May 12, 1936. N. LEWIS ET AL 2,040,518

YARN AND METHOD OF MAKING THE SAME

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Fig. 1

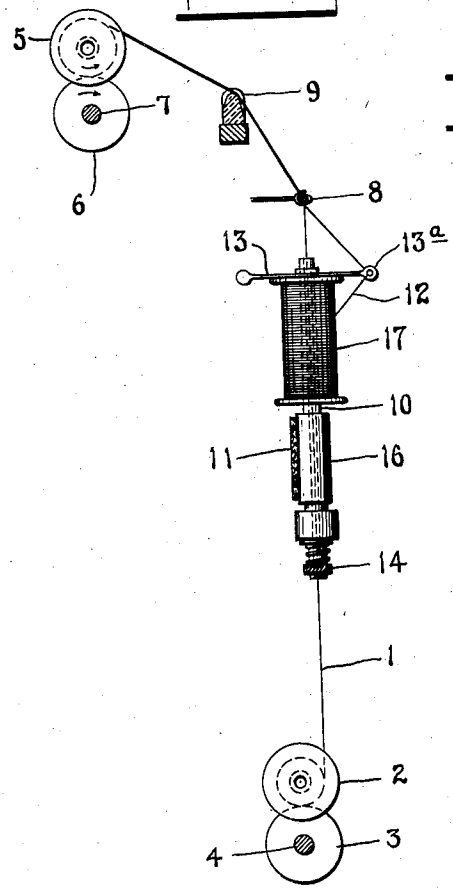


Fig. 2

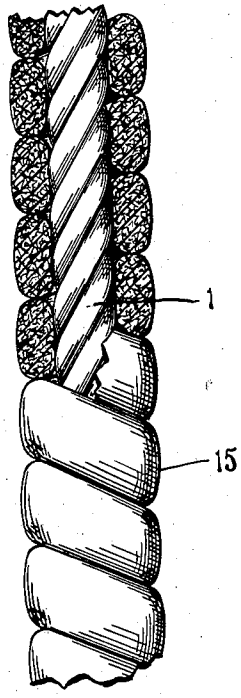
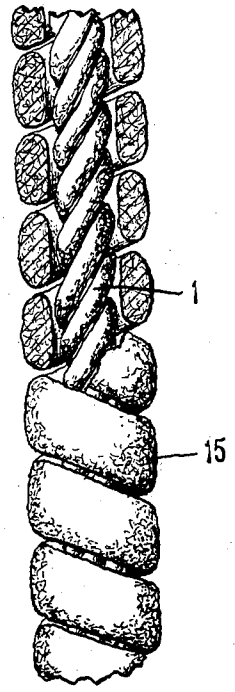


Fig. 3



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YARN AND METHOD OF MAKING THE SAME

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9 Claims. (Cl. 117—34)

This invention relates to an improved type of yarn suitable for use in the manufacture of various kinds of knitted and woven fabrics and also to the method of making said yarn.

The principal object of the invention is to provide a yarn which is so twisted and formed that it will not only possess extraordinary strength and durability, but also an elastic characteristic that will impart to a fabric, knitted or woven therefrom, an elastic quality which will permit said fabric to have considerable stretch or yield in all directions.

Another object of the invention is to provide a yarn having a considerable degree of elasticity or stretch, and which is formed by combining together in a predetermined twisted manner, a previously highly twisted yarn and a loosely twisted yarn.

A further object of the invention is to provide an elastic yarn, which is adaptable for use in all types of knitting and weaving machines, and which is formed by twisting together a previously highly twisted yarn, and a previously loosely twisted yarn, in such a manner that the highly twisted yarn constitutes a core in said elastic yarn and the loosely twisted yarn forms a covering for said core.

A further object of the invention is to provide a method of making said yarn which is simple to carry out and which may be performed by utilizing standard well known winding and twisting means and apparatus.

Further objects of the invention will appear more fully hereinafter.

The nature of the invention, and the construction of the elastic yarn, and the method of making the same, will be made clear from the following description and the drawing.

Referring to the drawing:

Fig. 1 is a diagrammatic view, in elevation showing the arrangement of suitable apparatus that may be employed for producing the elastic yarn and for carrying out our method of combining the highly twisted yarn with the loosely twisted yarn in the particular manner contemplated by our invention.

Fig. 2 is a greatly enlarged view, partly in section, of a portion of the yarn made in accordance with our invention and showing the appearance of the yarn as it comes from the twisting apparatus.

Fig. 3 is a greatly enlarged view, partly in section, showing the yarn made in accordance with our invention, after it has been subjected to a degumming process.

