

June 11, 1963

E. B. BLACKSTOCK

3,092,953

METHOD AND APPARATUS FOR FORMING YARN

Filed Aug. 1, 1960

6 Sheets-Sheet 1

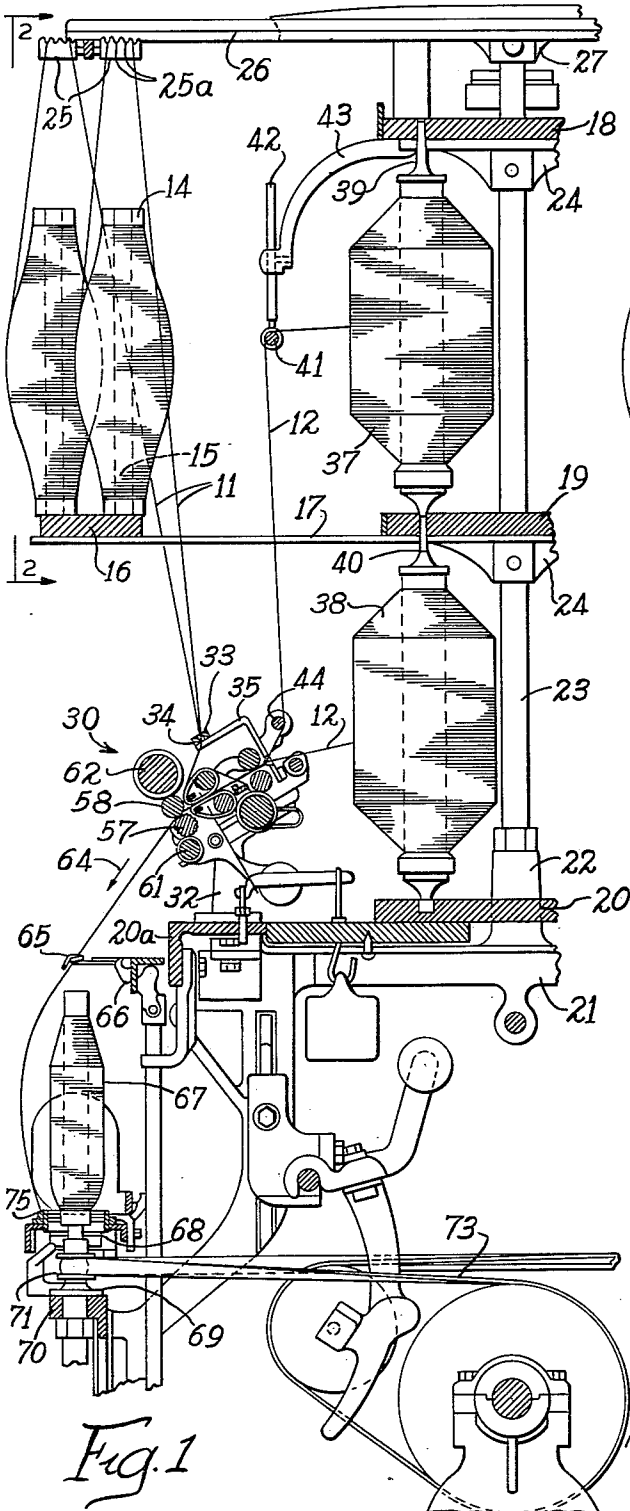


Fig. 1

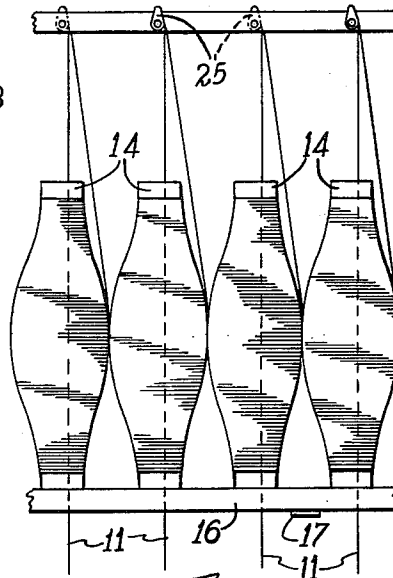


Fig. 2

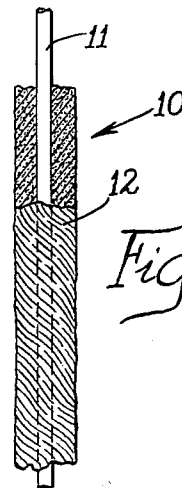


Fig. 3

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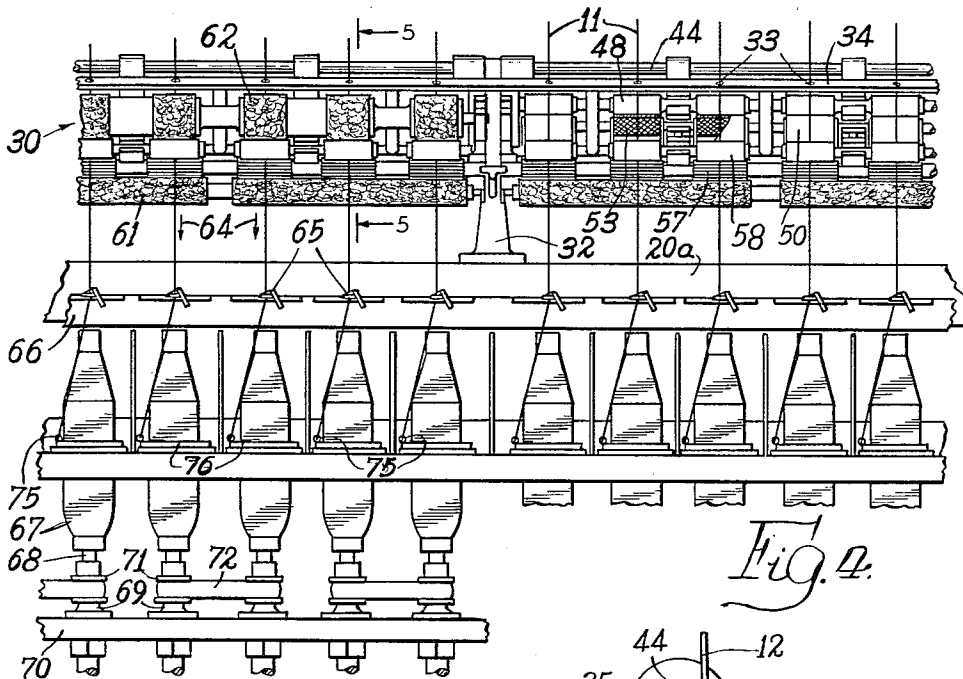


Fig. 4.

