June 28, 1966 S. L. ABBOTT 3,257,793

MAKING CORE YARN

Filed Dec. 26, 1963

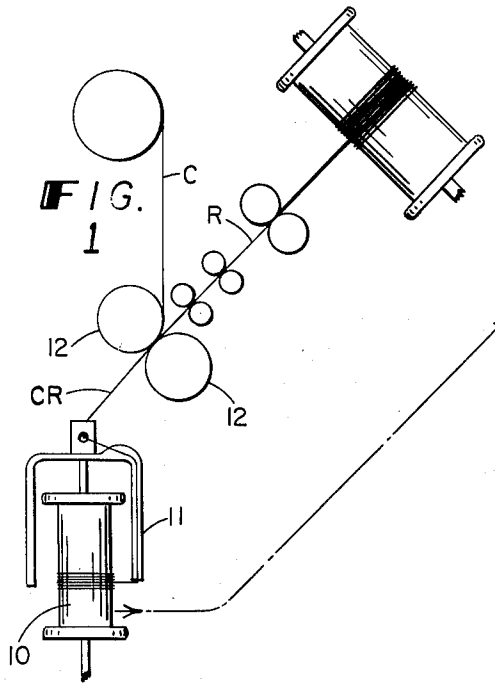


FIG. 1

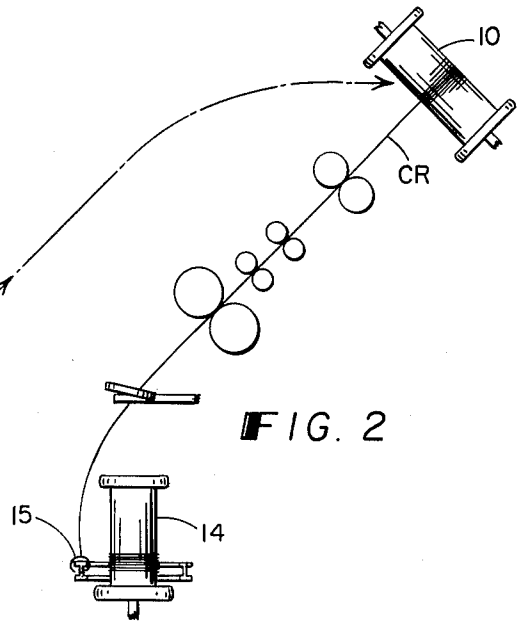


FIG. 2

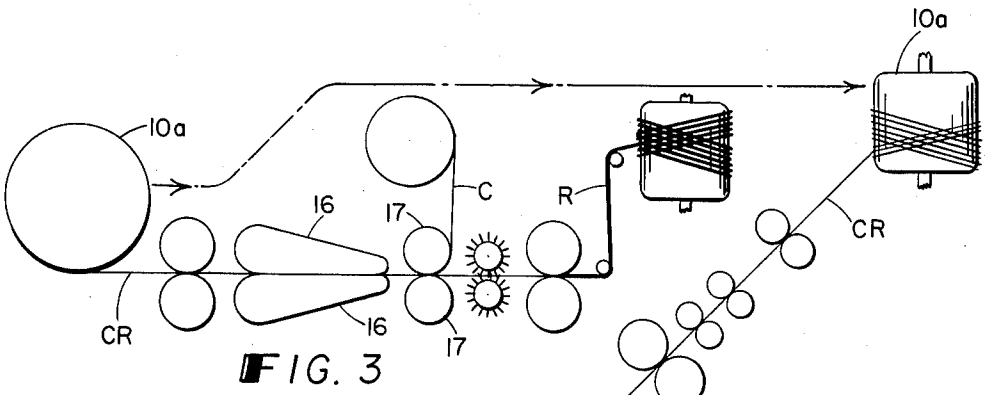


FIG. 3

FIG. 4

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3,257,793
MAKING CORE YARN

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This invention relates to making a yarn having an elastomeric core such as a spandex which is preferably the Du Pont polyurethane filament sold under the mark "Lycra," this being a continuous filament, and a covering of staple fibers, for example worsted, or synthetic staple fibers, or a mixture of various staple fibers. By way of example the bare core filament may be of about 0.006 inch diameter in at-rest condition.

The staple fibers require generally conventional textile treatment preparatory to and including spinning. In incorporating the elastomeric core it has been proposed to introduce the core filament at the entrance to the front rolls of the spinning frame, so that the core filament passes through the nip of these rolls along with the drafted staple fibers, whereupon both are twisted and wound up together as a yarn. For most uses the core should be held by the covering in a certain state of elongation or stretch from its bare at-rest condition. To accomplish this it has been proposed to provide at each spinning unit a device adapted to deliver the core at a selected degree of elongation. The staple fibers, of course, would not pass through this core delivery device, but proceed as usual through the drafting zone of the spinning frame and only meet the core when the latter had been delivered at the selected degree of elongation.