In carrying out the objects of our invention, we intend combining and twisting together in a certain manner to be hereinafter explained, a yarn which has previously been provided with a high twist, and a yarn that has been provided with a loose twist. For the highly twisted yarn we propose to use any of the well known yarns of that type such for instance, as a grenadine, organzine or a crepe yarn, or any other yarn that has been twisted sufficiently hard enough to give the elasticity contemplated in the finished product. For the loosely twisted yarn, any usual type of silk tram such for instance as a silk hosiery yarn having a small number of twists may be employed.

As is well known, high twisted yarns have certain characteristics which make them highly useful in the manufacture of knitted and woven fabrics. One of the important features of this type of yarn is that it has an extreme elasticity and will insure a desirable stretching and yielding quality to a fabric when it is used in the making of the same. The yarn also, due to the manner in which it is twisted, is exceedingly strong and durable and provides a fabric with superior wearing qualities. However, in most all of the highly twisted yarns there is an inherent tendency of the yarn to buckle up or kink and this causes considerable difficulty when it is desired to use the same in knitting and weaving machines of certain types. In the present invention we make use of all of the desirable features of strength, durability and elasticity existing in highly twisted yarn and at the same time produce a type of yarn that will not buckle or kink and which may readily be used in all types of knitting and weaving machines.

The manner in which the highly twisted yarn and the loosely twisted yarn are combined and twisted together is indicated in Fig. 1 of the drawing.

The highly twisted yarn indicated at 1 is wound on a spool 2 which is rotatively mounted in any suitable manner in the yarn twisting machine and so that said yarn can be unreeled from said spool. A too free rotative movement to spool 2 is prevented by means of a friction wheel 3 mounted on a shaft 4.

The highly twisted yarn is adapted to be unwound from spool 2 and around the spool 5. The spool 5 is driven in any suitable manner such as by a friction roller 6 fixedly secured to a shaft 7 which is rotated by suitable operating mechanism of the machine. The highly twisted yarn as it is caused to be unwound from spool 2 is

directed up through a hollow spindle 10 and thence through a guiding eyelet 8, and over the guide 9 to spool 5. Due to the frictional retarding action imparted to the spool 2 by the friction wheel 3, the highly twisted yarn is held under a slight tension as it is being wound on spool 5.

The hollow spindle 10 is suitably and rotatively mounted in the usual spindle rail 14 of the machine and carries bobbin 17 upon which is wound the loosely twisted yarn 12. The whirl 16 of the spindle presses against a continuous and longitudinally moving belt 11 by which the whirl and spindle is caused to be revolved.

Fixedly secured to spindle 10 and rotating therewith is a flyer-arm 13. Said flyer-arm is provided with an eyelet 13a through which the loosely twisted yarn on the bobbin 17 is adapted to be threaded. The yarn 12 is also directed up through the guiding eyelet 8, and thence over the guide 9 towards the spool 5.

It will be seen from the above description of the arrangement of the two yarns and the mechanisms of the yarn twisting apparatus that when the machine is operated, the spool 5 will be rotated so as to cause the highly twisted yarn 1 to be unwound from the spool 2 and to be wound thereon.

The yarn 1, as it is being wound on spool 5, is held under a slight tension by means of the friction wheel 3 engaging with the spool 2, as it passes upward through the hollow spindle 10 and the guiding means 8 and 9. Also the rotative movement imparted to the spindle 10 by the engagement of the friction belt 11 with the whirl 16 causes the whirl member 13 to unwind the yarn 12 from the bobbin 17 and to whip it around the highly twisted yarn in a continuous helical winding 15 (Fig. 2) as it emerges from the upper end of the hollow spindle. There is therefore produced a yarn construction or formation such as shown in Figure 2 of the drawing, wherein the highly twisted yarn 1 provides a core for the completed yarn and the loosely twisted yarn forms a helically wound cover for the core.

It is an important feature of the method of producing this yarn that the helical windings of the covering yarn be applied to the highly twisted core yarn in a direction opposite to the direction of the twists already present in the highly twisted yarn. For instance, if the twists of the highly twisted core yarn have been produced in a clockwise direction, then the helical windings of the covering yarn should be applied in a counter clockwise direction. This method of applying the covering yarn is necessary for the purpose of balancing the twist of the core yarn and to produce a finished yarn that will not kink or buckle up.

It is to be understood also that the highly twisted yarn and the loosely twisted yarn are combined and twisted together, in the manner above described, before the gum holding the fibres of the silk together in either of said yarns has been removed. In Figure 2 the completed yarn is shown before a degumming of the yarn has been performed. It will be noted that with the yarn in such condition, that the helical windings 15 of the outer covering yarn lie quite closely together, and closely contacting with the surface of the twisted inner core yarn. Also the twists of the strands of the inner core yarn are in close contacting relation with each other.