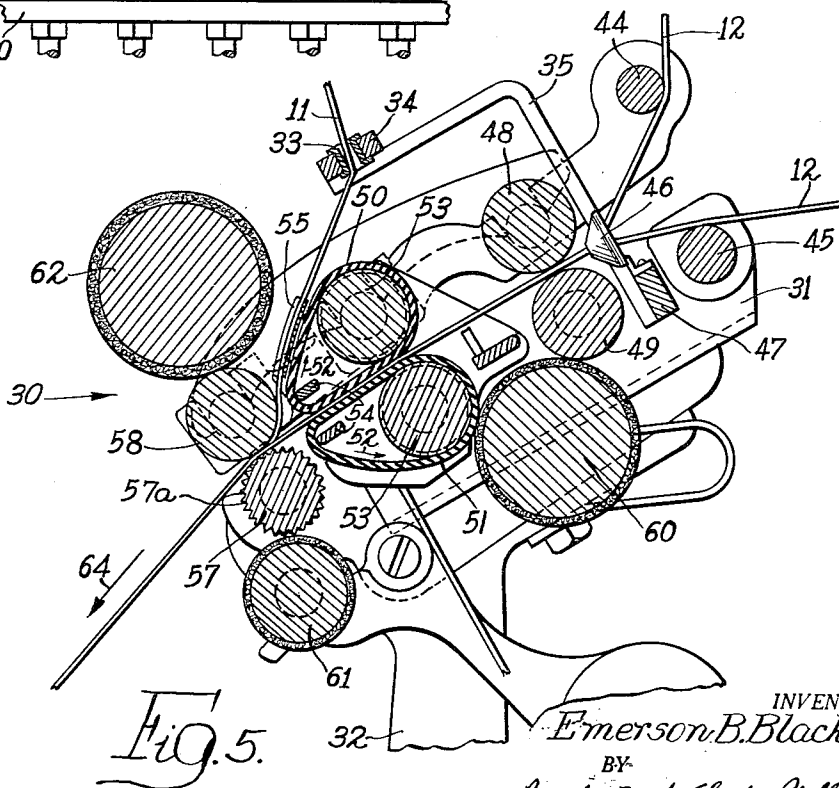


Fig. 5.

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Fig. 6

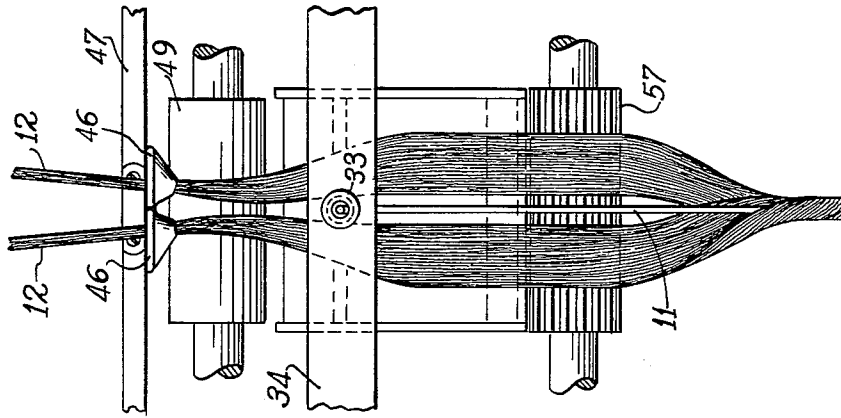


Fig. 7

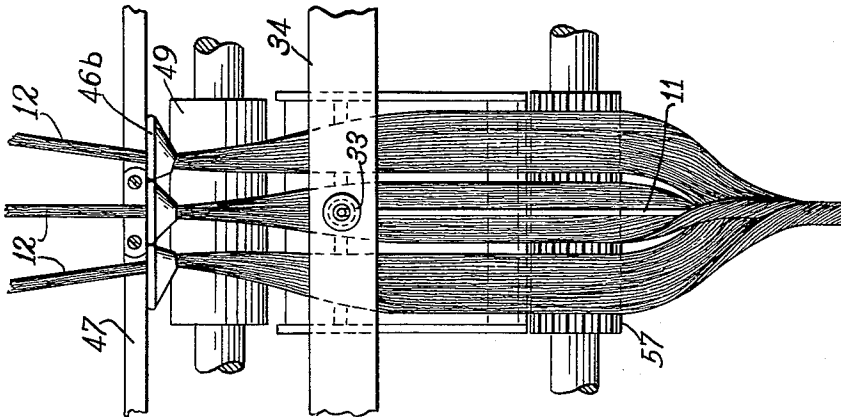
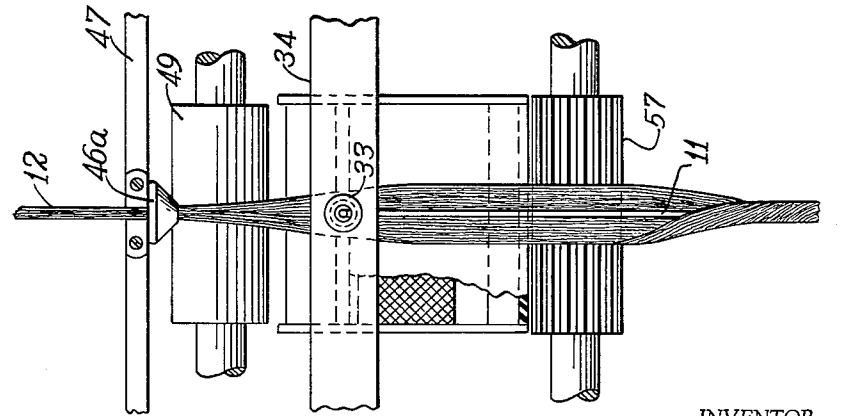