The present invention aims to reduce the expense of manufacture of yarn such as described above, and to improve upon its quality, particularly the uniformity of concealment of the core by the covering fibers.

These results can be obtained by the method of this invention which involves introducing the elastomeric core at an earlier point in the treatment of the staple fibers.

In the accompanying drawings:

FIG. 1 is a diagrammatic view showing the carrying out of an initial stage of the present invention with drawing equipment of the Bradford system.

FIG. 2 is a diagrammatic view showing the spinning of the composite roving produced by the operation shown in FIG. 1.

FIG. 3 is a diagrammatic view showing the performance of an initial stage of the present invention through the use of a conventional French porcupine drawing frame.

FIG. 4 is a diagrammatic view showing the spinning of the composite roving produced by the operation of FIG. 3.

An example of the invention is as follows:

The elastomeric core is introduced at the typical roving frame at which the staple fibers are drafted, twisted and wound preparatory to spinning. The core may simply be led in an approximately tensionless condition into the entrance of the nip of the front rolls of the roving frame, there meeting the drafted roving. The staple fibers then become twisted together with the core and wound up as a composite roving. Ordinarily the core filament will not have any appreciable twist when it meets the staple fibers. The bundle of staple fibers which meets the core at the front rolls of the roving frame will have little twist, because of the drafting operation in the roving frame which will have nearly eliminated the twist which the roving had in entering the drafting zone. Therefore, since both core and the staple fibers receive the same twist from the flier of the roving frame, the two twists will be similar, differing only by the residual twist

which the staple material had following its drafting but preceding its twisting in the roving frame.

It is recommended that the roving frame should be of the cone actuated type in which the roving is wound on its bobbin without frictional drag so that the composite roving is not stretched by the winding, the bobbin and the flier each being mechanically driven.

Thus the elastomeric core will lie in the composite roving, twisted with a roving twist but substantially unstretched, i.e., in the example given, still about 0.006 inch diameter. The staple fibers of the composite roving, for example worsted, may amount to around 1.5 grains per yard.

The composite roving, so produced, is then used as the supply for a final spinning operation, which may employ a conventional ring spinning frame.

In this spinning operation the draft is selected so as to produce in the spun yarn a core-elongation of the extent desired. Thus, if the core is to have in the finished yarn a length of five times its at-rest length, the draft of the spinning is selected accordingly. The improvement in quality by improvement of uniformity of concealment of the core by the covering fibers is attributable to the nearness with which the twist of the core filament approaches the twist of the staple material as these components are delivered by the front rolls of the spinning frame. Some residual twist of the staple material reaching the front rolls is inherent in conventional spinning employing twisted roving. It would appear that when a core filament is placed with this partially twisted staple material initially at the front rolls and the two then twisted together, this residual twist is an impediment to complete and uniform entry of the core into the interior of the twisting-up yarn. On the other hand, when the two components have prevously been twisted together as above described in the twisting step of the roving stage, and have the same or nearly the same attenuated residual twist as they reach the front rolls of the spinning frame, the embedding of the core filament in the body of covering fibers is facilitated.

There is as noted above a little residual twist in the roving at the front rolls of the roving frame and hence a little difference in twist between the covering fibers and twistless core introduced at that point. However, with the present invention no further difference is introduced, and the difference that exists at that point is reduced by the drafting in the spinning, for example, divided by five when the draft is five. This type of reduction in difference could not be secured if the core were initially introduced at the front rolls of spinning.

The economy effected by the invention is felt in two ways. As well understood, one roving frame will produce the roving for supplying a number of spinning frames. Thus, introduction of the core at the roving stage greatly reduces the number of places where tending of the core supply is required and the number of such supplies in use at any one time. Furthermore, the need for devices for delivering the core in a stage of elongation is eliminated. The core filament can simply be drawn off its package over end through a stationary guide or eye by the feeding action of the front rolls of the roving frame.

When the package of core filament delivers in this simple way by over end unwinding, the overend unwinding should be over that end of the package which will cause the slight twist introduced by the overend unwinding to be in the same direction as the slight residual twist in the roving entering the front rolls of the roving frame.

While the invention has been described as applied to the final roving stage and the spinning stage, there may be instances when it may be desirable to introduce the elas-

tomeric core at the entrance to the front rolls of a roving or similar frame preceding the last roving stage. In such case the core will be subject not only to the elongation of the drafting involved in the spinning stage, but also to the drafting involved in the final roving stage.

This modification would be especially appropriate if quite low drafts were to be used in the final roving stage and in the spinning stage.