After the yarn made in accordance with our invention has been completely formed as shown in Figure 2, it is then subjected to the usual degumming process and is then ready to be coned up for use in knitting or weaving operations on the usual types of knitting and weaving machines.

It will be observed by reference to the structure of the yarn as shown in Figure 3, which is a greatly enlarged view of a portion of the yarn after it has been degummed, that when the gum is removed, the windings of the outer covering yarn will be left separated slightly from each other and said covering yarn will present a sliding or yieldable helical spring cover over the core yarn. Also the twisted turns of the core yarn will be slightly separated from each other and from the inner surfaces of the helical windings of the outer covering yarn. This will result in having an inner core yarn possessed of a considerable stretch or elasticity and which has a sliding engagement within the covering yarn. The inner core yarn however, even though it has a high degree of elasticity and give is prevented from kinking or buckling because of the manner in which it is surrounded by the covering yarn.

The yarn of our invention due to its particular structure has many desirable characteristics which makes it exceedingly useful in connection with the manufacture of knitted and woven fabrics. The yarn will have remarkable strength and durability because it is formed with a core of a hard twisted yarn reinforced by an outer covering of another yarn helically wound around the same. The yarn will also be provided with an extreme degree of elasticity and the manner in which the helical cover windings are applied to the core yarn will prevent the yarn from knitting or buckling up. Furthermore the yarn due to its manner of construction makes it possible to produce knitted articles, such as hosiery, wherein the fabric will be reinforced against snags or tears and the possibility of starting a run in the looped fabric will be greatly lessened. Also, a fabric knitted or woven from the yarn will be smooth and will not have a flaky appearance due to kinking up of the yarn after the twist is released such as occurs when ordinary crepe yarn is used. In addition to the above advantages derived from the use of the yarn in manufacturing knitted and woven fabrics, a fabric made from the same will always retain its elasticity even after frequent washings and continuous wear. Furthermore, yarns produced in accordance with the method described herein can be made of a very fine gauge and can be employed in the manufacture of various types of fine gauge knitted fabrics.

Having thus described our invention, what we claim and desire to protect by Letters Patent is:

1. A method of making a yarn which consists in winding a loosely twisted yarn around a highly twisted yarn in a continuous helical winding so as to completely encase the same and then degumming the combined yarns.

2. A method of making an elastic yarn which consists of feeding a highly twisted yarn, which has not been degummed, to a winding spool and during said feeding movement holding said yarn under tension, and applying around said yarn in a continuous helical winding a loosely twisted yarn which also has not been degummed, and then causing said combined yarns to be degummed.

3. A yarn having a core of an elastic highly twisted yarn and a covering consisting of a loosely twisted relatively inelastic yarn applied around the core yarn in a continuous helical winding and

in an opposite direction to the twists in the core yarn and so that the windings will be positioned closely adjacent to each other and provide a sliding cover over the surface of the core yarn.

4. A yarn consisting of a core comprised of a highly twisted yarn and a cover comprised of a loosely twisted yarn wound around the core yarn in a continuous helical winding and so that said windings are closely adjacent to each other and form a complete cover for the core yarn which slidingly engages over the surface thereof.

5. A method of making an elastic yarn which consists in winding a loosely twisted yarn around a highly twisted yarn as it is held under a slight tension so that the highly twisted yarn will constitute a core and the loosely twisted yarn will constitute a continuous helically wound covering, the windings of which completely encase the core and have a sliding contact over the surface of the yarn comprising said core.

6. A method of making an elastic yarn which consists in winding a loosely twisted yarn around a highly twisted yarn so that the highly twisted yarn will constitute a core and the loosely twisted yarn will constitute a continuous helically wound covering which completely encases the core with the windings thereof lying closely adjacent to each other and slidingly contacting with the surface of the core yarn.

7. A method of making a yarn which consists in winding a loosely twisted yarn which has not been degummed around a highly twisted yarn that has not been degummed so that the highly twisted yarn will constitute a core and the loosely twisted yarn will constitute a continuous helically wound covering with its windings lying closely adjacent to each other and completely covering the core yarn, and then causing said combined yarns to be degummed.

8. A method of making a yarn which consists in winding a loosely twisted yarn which has not been degummed around a highly twisted yarn which also has not been degummed in such a manner that the original twists in the loosely twisted yarn are substantially retained and the original twists in the highly twisted yarn are not interfered with and so that the windings of the loosely twisted yarn will completely cover the highly twisted yarn, and then degumming the combined yarns.

9. A method of making a yarn which consists in winding a loosely twisted yarn around a highly twisted yarn in such a manner that the original twists in the loosely twisted yarn are substantially retained and the original twists in the highly twisted yarn are not interfered with and so that the windings of the loosely twisted yarn completely encase and cover the highly twisted yarn and have a sliding contact thereover.

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