, as shown in more detail in FIGURES 2 through 5, aids in preventing the spacing of the core and sheath yarns from one another at the nip of the front rolls. It can be seen that this guide 32 is generally V-shaped in that it has an apex portion and two legs which are relatively thin. The apex portion 36 is rather thick and is generally triangular to provide a reinforced section although its apex 37 is rounded rather than sharp. The upper leg 38 is the longer leg which narrows toward its upper end and, as can be seen, it is curved so as to generally correspond to the diameter of the upper front roll 16. The lower leg 40 is shorter but is also slightly curved at least on its outer surface so as to conform to the contour of the lower front roll 16'. The lower leg 40 actually is composed of two arms 41 and 42 which are defined due to a narrowing slot 44 which is formed centrally through this leg 40. This slot also extends slightly upwardly so as to also pass to some extent through the bottom portion of leg 38 and this portion of the slot is indicated at 46 in the drawings. A groove 48 is formed in the inner surface of the upper leg 38 which faces away from the front rolls and thus in the convex surface of the leg. The upper portion 50 of this groove is rather shallow and somewhat narrower than the lower portion 52 which is deeper and somewhat wider, and this portion 52 leads gently into the beginning of the slot 46. The slot 46 and the adjacent portion of slot 44 are formed by smoothly curved surfaces which curve gently from the surfaces shown in FIGURE 2 toward the slots.

In use, the guide 32 is placed with the apex portion immediately adjacent the nip of the front rolls with the lower leg 40 resting against the lower front roll and the upper leg 38 resting on the upper front roll. Because of the usual inclination of the drafting system 10, the guide merely sits here adjacent the nip of the rolls and is supported by the rolls so that no other support means need be provided. As the ribbon 20' of the staple fibers formed from the single roving 20 emerges from the aprons 14, 14', it passes into the slot 44 of the guide and then through the lower portion of slot 46 so that it, in effect, passes directly to the nip of the front rolls. The core yarn 28 is initially guided by the upper portion 50 of groove 48 and is then guided by the lower portion 52 of this groove and eventually this core yarn passes through the slot 46 together with the ribbon 20' of staple fibers so that the two yarns pass through the guide together and therefore enter the nip of the rolls spaced immediately adjacent or one on top of the other which is as desired for proper core-spinning operations.

It should be noted that due to the high coefficient of friction of the spandex core yarn 28 it passes through the guiding recess or groove 48 to the slot 46 and should there be any movement of the guide, the core yarn 28 will be properly guided since it will remain in the guiding recess 48. Thus, for example, if the traverse mechanism is connected and the ribbon of fibers 20' moves laterally to and fro, the guide 32 can also move to and fro and despite this the two yarns are guided together through the device so that they pass into the nip of the front rolls together. Furthermore, the guiding which does take place is immediately adjacent the nip of the front rolls. In the event of a broken thread, the guide does not adversely affect the mechanism at all, since it merely rests in its proper position. When the drafting device 10 is stopped the guide 32 merely rests on the front rolls adjacent the nip thereof.

The guide can be made of any suitable material, and it has been found that a preferred form is produced when these guides are molded of a nylon material, for example, when intended for use in a core yarn having a high coefficient of friction, then a suitable lubricant may be added to the nylon to prevent undue friction between the guide and core yarn. It has been found that .2–.5% graphite is suitable, and ⅜ of 1% has been used with good results.

Although the present invention provides an arrangement whereby only one end of roving need be used, it can be used equally well with two or more ends of roving.

It will be understood that the above description of the present invention is susceptible to various modifications, changes, and adaptations, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

What is claimed is:

1. A core-spinning device, comprising, in combination:
   a drafting system with the fiber path inclined forwardly downwardly and including a set of front rolls providing a nip between them and with the upper front roll disposed forwardly of the lower front roll;
   a system for feeding a roving to said drafting system;
   a core yarn feeding system; and
   freely movable guide means disposed immediately adjacent and behind the nip of the front rolls for positively guiding a drafted roving and a core yarn together at said guide means before they reach the nip of the front rolls.

2. A device as defined in claim 1 wherein said guide means is loosely seated on said front rolls.

3. A core-spinning device, comprising, in combination:
   a drafting system with the fiber path inclined forwardly downwardly and including a set of front rolls providing a nip between them and with the upper front roll disposed forwardly of the lower front roll;

a system for feeding a roving to said drafting system;
a core yarn feeding system; and
guide means disposed immediately adjacent and behind the nip of the front rolls for guiding a drafted roving and a core yarn together to the nip of the front rolls, said guide means being a generally V-shaped body having two relatively thin legs, one longer than the other, the outer surface of the longer leg being concave and conforming to the curvature of the upper front roll, the inner surface of said longer leg having a groove defined therein centrally thereof for guiding a core yarn along said inner surface, the outer surface of the shorter leg being concave and conforming to the curvature of the lower front roll, the shorter leg having a slot therein for guiding the drafted roving and the core yarn together from the groove to the nip of the front rolls.

4. A guide comprising a generally V-shaped body having two relatively thin legs, one longer than the other, and a thickened triangular apex portion, the longer leg having a concave outer surface and a convex inner surface having a groove disposed centrally therealong, the shorter leg having a concave outer surface and said leg being divided into two arms by a first slot extending for the length of this leg, a second slot defined only through the portion of the longer leg adjacent the apex portion and also through the apex portion and in free communication with said first slot, said groove being directed into said second slot.

5. A guide as defined in claim 4 wherein said groove gradually becomes wider and deeper as it approaches said second slot.

6. A guide as defined in claim 4 wherein said first slot narrows as it approaches said second slot.

7. A method of making a core-spun yarn comprising the steps:
drafting a single roving of staple fiber to form a ribbon and moving it toward a nip;

feeding a spandex yarn toward said nip in a different direction than that in which the roving moves toward said nip;
positively bringing said ribbon and said yarn into contact at a point in advance of a guiding zone and maintaining them in contact as they pass through said zone to said nip;
spinning said ribbon and said yarn; and
winding the spun yarn onto a package.

8. A method of making a core-spun yarn comprising the steps:
drafting at least two rovings of staple fiber to form a ribbon and moving it toward a nip;
feeding a spandex yarn toward said nip in a different direction than that in which the roving moves toward said nip;
positively bringing said ribbon and said yarn into contact at a point in advance of a guiding zone and maintaining them in contact as they pass through said zone to said nip;
spinning said ribbon and said yarn; and
winding the spun yarn onto a package.

9. A device as defined in claim 3 wherein said body is made of a material which includes a small amount of lubricant.

10. A device as defined in claim 9 wherein said body is of nylon and the lubricant is graphite.

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