A process for preparing fancy yarns utilizing a false twist assembly comprising feeding one yarn at a rate in excess with reference to a second yarn and subsequently contacting both of said yarns with a reciprocating frictional force. An apparatus comprising a false friction twist assembly associated with a movable means having a passage for the yarns to be treated is also disclosed.

10 Claims, 6 Drawing Figures
FIG. 1

FIG. 2

INVENTOR
PIERRE SEGUIN

BY
SHERMAN & SULLIVAN
ATTORNEYS
METHOD AND APPARATUS FOR USE IN THE PRODUCTION OF FANCY YARNS

The instant invention is directed to a new process and apparatus for use in the manufacture of fancy yarns. In particular the instant invention is directed to the manufacture of fancy yarns by a technique which employs the use of an apparatus which is suitable for creating a false twist on the combined fancy yarn structure by means of frictional forces.

As noted, the instant invention is particularly directed to the production of fancy yarns which yarns may contain protuberances, nubs, tags, loops and the like. It is noted that mechanical processes have been known which were useful for the production of such yarns. Such processes have in the past consisted of forming protuberances by means of wrapping an effect yarn around one or more core yarns. Subsequent thereto, a so-called binding yarn was associated with the above noted effect yarn-core yarn, intermediate assembly so as to prevent the slipping of said protuberances on the core yarn. A still further process and one which presented numerous advantages over the foregoing, inasmuch as it was continuous in nature, consisted in drawing a core yarn down from a spool maintained in a location above the preparation surface to the intake of a lapping element which bore the effect yarn and subsequently wrapping a binding yarn at the passage into a second lapping element and finally winding off the thus produced fancy yarn. By means of the foregoing process, the core yarn and the effect yarn were joined by means of a cylindroconical needle disposed in the longitudinal axis of the first lapping element subsequent to the winding of the effect yarn around said core yarn as discussed above. It is noted, however, that even this improved, continuous process has not been found to be perfectly suited for the manufacture of such fancy yarns, especially in light of the fact that the equipment employed in connection therewith is extremely heavy and further may only be utilized at relatively slow speeds thus negating the economic advantages of a continuous process.

As a result of the foregoing processes, numerous other such processes have been developed for the manufacture of fancy yarns. One of such processes involves the passage of a roving of fibers and a core constituted by a thread through the nip of a pair or rollers, i.e., in a drawing train. The product which resulted was then continuously twisted, and a yarn with a swelling core was produced. While such a fancy yarn is of interest, the applications suitable therefor were exceedingly limited, thus negating the advantages of this process. Furthermore, fancy yarns have been manufactured utilizing false twist assemblies. In a process of this type a core yarn is contacted with an effect yarn which is fed at a rate in excess with reference to the core yarn. According to such process, a yarn is bound with a binding yarn at the moment of the tightening of the false twist imparted by the use of the false twist assembly. Such a process allows for the utilization of a much simpler apparatus and therefore has been of great interest to the industry, inasmuch as the speeds of reproduction which are useful in connection therewith are much higher than those previously employed in connection with any other conventional device. It is noted, however, that while the speed useful in connection with this apparatus is greater than that previously known, it is still relatively low, of the order of 5 to 10 meters per minute, thus once again negating the economic advantages of utilizing such a process.

Therefore, it is an object of the instant invention to provide a process for the preparation of fancy yarn. Another object of the instant invention is to provide an apparatus useful in the preparation of fancy yarns.

Yet a further object of the instant invention is to provide a process for preparing a fancy yarn, which process utilizes a false twist assembly, which assembly provides said false twist by means of friction.

A still further object of the instant invention is to provide a device useful in the production of fancy yarns, which device comprises a false twist means which produces said false twist by means of friction.

These and other objects of the instant invention will become more evident from the following more detailed disclosure thereof.

As noted, the instant invention is directed to a new manufacturing process for the production of fancy yarns and a device for use in connection therewith, which process consists of assembling by means of a false twist at least two yarns, threads or rovings, at least one of which, called the effect yarn, is fed at a rate in excess with reference to the rate of said other yarn. The instant process is further characterized in that said yarns, threads or rovings are ultimately assembled by means of a frictionally induced false twist.