Fig. 8



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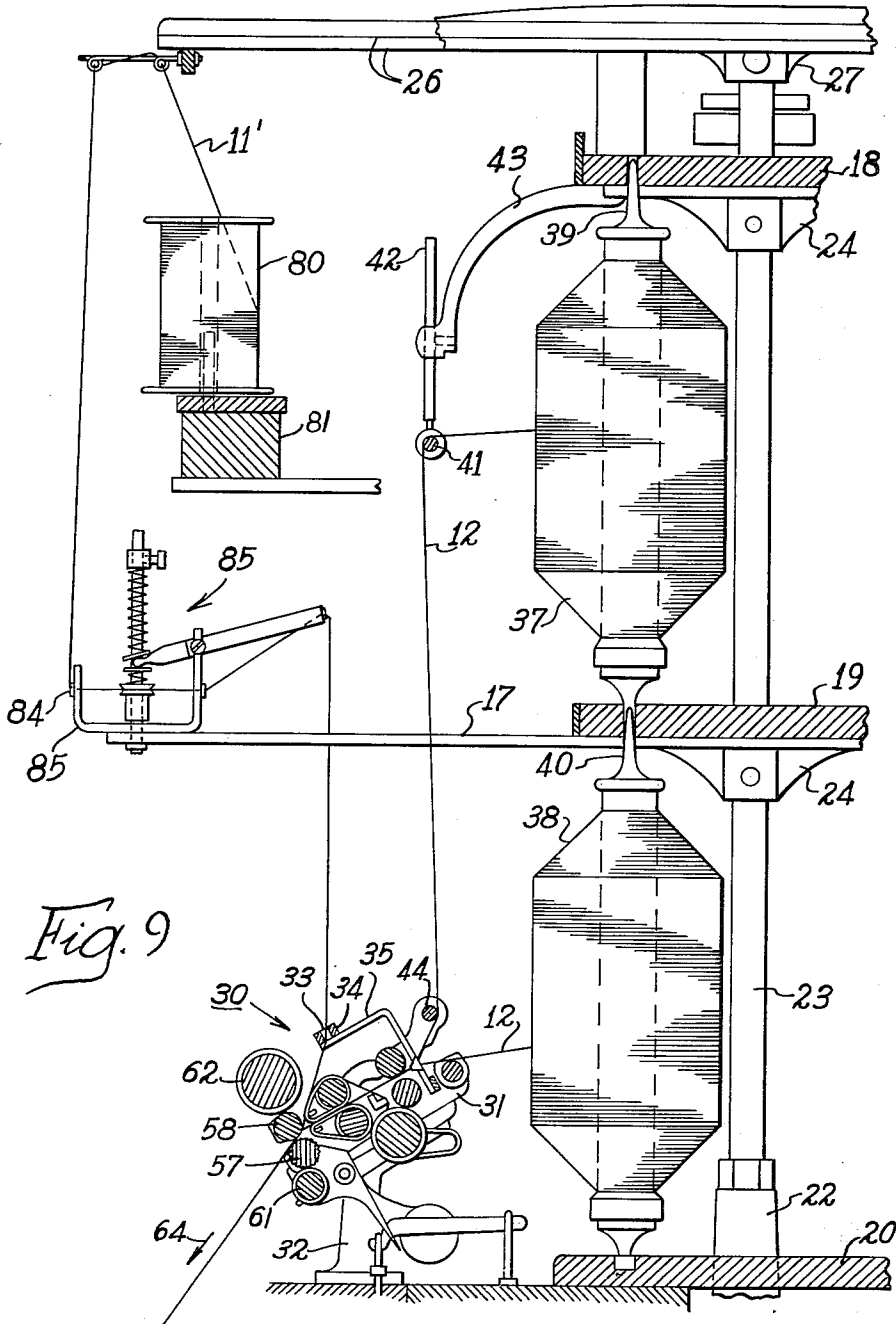


Fig. 9

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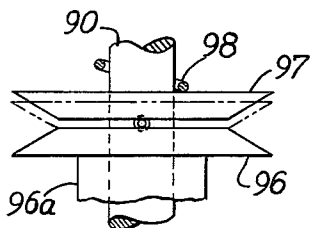
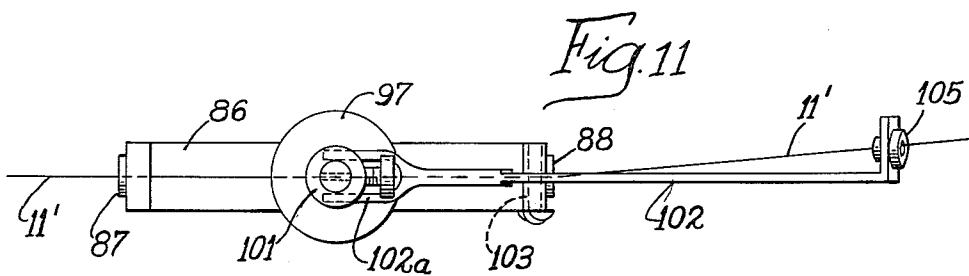
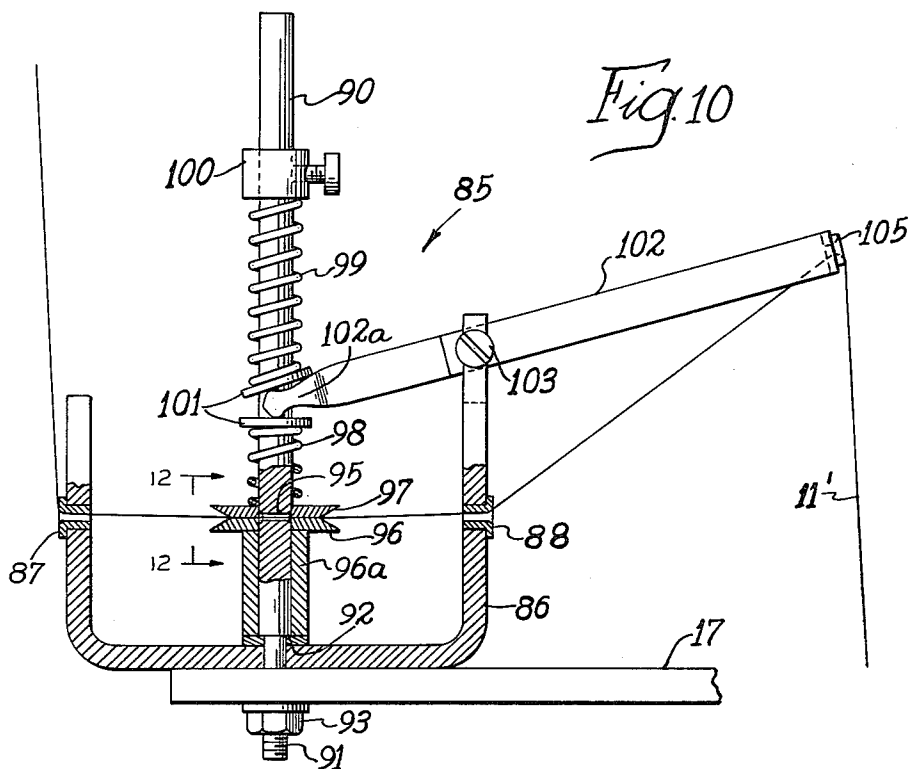