While the invention has been described above as applied to the more usual system of drawing in which the roving is twisted, certain aspects of the invention are applicable to the French system which produces twistless roving. Here the elastomeric core would be fed in a substantially untensioned and twistless condition into the entrance between the rubbing aprons of the roving frame, which frame in the French system is often referred to as the finisher. The rubbing aprons condense the roving and apply a temporary false twist. The composite roving would then be wound up as is the roving in the French system, without permanent twist. Thereupon the composite roving would be subjected to the drafting, twisting and winding steps of the spinning stage as above described.

In FIG. 1 the staple fiber roving R is shown as being drawn on the conventional Bradford drawing frame and twisted and wound on a bobbin **10** by the usual flyer **11**. The elastomeric core filament C is taken in at the nip of the front rolls **12, 12** in an approximately tensionless condition and becomes combined with the roving. The core filament at this point will have approximately no twist and the roving will have very little residual twist because of its attenuation in the drawing. The composite roving CR consisting of the drawn roving and the core will receive some twist from the flyer and the amount of twist in its two components will be substantially equal.

In FIG. 2 the bobbin **10** containing the composite roving CR has been transferred to the conventional Bradford ring spinning frame where it serves as a supply. In this operation the composite roving may receive a draft of for example five, then receive the usual twisting and winding to form a yarn wound on the bobbin **14** by the usual ring traveler **15**. The attenuation in this stage of the process minimizes any slight difference in twist between the core filament and the staple fiber component of the composite roving, so that they are wound with almost exactly the same twist, resulting in good covering of the core.

In FIG. 3 the roving R is shown as being drawn in to a conventional French porcupine drawing frame having rub aprons **16, 16** which impart a false twist, the core filament C being inserted at the nip of the intermediate rolls **17, 17** so that it partakes of the same false twist as the roving fibers. The draft in the rub apron area is slight, only sufficient to keep the strands taut, the main draft being in advance of the insertion of the core filament C.

The composite roving CR is wound onto a package **10***a* without additional twist, and this package is then transferred to a conventional spinning frame as in FIG. 4 where it serves as a supply for the spinning operation as explained in connection with FIG. 2.

I claim:

1. Method of making a yarn having an elastomeric core of continuous filament and a covering of staple fibers, the method comprising associating the core in an approximately unextended condition with a roving of the staple fibers so as to form a composite roving, winding this into a supply package, and subjecting the composite roving from the supply package to a drafting operation in which the core filament is extended and then to a twisting operation to form a yarn.

2. Method according to claim **1** in which the composite roving is subjected to condensing before being wound into a supply package.

3. Method according to claim **1** in which the composite roving is subjected to false twisting before being wound into a supply package.

4. Method of making a yarn having an elastomeric core and a covering of staple fibers, the method including as to the staple fibers successive stages each comprising a drafting step followed by a winding step, the method being characterized by bringing the elastomeric core into association with the staple fibers before the winding step of a stage before the last of such stages, so that in the last of such stages the core, as a part of a composite roving is subjected to the elongation of the drafting imparted to the staple fibers.

5. Method of making a yarn having an elastomeric core and a covering of staple fibers, the method including as to the staple fibers successive stages each comprising both drafting and twisting steps, the method being characterized by associating the elastomeric core with the staple fibers before the twisting step of a stage preceding the last of such stages so as to tend to equalize residual twist remaining in the core and in the staple fibers at the end of the drafting of the last of said stages.

6. Method of making a yarn having an elastomeric core and a covering of staple fibers, the method including as to the staple fibers successive stages each comprising both drafting and twisting steps, the method being characterized by associating the elastomeric core in an aproximately twistless condition with the staple fibers before the twisting step of a stage preceding the last of said stages, so that both the core and the staple fibers are subjected to the twisting step of said preceding stage and are subjected to the drafting action of said last stage.

7. Method of making a yarn having an elastomeric core and a covering of staple fibers comprising subjecting the staple fibers to a roving operation including twisting and winding, introducing the core so that it participates in said twisting and winding along with the staple fibers, then spinning the core and staple fibers including drafting, twisting and winding.

8. Method of making a yarn having an elastomeric core of continuous filament and a covering of staple fibers, the method comprising associating the core in an approximately unextended condition with a roving of the staple fibers to as to form a composite roving, twisting this roving and winding the twisted roving into a supply package, and subjecting the composite roving from the supply package to a drafting operation in which the core filament is extended and then to a twisting operation to form a yarn.

References Cited by the Examiner

UNITED STATES PATENTS

2,076,270	4/1937	Harris	57—163
2,210,884	8/1940	Chittenden et al.	57—163
2,263,612	11/1941	Chittenden	57—163
2,902,820	9/1959	Bronson et al.	57—163
3,164,951	1/1965	Donaldson et al.	57—160

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Notice of Adverse Decision in Interference

In Interference No. 95,953 involving Patent No. 3,257,793, S. L. Abbott, MAKING CORE YARN, final judgment adverse to the patentee was rendered May 10, 1968, as to claims 1, 4, 5, 6, 7 and 8.

[*Official Gazette August 20, 1968.*]