In connection with the instant invention, the effect yarn or yarns are fed at a rate which is in excess of the rate at which the core yarn is fed. This excess rate may be characterized as being either regular, wherein the rate is uniform, or irregular, wherein the rate is varied. The degree of excess of the rate of the effect yarn fed may be varied as well as the rate of the core yarn fed according to the operational requirements of the individual apparatus employed, with particular concern being given to the ultimate effect which is desired. One or more of the yarns, threads or rovings employed, either separately or as a composite effect yarn, may undergo a thermal fixing treatment. In this connection, it is also noted that it is preferred to have the core yarn and the effect yarn fed in different directions with the angle which they enclose being preferably from about 30° to about 90°. It is also preferred to have at least one of said yarns, i.e., effect yarns or core yarns, undergo a substantial change of direction upon contact with the friction surface or surfaces which is utilized to induce the false twist. Such change of direction should preferably comprise an angle of at least 180° according to this embodiment of the instant invention.

As is readily apparent, there may be numerous variations of the instant process, which variations are considered a part hereof. According to one of said variations, a fancy yarn is manufactured on a false twist assembly wherein the false twist is induced by means of friction on at least two yarns, threads or rovings. This particular embodiment is characterized in that the frictional element utilized to induce the false twist is located at the point of assembly of said yarns, threads, or rovings, one of which serves as a core and the other of which serves as an effect yarn. According to a still further embodiment of the instant invention, the point of assembly of said yarns is disposed upstream of the
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point or points of contact with said frictional element or elements.
As previously noted, the instant invention is useful in connection with yarns threads or rovings which are comprised of either natural, artificial, synthetic or mineral materials, all of which are useful in connection herewith. Such threads, yarns, or rovings may, according to the instant invention be passed either directly to the assembly point or prior thereto through a friction ring. It is noted that either the core or the effect yarn or both may be passed through such a friction ring prior to being guided to said assembly point. Preferably, however, all of said yarns, threads or rovings are passed through such a friction ring.

According to a still further embodiment of the instant invention, the point of junction of the effect and core yarns constantly moves upstream of the friction surface. Such movement may be either random or controlled according to the desired ultimate effect yarn product. As a result of the movement of said point of junction of said yarns, an alternated twist is obtained therein. It is also noted in connection with this embodiment and each of the others set forth herein that one or more of the yarns, threads or roving utilized in connection with the effect yarn of the instant invention may be passed either interior or exterior of the tube of the frictional false twist means, and further if said yarns are passed exterior of said means, they may be fed in an excess thereto.

According to the simplest embodiment of the instant invention, only two yarns are employed in connection therewith. One of said yarns is fed at a rate in excess with reference to the other of said yarns, with at least one of said yarns passing through the hollow axis of the false twist spindle. The above process may be utilized in connection with a device which comprises a friction element such as a belt and the like which is in constant motion. It is noted, however, that the preferred false twist means comprises an apparatus having at least one annular friction surface rotating on itself about a fixed axis, said surface being disposed inside a tube and being driven by a known means such as a belt or the like. As a practical matter, the annular surface is constructed to be of a simple geometric shape such as, for example, toric and the like. The spindle utilized in connection therewith may be of any known type and may be constituted as a tube whose two ends are provided with a ring made of material having a hard coefficient of friction which serve as the friction surface to induce a false twist. Exemplary of such a material is a reinforced elastomer, fritted oxide, and the like.

The element utilized to deliver the yarns, threads or rovings may be constituted of any known means as are exemplified by delivery rollers.
In connection with the manufacture of fancy yarn utilizing an intermittent or irregular excess feed of the effect yarn with respect to at least one core yarn, one advantageously employs as a part of the apparatus utilized in connection herewith a friction element characterized in that it has a movable element for the passage of core and effect yarn which is freely slideable on a fixed element, said movable element being driven in a reciprocating motion and in which movable element the core and effect yarns are assembled upstream of the friction element previously described. It is noted that the reciprocating motion of said movable element may be imparted by means of a device constituted by a metallic blade which is oscillated by an electromagnet. The movable element constituted, for example, by a sliding ring that falls on the blade as a result of gravity and its own weight is projected by said blade to a distance that is a function of the amplitude of the oscillation of said blade as a result of the effect thereon by said electromagnet. It is also noted that the reciprocating motion of said movable element may also be imparted by means such as a fluid jet utilizing a jet of compressed air therein, which compressed air is dispensed intermittently. It is also noted that equivalent devices may be utilized to accomplish the same function. For example, the sliding rings may be made integral with a guide, which guide is driven in a reciprocating motion and the like.

The instant invention will now be described with reference to the attached drawings. It is to be noted, however, that the instant invention is not deemed as being limited thereto.

FIG. 1 represents a diagram of the device of the instant invention in which the association of the core and effect yarns is accomplished substantially on a frictional element with the core yarn only being fed through the spindle thereof.

FIG. 2 is a diagram of that embodiment of the instant invention in which the core and effect yarns are both fed through the spindle of the frictional element.