Fig. 12

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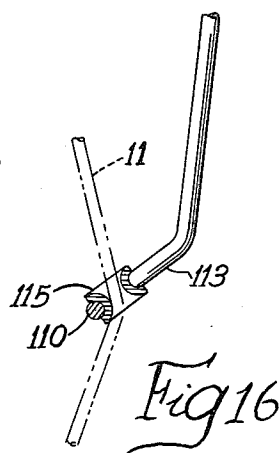
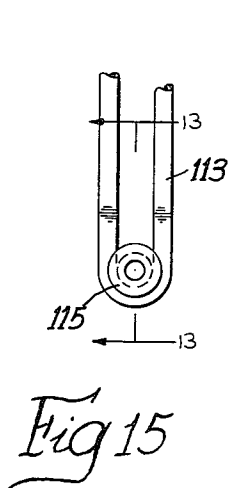
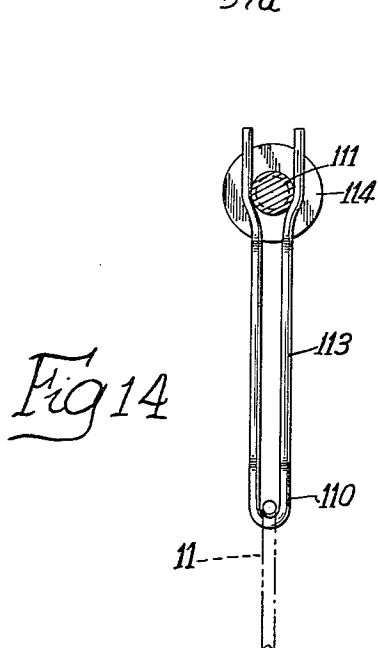
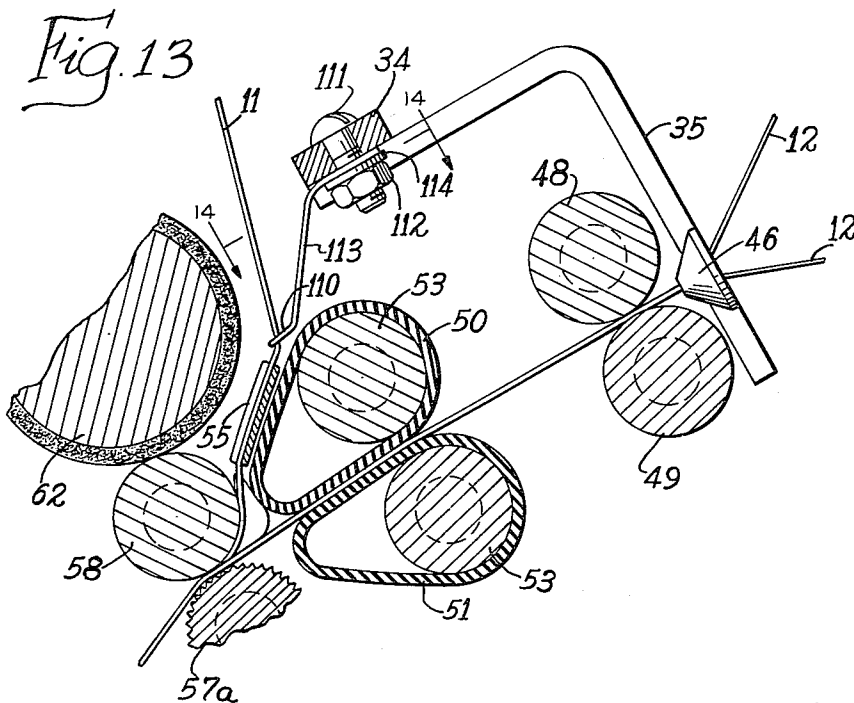
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METHOD AND APPARATUS FOR FORMING YARN

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6 Sheets-Sheet 6



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METHOD AND APPARATUS FOR
FORMING YARN

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Filed Aug. 1, 1960, Ser. No. 46,641
17 Claims. (Cl. 57—36)

This invention relates to improvements in methods of and apparatus for forming yarns and the purpose of the invention is to provide a novel method and apparatus for producing a composite yarn made up of a continuous filament yarn, such as nylon or an elastomeric material, and a staple yarn, such as a cotton yarn, which are spun together to form a product having many advantages over other yarns heretofore known.

The present application is a continuation-in-part of my application Serial No. 572,998, filed March 21, 1956, entitled "Yarn and Method of and Apparatus for Forming Same," now abandoned.

The principal object of the invention is to provide improved methods and apparatus for producing yarn adapted for use in knitting and weaving various textile fabrics such as hosiery, sweaters and various woven fabrics. Another object of the invention is to provide a method and apparatus for producing a composite yarn made up of a center yarn having uniformly and tightly spun about it in helical fashion and under relatively high tension numerous fibers of a sheath yarn or roving. The center yarn may be of a material such as those known as nylon, Dacron, Orlon, Fortisan and the like, which have great tensile strength, or may comprise an elastomeric material, and may be a single filament or a multifilament yarn. The sheath or shell is formed from a multitude of fibers of a so-called staple yarn, such as cotton, wool, spun rayon and the like, which are moisture absorbent and pleasing to the touch.

This composite yarn has many advantages. It has greater strength and is more elastic than either of its components, is less abrasive than any continuous filament yarn so that there is less wear on knitting machines and weaving apparatus, is substantially uniform in diameter or gauge with substantial elimination of thick or thin spots or "slubs" (i.e., flattened portions of the yarn), causes less needle breakage in knitting operations and is adapted to keep its position in the yarn holder so that it is drawn out under uniform tension with a resulting uniformity in the appearance of the resulting product. The yarn produced by the present invention has the further advantage that it absorbs dye better and more uniformly than nylon so that there is no two-tone effect in the products woven therefrom. Fabrics woven from this improved yarn also bleach better than those formed of nylon alone, also, fabrics woven from this novel yarn absorb perspiration better than continuous filament and are more pleasing to the touch so that they are well adapted for the formation of undergarments. Articles formed from this improved yarn may be worn by persons who are allergic to nylon, Orlon and other man-made fibers. Due to the increased strength of the composite yarn of the present invention as compared with either a continuous filament yarn or a staple yarn, there is less interruption of knitting and weaving operations caused by yarn breakage so that the use of the improved yarn leads to substantial increases in production as compared with the former practice. Furthermore, garments and domestic and industrial fabrics manufactured of the yarn of the present invention retain their original shapes after laundering better than those made of many previous known yarns.