FIG. 3 is an illustration of the embodiment of the invention wherein the fancy effect is produced by simple random distribution of the effect yarn upstream of the spindle.

FIG. 4 represents a further modification of the device utilized in connection with the instant invention wherein a yarn is fed through the spindle and contacted twice by the frictional element.

FIG. 5 is an illustration of that embodiment of the instant invention wherein associated with the false twist spindle means there is a ring which is freely movable on a fixed element, which ring is propelled by means of a metallic blade which is driven by an electromagnet.

FIG. 6 of the drawings shows a further modification of FIG. 5 wherein the sliding ring is moved by means of an air jet.

According to the device illustrated in FIG. 1, a core yarn 1 is taken from spool 2 and passed over a pin 3. The core yarn then passes through shaft 4 of a false twist friction spindle 5 which spindle has a friction ring 6 thereon on which the core yarn is associated with the effect yarn 7, which effect yarn is delivered thereto by means of rollers 8 and 9. As a result of the contact with the frictional ring 6, a fancy yarn product 10 is taken off by a winding device not shown.

According to a device shown in FIG. 2 of the drawings, a core yarn 11 is taken from spool 12 and passed through positively driven train rollers 13 and 14 where it is associated with roving 15, which roving is delivered by means of rollers 16 and 17 at a linear speed which is below that of rollers 13 and 14 in order to break said rovings. The intermediate yarn 18 which results is passed through spindle 19 where it undergoes a false twist as a result of the frictional contact of friction ring 20 which is borne by said spindle 19. The contact with said friction ring is improved by drawing the
product 18 in a direction which cuts the direction of passage of said spindle so as to maximize the contact of said friction ring 20 with said yarn product 18.

According to FIG. 3 of the drawings, a core yarn 21 is continuously drawn from spool 22 and passed through a tensioning device 23. The yarn is then directed to friction ring 24 which is mounted on spindle 25. An effect yarn 26 is continually withdrawn from spool 27, passed over pin 28 and distributed at random on core yarn 21 between said tensioning device 23 and said friction ring 24. As a result of the contact of said effect yarn, a fancy yarn product 29 is produced.

According to FIG. 4, which is an improvement on the apparatus disclosed in FIG. 3, the intermediate yarn 31 is fed into the shaft of spindle 32 at an angle cutting the angle of the passage of said spindle with the yarn being removed therefrom at a still different angle so as to maximize the contact of said intermediate yarn 31 with the frictional ring of said spindle 32.

FIG. 5 of the drawings illustrates that embodiment of the instant invention wherein the random distribution of the effect yarn on the core yarn is controlled by means of a ring through which said core yarn and effect yarn pass. In the drawing, the random distribution of the effect yarn is controlled by means of ring 40 through which a core yarn 42 and the effect yarn 41 both pass. Ring 40 slides along a piano wire 43 and is subject to a reciprocating motion along said piano wire by virtue of impulses induced from a blade 44 which is driven by an electromagnet 45. The yarn passes over the same path as is disclosed in connection with FIG. 4 and passes through spindle 46 which contains two friction rings 47 and 48.

According to FIG. 6, which is another embodiment of the apparatus disclosed in FIG. 5, ring 40 slides along piano wire 43 in a tube 49 and is propelled therein by virtue of a jet of compressed air which is introduced into said tube 49 by means of connection 50. The tube 49 is provided with a photoelectric cell 51 which controls the duration of the air jet. That is to say that photoelectric cell 51 emits a signal when ring 40 passes beneath same so as to control the short jet of air entering through connection 50 by virtue of the signal which is emitted. Said signal controls an electric valve 52 connected to connection 50 for said air.

The instant invention will now be illustrated by the following more detailed examples thereof. It is to be noted, however, that the instant invention is not deemed as being limited thereto.

**EXAMPLE 1**

Utilizing the device disclosed in FIG. 1 of the instant application, a core yarn of polyhexamethylene adipamide (polyamide 6.6), 165 dtex/46 strands, is removed from a spool and passed over a pin through the shaft of a false twist friction spindle having the friction ring thereof driven at 15,000 rpm. The core yarn is associated on the friction ring with an effect yarn comprising a polyethylene terephthalate, 72 dtex/33 strands, which is delivered by a set of rollers at 280 meters per minute. As a result a fancy yarn having a continuous effect is obtained, which fancy yarn is wound off at a rate of 80 meters/minute.