Other objects of the invention relate to various fea-

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tures of the novel means and method for producing the yarn, all of which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one example of the novel yarn and one form of apparatus, with certain variations, for producing it by the novel method are illustrated. In the drawings:

FIG. 1 shows a vertical section through a battery of yarn spinning units, illustrating in side elevation one form of apparatus which may be used in practicing the present invention;

FIG. 2 shows a front elevation of the upper portion of the apparatus illustrated in FIG. 1, the view being taken along the line 2—2 of FIG. 1;

FIG. 3 shows a greatly magnified elevation of a piece of yarn embodying the present invention and produced by the apparatus shown in FIGS. 1 and 2, with a part of the yarn shown in longitudinal axial section;

FIG. 4 shows a front elevation of the lower portion of the battery of yarn spinning units, of which one is shown in side elevation in FIG. 1;

FIG. 5 shows an enlarged vertical section taken on the line 5—5 of FIG. 4;

FIG. 6 is a schematic top plan view of that portion of the apparatus illustrated in FIG. 5, with most of the upper portions thereof removed to permit clarified illustration of the passage of the rovings and the center yarn through this apparatus and to show where the core yarn is deposited with respect to the two rovings;

FIGS. 7 and 8 are views similar to that of FIG. 6 but respectively illustrating the deposition of the core yarn when three strands of rovings, and when a single roving is used;

FIG. 9 is a view similar to FIG. 1 but omitting the lower portion of the apparatus and illustrating a different yarn tensioning mechanism in combination with the apparatus;

FIG. 10 is an enlarged view of yarn tensioning mechanism shown in FIG. 9, with a portion thereof cut away;

FIG. 11 is a top plan view of the apparatus of FIG. 10;

FIG. 12 is an enlarged partial view of the apparatus of FIG. 10 taken substantially along the line 12—12 thereof;

FIG. 13 is a view similar to FIG. 5 but illustrating an improved core yarn guide;

FIG. 14 is an enlarged view of the yarn guiding apparatus included in the apparatus of FIG. 13 and as viewed substantially along the line 14—14 thereof;

FIG. 15 is a partial view of the apparatus of FIG. 14 illustrating a different embodiment thereof; and,

FIG. 16 is a cross-sectional view taken along the line 13—13 of FIG. 15.

In the following specification the yarn produced by the present invention is described, for illustration, as being made up of a nylon or an elastomeric center and a surrounding sheath of spun cotton yarn, which are now the preferred combinations of yarns, but it will be understood that the yarn may include the use of other continuous filament or multiple filament yarns in forming the center or core and other staple yarns or rovings in forming the sheath. In FIG. 3 of the drawings, the yarn 10 of the present invention is illustrated on a magnified scale and is shown as comprising a central core formed of a nylon or elastomeric yarn 11 which is enclosed in a uniform sheath or shell of uniform thickness formed of numerous fibers of cotton yarns 12 spun thereon under relatively high tension and in helical fashion with adjacent convolutions in close constant with each other. The yarn 11 may be nylon yarn of 20, 30, 50, 70 or 100 denier, for example, and the cotton yarns of 6 to 30 count, for

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example. The cotton roving is spun tightly about the centrally disposed nylon or elastomeric yarn by a spinning operation which leaves the nylon yarn entirely and uniformly enclosed by the cotton throughout the entire length of the finished yarn.

The apparatus shown in FIGS. 1, 2, 4 and 5 is a ring spinning frame and modified and adapted to produce the composite yarn 10 by spinning two cotton rovings 12, for example, about a single nylon yarn 11. In a single unit of the apparatus a continuous filament nylon yarn 11 is withdrawn from a supply thereof in the form of a spool 14 mounted to revolve about a support or spindle 15 having its lower end fixed in a bar 16 which is carried by arms 17 extending forwardly from a shelf 19 which is one of three shelves 18, 19 and 20. The lower shelf 20 is mounted on a part of the frame structure 21 which is provided with bosses 22 in which are mounted upwardly extending rods 23. The upper shelves 18 and 19 are fixed on brackets 24 which are adjustably secured on the rods 23.

The nylon yarn 11 passes upwardly over a comb 25 which is secured on the forward portion of a horizontal plate 26 carried by brackets 27 mounted on the upper ends of the rods 23. The comb 25 has a series of upwardly extending teeth 25a and the yarn 11 is looped around one or more of these teeth so that a uniform desired frictional resistance is offered to the movement of the yarn in order to set up substantial and substantially uniform controlled predetermined tension in the yarn as it moves downwardly from the comb to the spinning mechanism 30.

That mechanism comprises a plurality of rolls and the like which are carried by a frame 31 supported by pedestals 32 extending upwardly from the forward extension 20a, of the shelf 20. As the tensioned yarn 11 approaches the mechanism 30 it passes through an eyelet 33 mounted in a bar 34 which is carried by angular brackets 35 fixed on a traversing rods 47 which will be explained more fully hereafter.

The eyelet 33 is preferably of a material such as that disclosed and claimed in Patent Number 2,369,266 entitled "Electrically Conductive Ceramic Thread Guide." Such material is sufficiently conductive that it prevents, and grounds out on the frame of the machine, any accumulation of a static charge on the filament 11. Various disadvantages of accumulated electric charge on yarns are well known in the art. In the present application there is an additional objection in that a substantial charge on the filament 11 makes it very difficult to place the filament 11 properly with respect to the rovings 12 and to retain in proper position. Accordingly, the use of vitrified yarn guides of resistivity on the order of 1 megohm per cubic centimeter or less in this application, particularly where a nylon center yarn is employed, constitutes a substantial inventive concept.

The two cotton strands 12 in the form of roving are withdrawn from a roving creel having spools 37 and 38 which revolve on spindles 39 and 40, respectively, having bearing sockets in the shelves 18, 19 and 20. The roving from the upper spool 37 passes over a round bar 41 carried by rods 42 which are adjustably mounted in brackets 43 extending forwardly from the shelf 18 and this roving then extends downwardly and around the underside of a round bar 44 fixed in the frame 31 as it enters the mechanism 30. The other cotton roving 12 extends forwardly from the spool 38 and over the top surface of another round bar 45 which is fixed in the frame 31.

Two cotton rovings for a single unit of the mechanism 30 converge from the bars 44 and 45 and pass together through a pair of cone-shaped eyelets or trumpets 46 (see FIG. 6) mounted on the above mentioned traversing rod 47. From these trumpets the rovings extend together side by side between two rollers 48 and 49 (FIG. 5) and thence forwardly and between two endless feed belts or aprons 50 and 51 which move in the direction

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of the arrows 52 and contact the rovings 12 on their upper and lower sides. The aprons 50 and 51 extend around rollers 53 having bearings in the frame 31 and also around bars 54 which are fixed in this frame. The rod 47 carrying the eyelet 33 and the trumpets 46 is preferably reciprocated slowly endwise by means not shown in order to distribute the wear on the aprons 50 and 51. As the cotton rovings 12 emerge from the endless aprons 50 and 51, they are joined by the nylon yarn 11 which passes downwardly through a guide 55 located above the upper apron 50 and then is directed or laid directly between the two cotton rovings 12 (see FIG. 6) which are subjected to a drawing operation as they pass through this apparatus 30. The two rovings and filament yarn then pass together over a power driven feed or drawing roll 57 which has bearings in the frame 31 and is provided with a longitudinally fluted external surface 57a. The filament yarn and rovings 11 and 12 are maintained in contact with the fluted roll 57 by an upper drawing roller 58 and the nylon yarn is located directly between the two cotton rovings.

The roller 49 and the belt 51 are engaged by a felt covered idler roller 60 which is adapted to remove lint and loose cotton fibers from these members. A similar felt covered roller 61 is arranged to clean the fluted roll 57 and another felt covered roller 62 performs this function with respect to the roller 58.

From the roll 57 and the roller 58 the tensioned filament yarn 11 and the two rovings 12 pass downwardly together in the direction of the arrow 64 and extend through a spirally looped eyelet 65 mounted on a bar 66. All of these eyelets for several spinning units are mounted on a single bar as shown in FIG. 4. From each eyelet a nylon yarn about which are spun two cotton rovings of a single unit extend downwardly to be wound on a bobbin 67. These bobbins have spindles 68 which are journaled in bearings 69 fixed in a frame member 70. These spindles are provided with pulleys 71 and are connected in pairs by endless belts 72. All of the spindles are arranged to be driven at high speed by a belt 73 extending from a driving motor.

As the filament yarn and rovings 11 and 12 of a single unit pass to a bobbin 67, they extend through a metal clip 75, called a "traveler," which travels around the bobbin on a ring 76 with which it has a sliding interlocking connection. The ring 76 is mounted on a rail which is reciprocated upwardly and downwardly by well known means to distribute the finished yarn over the bobbin in regular fashion as the spinning and winding proceeds. The bobbin 67 is rotated at a very high speed, for example, about 8500 revolutions per minute, while the fluted feed roll 57 rotates at a comparatively low speed, for example, about 215 r.p.m. Thus, the bobbin is rotated at a speed on the order of about 40 times the speed of the front drawing rolls. The result is that the winding operation of the bobbin 67 causes the filament yarn 11 and the rovings 12 to be spun together while under a relatively high tension, somewhat as shown in FIG. 3, with the nylon yarn 11 forming a center and with the cotton rovings 12 forming helical spinings of uniform thickness about this center. The spinning of the filament yarn and roving together extends upwardly to the feed roll 57 and the high speed winding operations sets up substantial tension in the filament yarn and rovings at the same time that the spinning occurs so that the resulting composite yarn which is wound on the bobbin is a tightly spun unitary structure capable of being knitted or woven with all of the advantages which have been referred to above. Because the unitary structure is tightly spun together and the spun cotton rovings form a more or less compact spun sheath about the center filament, the cotton will not slip longitudinally along the center filament. The amount of twist in the composite yarn may be varied by varying the relative speeds of the feeding and winding operations. When the feed roll 57 and the winding bobbin 67 have

the relative speeds mentioned above, it has been found that the number of turns of the cotton yarns about a 70 denier nylon yarn, for example, may be about twelve turns per inch.

The specific embodiment of the invention described above has been indicated as providing two cotton rovings 12 for cooperation with a single monofilament 11. The invention is operative with a single roving or with more than the suggested two rovings, the important factor being that the monofilament be centered with respect to the rovings. FIGS. 6, 7 and 8 illustrate the use of different numbers of rovings with a single monofilament.

More particularly, FIG. 6 illustrates the use of two rovings, the combination described above. In this instance the two rovings 12 are shown as being separated slightly as they pass between the rollers and the aprons, the monofilament 11 being centered accurately with respect to the rovings. In FIGS. 8 and 7, where one and three rovings 12 respectively are employed, the monofilament 11 is laid along the center of the sole or central roving. In each of FIGS. 6, 7 and 8 the spinning of the roving or rovings about the monofilament is portrayed. In these FIGS. the eyelet assemblies 46, 46a and 46b are shown as incorporating one, two and three individual trumpets, one for each roving.

Where the central monofilament is of elastomeric material the machine of FIGS. 1-8 is preferably modified to incorporate filament tension regulating apparatus such as that illustrated in FIGS. 9-12. The over-all machine of FIGS. 9-12 may be identical to that of FIGS. 1-8 except for the apparatus which serves to feed the elastomeric filament 11' to the spinning mechanism 30.

In FIG. 9 a spool 80 of elastomeric monofilament 11' is rotatably supported in any suitable manner on a fixed bracket 81. The elastomeric filament may be of any suitable material, such as rubber or spandex synthetic elastomers. The filament extends through a pair of eyelets 28 formed in a rod 83, which is in turn secured to the plate 26. Preferably the eyelets 82 are of the same material recommended above for the eyelet 33.

The filament extends from the eyelets 82 to tension regulating apparatus generally designated 85 and shown in enlarged scale in FIGS. 10-12. Referring to FIG. 10 it will be seen that the apparatus 85 includes a U-shaped base 86, the opposed legs of which contain eyelets 87 and 88 through which the filament 11' passes.

A post 90 is arranged between the legs of the U-shaped base member 86, a threaded end 91, a shoulder 92 and a nut 93 serving not only to support the post 90 rigidly but also to secure the base 86 to the associated arm 17 as shown. An opening 95 through the post 90 is provided, through which the filament 11' passes.

A sleeve 96a encircles the post 90 and supports a lower disk 96 with its upper surface just above the lower edge of the opening 95. An upper disk 97 rides freely on the post 90 and is urged downwardly by springs 98 and 99, an adjustable collar 100 confining the springs as shown.

A pair of washers 101 separate the two springs 98 and 99, and the forked end 102a of a lever 102 is arranged between the washers in the manner shown. The lever 102 is pivotally mounted on the right hand leg of the base member 86 by means of a pin 103, the base being slotted to receive the lever 102 freely and being drilled and tapped to receive the pin 103.

At the free end of the lever 102 an eyelet 105 is supported in the manner clearly shown in FIGS. 10 and 11. The filament 11' extends from the eyelet 88 through the lever-supported eyelet 105 and downwardly to the eyelet 33 of the spinning mechanism 30.

It will be apparent that the filament is squeezed between the upper and lower disks 97 and 96 and is thereby frictionally restrained against the pull of the drawing rolls 57 and 58, the degree of frictional restraint depending upon the spring pressure against the upper surface

of the upper disk 97. It will be apparent that the spring pressure and hence the frictional restraint can be altered by adjustment of the collar 100. Preferably the edges of the disks 96 and 97 are beveled, as shown, to avoid presentation of sharp edges of the filament.

Frictional restraint of the filament 11' is also regulated automatically by the lever 102. In the event the filament tension should increase, the free end of the lever 102 is drawn downwardly, the left hand end of the lever exerting an upward force against the upper washer 101 to compress the spring 99 and to relieve the compression of the spring 98. Conversely if filament tension is relieved the spring 99 experiences less restraint by the lever 102 and transmits an increased force through the spring 98 against the disk 97.