**EXAMPLE 2**

Utilizing the device as illustrated in FIG. 2 of the drawings, a core yarn of polyhexamethylene adipamide (polyamide 6.6), 165 dtex/46 strands, is taken from a spool and passed through a train of positively driven rollers at a linear speed of 60 meters per minute, where it is associated with a roving of polyacrylic fibers Nm = 2, with a cut length equal to 60 millimeters and delivered to a set of rollers driven at a speed below that of said positively driven rollers, i.e., 40 meters per minute, in order to break said rovings. The intermediate yarn which results is then passed through the spindle where it undergoes the effect of friction by virtue of said false twist means wherein the friction ring is turning at 12,000 rpm. Subsequent to contact with said friction ring, the yarn product is drawn off at the rate of 60 meters per minute in a direction which cuts the direction of the passage of said spindle so as to maximize the contact with said friction ring. The yarn which resulted had a large spaced pattern.

**EXAMPLE 3**

Utilizing the device in FIG. 3, a core yarn of polyhexamethylene adipamide (polyamide 6.6), 233 dtex/34 strands, is drawn continuously from a spool and passed through a tensioning device. The yarn is then directed to a friction ring which is driven at 15,000 rpm. The effect yarn comprising a cellulose acetate yarn 110 dtex/24 strands, initial S twist of 150 turns/meter, is taken from a second spool, passed over a pin and distributed at random on said core yarn between the tensioning device and said friction ring. The effect yarn which resulted was taken off at a rate of 60 meters per minute. Then the ultimate yarn produced obtained a pattern of several centimeters long.

**EXAMPLE 4**

The procedure of Example 3 was repeated with the exception that the intermediate yarn was fed into the shaft of the spindle and removed therefrom at a direction which was distinctly different from the axis of said spindle so as to envelop the friction ring thoroughly. In this example the spindle was driven at 14,000 rpm, and the rate of windoff was 70 meters per minute. The yarn produced had a varied pattern thereon.

**EXAMPLE 5**

Utilizing the apparatus as disclosed in FIG. 5, a core yarn of polyethylene terephthalate, 144 dtex/44 strands, and an effect yarn of polyethylene terephthalate, 49 dtex/22 strands, were continuously drawn off spools at a rate of 120 meters per minute. The false twist friction ring was rotated at 12,000 rpm, and the blade had a pulse frequency of 30 pulses per minute. The beat amplitude was about 40 centimeters, and the yarn produced had a pattern of approximately 15 centimeters in length.

**EXAMPLE 6**

The procedure of Example 5 was repeated utilizing an air pulsed ring as disclosed in FIG. 6 in lieu of the magnetically pulsed ring as employed in the previous examples. As a result, a yarn having a pattern of approximately 15 centimeters was produced.
As will readily be apparent from the foregoing, the instant invention is highly flexible and uniquely suited for industrial use in light of its mechanical simplicity. Furthermore, it is noted that it is not necessary to fix the ultimately obtained fancy yarn product so as to maintain the pattern therein prior to subsequent treatment thereof.

What is claimed is:

1. A process for the manufacture of a fancy yarn comprising at least two yarns, threads or rovings which comprises feeding first and second yarns, said first yarn being fed at a rate in excess with reference to said second yarn, joining said first and second yarns, and contacting both of said first and second yarns with a reciprocating frictional force, said reciprocating frictional force being created by a frictional false twist means which rotates about its own axis.

2. The process of claim 1 wherein one of said first and second yarns is fed at an irregular rate in excess with reference to said second yarn.

3. The process of claim 1 wherein at least one of said first and second yarns is fed in a direction different from the yarn wherein the angle described by said first and second yarns is from about 30° to 90°.

4. The process of claim 1 wherein the point of junction of said first and second yarns is movable upstream of said frictional false twist means.

5. The process of claim 1 wherein said yarns are joined on said frictional false twist means.

6. The process of claim 1 wherein said yarns are joined above said frictional false twist means.

7. An apparatus for the manufacture of fancy yarns comprising: a frictional false twist means, means for guiding at least one yarn of a core yarn and effect yarn assembly to said frictional false twist means, said guide means being freely slidable on a fixed element, and means for sliding said guide means in a reciprocating motion on said fixed element.

8. The apparatus of claim 7 wherein said means for sliding said guide means in a reciprocating motion is an electromagnet on a metallic blade.

9. The apparatus of claim 7 wherein said means for sliding and guide means in a reciprocating motion is an intermittent fluid jet.

10. The apparatus of claim 7 wherein said frictional false twist means comprises a hollow element having at least one annular friction surface.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,685,268 Dated August 22, 1972

Inventor(s) PIERRE SEGUIN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Heading Portion preceding the Abstract of the Disclosure insert the following:

--Priority: French Patent Application PV 69/14881
Filed May 12, 1969 --

Signed and sealed this 13th day of February 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR. ROBERT GOTTSCHALK
Attesting Officer Commissioner of Patents