This automatic regulation of filament tension is important under any circumstances in the practice of the present invention but is of particular importance where an elastomeric filament is employed. Uniform spinning of a cotton or other sheath about elastic yarns requires that those elastic yarns be maintained at a substantially constant tension. The novel apparatus disclosed in FIGS. 9-12 effectively regulates filament tension while being inherently simple in construction, reliable in operation, and inexpensive to manufacture.

In the various forms of the apparatus illustrated in FIGS. 1-12, the monofilament yarn is fed to drawing rolls through an eyelet 33 which is arranged at a substantial distance above and to the rear of the drawing rolls. In the modification of the invention illustrated in FIG. 13 the filament 11 is fed to the drawing rolls and accurately deposited with respect to the rovings by an eyelet 110 which is arranged closely adjacent the drawing rolls.

The eyelet 110 is formed at the free end of a hairpin-like wire construction 113 which extends forwardly and downwardly from the bar 34. In the manner clearly shown in FIG. 13, the upper rearward end of this wire construction is secured to the bracket by a bolt 111, a nut 112, and a washer 114.

It may be seen that the eyelet 110 is thus maintained immediately above and to the rear of the guide 55. This provides absolute and positive control over the feeding of the filament 11 to the drawing rolls 57 and 58 such that the filament is laid accurately along the center line of the roving or rovings 12, and the last of any accumulated charge of static electricity on the filament 11 is grounded out immediately before the filament yarn 11 is deposited with respect to the rovings 12.

A modification of the embodiment of FIGS. 13 and 14 is shown in FIGS. 15 and 16. In accordance with this embodiment of the invention an eyelet 115, preferably of the material suggested above for the eyelet 33, is formed with an annular exterior groove such that it may nest within the closed end of the wire construction 113.

The yarn which may be produced by the method and apparatus described above is novel and has desirable characteristics which would not reasonably be expected to be obtained simply through the use of the illustrated method and apparatus. This is particularly true of the yarn which is produced in the indicated manner with an elastomeric center filament. Such a product retains the resilience of the elastomeric filament while having the desired characteristics of the soft rovings.

The method and apparatus for producing yarn have numerous novel features which result in important and unexpected advantages. Particular attention is directed to the precise centering of the monofilament with respect to the rovings. The relatively low resistance eyelets recommended for the monofilament 11 or 11' are important in this centering of the monofilament since the high voltage which can otherwise develop on the filament, particularly on Orlon, can cause substantial difficulty in the centering of the filament.

One embodiment of the novel apparatus of the invention, with certain modifications, for carrying out the method have been shown and described by way of illustration, but it will be understood that the apparatus and method may be modified in various other ways within the scope of the appended claims.

I claim:

1. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls including front drawing rolls, a spindle and a ring and traveler; a support for a supply of continuous filament yarn; yarn guide means independent of said drawing rolls and disposed immediately adjacent said front drawing rolls for guiding the continuous filament yarn from said supply thereof to a position between the front drawing rolls in longitudinal alignment with the center line of the ribbon of staple fibers passing between said front drawing rolls; tensioning means for maintaining the continuous filament under a predetermined tension as it is introduced between said front drawing rolls; a bobbin on said spindle for receiving said continuous filament yarn and said staple fibers after they have emerged from said front drawing rolls; and means including said spindle for rotating said bobbin at a speed far in excess of the speed of rotation of said front rolls whereby said continuous filament yarn and said staple fibers are both maintained under relatively high tension as they pass from said front rolls to said bobbin and while said staple fibers are thus spun about said filament yarn.

2. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls including front drawing rolls, a spindle and a ring and traveler; a support for a supply of continuous filament yarn; yarn guide means independent of said drawing rolls and disposed immediately adjacent said front drawing rolls for guiding the continuous filament yarn from said supply thereof to a position between the front drawing rolls in longitudinal alignment with the center line of a single ribbon of staple fibers passing between said front drawing rolls and drawn from a single spool of said roving creel; tensioning means for maintaining the continuous filament under a predetermined tension as it is introduced between said front drawing rolls; a bobbin on said spindle for receiving said continuous filament yarn and said staple fibers after they have emerged from said front drawing rolls; and means including said spindle for rotating said bobbin at a speed far in excess of the speed of rotation of said front rolls whereby said continuous filament yarn and said staple fibers are both maintained under relatively high tension as they pass from said front rolls to said bobbin and while said staple fibers are thus spun about said filament yarn.

3. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls including front drawing rolls, a spindle and a ring and traveler; a support for a supply of continuous filament yarn; yarn guide means independent of said drawing rolls and disposed immediately adjacent said front drawing rolls for guiding the continuous filament yarn from said supply thereof to a position between the front drawing rolls in longitudinal alignment with the center line of a plurality of ribbons of staple fibers passing between said front drawing rolls in side-by-side relationship, each such ribbon being drawn from a separate spool of said roving creel; tensioning means for maintaining the continuous filament under a predetermined tension as it is introduced between said front drawing rolls; a bobbin on said spindle for receiving said continuous filament yarn and said staple fibers after they have emerged from said front drawing rolls; and means including said spindle for rotating said bobbin at a speed far in excess of the speed of rotation of said front rolls whereby said continuous filament yarn and said staple fibers are both maintained under relatively high tension as they pass from said front

rolls to said bobbin and while said staple fibers are thus spun about said filament yarn.

4. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls including front drawing rolls, a spindle and a ring and traveler; a support for a supply of continuous filament yarn; means for feeding a continuous filament yarn from such supply to the front drawing rolls, yarn tensioning means contacting the continuous filament yarn between the supply thereof and said front drawing rolls to permit advance of the continuous filament yarn with respect thereto at a speed slightly less than the surface speed of said front drawing rolls, yarn guide means independent of said drawing rolls and disposed immediately adjacent said front drawing rolls for guiding the continuous filament yarn between said front drawing rolls in longitudinal alignment with the center of a ribbon of staple fibers passing between said front drawing rolls; a bobbin on said spindle for receiving said continuous filament yarn and said staple fibers after they have emerged from said front drawing rolls; and means including said spindle for rotating said bobbin at a speed on the order of about forty times the speed of rotation of said front rolls whereby said continuous filament yarn and said staple fibers are both maintained under relatively high tension as they pass from said front rolls to said bobbin and while said staple fibers are thus spun tightly about said filament yarn.

5. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls including front drawing rolls, a spindle and a ring and traveler; a support for a supply of continuous filament yarn; yarn guide means independent of said drawing rolls and disposed immediately adjacent said front drawing rolls for guiding the continuous filament yarn from said supply thereof to a position between the front drawing rolls in longitudinal alignment with the center line of the ribbon of staple fibers passing between said front drawing rolls; and tensioning means for maintaining the continuous filament under a predetermined tension as it is introduced between said front drawing rolls, said tensioning means comprising a frictional, filament restraining device, and a control member responsive to increasing filament tension to release said device and responsive to decreasing filament tension to tighten said device.

6. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls including front drawing rolls, a spindle and a ring and traveler; a support for a supply of continuous filament yarn; yarn guide means independent of said drawing rolls and disposed immediately adjacent said front drawing rolls for guiding the continuous filament yarn from said supply thereof to a position between the front drawing rolls in longitudinal alignment with the center line of the ribbon of staple fibers passing between said front drawing rolls; and tensioning means for maintaining the continuous filament under a predetermined tension as it is introduced between said front drawing rolls, said tensioning means comprising a pair of members biased toward each other for receiving therebetween and frictionally restraining said filament, and a control member subject to the tension of said filament as it approaches said front drawing rolls, said control member being responsive to increasing filament tension to decrease frictional restraint of said filament by said members, and responsive to decreasing filament tension to increase frictional restraint of said filament by said members.

7. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls including front drawing rolls, a spindle and a ring and traveler; a support for a supply of elastomeric yarn; yarn guide means independent of said drawing rolls and disposed immediately adjacent said front drawing rolls

for guiding the elastomeric yarn from said supply thereof to a position between the front drawing rolls in longitudinal alignment with the center line of the ribbon of staple fibers passing between said front drawing rolls; and tensioning means for maintaining the elastomeric yarn under a predetermined tension as it is introduced between said front drawing rolls, said tensioning means comprising a pair of members biased toward each other for receiving therebetween and frictionally restraining said elastomeric yarn, and a control member subject to the tension of said elastomeric yarn as it approaches said front drawing rolls, said control member being responsive to increasing elastomeric yarn tension to decrease frictional restraint of said elastomeric yarn by said members, and responsive to decreasing elastomeric yarn tension to increase frictional restraint of said elastomeric yarn by said members.

8. Apparatus for producing a core yarn comprising: a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; a support for a supply of continuous filament yarn; yarn guide means for guiding the continuous filament yarn from said supply thereof to a position between the front drawing rolls in longitudinal alignment with the center line of the ribbon of staple fibers passing between said front drawing rolls; and tensioning means for maintaining the continuous filament under a predetermined tension as it is introduced between said front drawing rolls, said apparatus including ceramic thread guides for said continuous filament yarn having a resistivity not greater than 1 megohm per cubic centimeter, at least one of said thread guides being grounded and disposed closely adjacent said front drawing rolls for dissipating static electricity from said continuous filament yarn immediately before said continuous filament yarn is introduced between said front rolls.

9. Apparatus for producing a core yarn as specified in claim 8, wherein said thread guides comprise a vitrified mixture of titanium oxide and a metallic oxide.

10. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding a continuous filament yarn from a supply thereof to the front drawing rolls, guiding the continuous filament yarn closely adjacent the front drawing rolls but ahead thereof to a position between the front drawing rolls in longitudinal alignment with the center of a ribbon of staple fibers passing between the front drawing rolls, resisting the movement of the continuous filament yarn from the supply thereof to the front drawing rolls to maintain the continuous filament yarn under a predetermined tension as it is fed to the front drawing rolls, and thereafter spinning the ribbon of staple fibers about the continuous filament yarn while both are under relatively high tension.

11. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding a continuous filament yarn from a supply thereof to the front drawing rolls, guiding the continuous filament yarn closely adjacent the front drawing rolls but ahead thereof to a position between the front drawing rolls in longitudinal alignment with the center of a single ribbon of staple fibers passing between said front drawing rolls and drawn from a single spool of said roving creel, resisting the movement of the continuous filament yarn from the supply thereof to the front drawing rolls to maintain the continuous filament yarn under a predetermined tension as it is fed to the front drawing rolls, and thereafter spinning the ribbon of staple fibers about the continuous filament yarn while both are under relatively high tension.

12. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding a continuous filament yarn from a supply

thereof to the front drawing rolls, guiding the continuous filament yarn closely adjacent the front drawing rolls but ahead thereof to a position between the front drawing rolls in longitudinal alignment with the center of a plurality of ribbons of staple fibers passing between said front drawing rolls in side-by-side relationship and drawn from separate spools of said roving creel, resisting the movement of the continuous filament yarn from the supply thereof to the front drawing rolls to maintain the continuous filament yarn under a predetermined tension as it is fed to the front drawing rolls, and thereafter spinning the ribbon of staple fibers about the continuous filament yarn while both are under relatively high tension.

13. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding a continuous filament yarn from a supply thereof to the front drawing rolls, guiding the continuous filament yarn between the front drawing rolls in longitudinal alignment with the center of a ribbon of staple fibers passing between the front drawing rolls, resisting the movement of the continuous filament yarn from the supply thereof to the front drawing rolls to maintain the continuous filament yarn under a predetermined tension as it is fed to the front drawing rolls, discharging from said continuous filament yarn immediately before the same enters the front drawing rolls any static electricity that may have accumulated therein, and spinning the continuous filament yarn and the staple fibers together while winding them under relatively high tension on a bobbin.

14. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding a continuous filament yarn from a supply thereof to the front drawing rolls, tensioning the continuous filament yarn between the supply thereof and the front drawing rolls to permit advance of the continuous filament yarn at a speed slightly less than the surface speed of the front drawing rolls, guiding the continuous filament yarn closely adjacent the front drawing rolls but ahead thereof to a position between the front drawing rolls in longitudinal alignment with the center of a ribbon of staple fibers passing between the front drawing rolls, and thereafter twisting the ribbon of staple fibers about the continuous filament yarn.

15. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding a plurality of separate rovings from said roving creel to the front drawing rolls in side-by-side relationship, feeding a continuous filament yarn from a supply thereof to the front drawing rolls, guiding the continuous filament yarn closely adjacent the front drawing rolls but ahead thereof to a position between the front drawing rolls in longitudinal alignment with the center line of said plurality of side-by-side rovings, resisting the movement of the continuous filament yarn from the supply thereof to the front drawing rolls to maintain the continuous filament yarn under a substantial predetermined tension as it is fed to the front drawing rolls, and thereafter spinning the ribbon of staple fibers about the continuous filament yarn.

16. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding two separate rovings from said roving creel to the front drawing rolls in side-by-side relationship, feeding a continuous filament yarn from a supply thereof to the front drawing rolls, guiding the continuous filament yarn closely adjacent the front drawing rolls but ahead thereof to a position between the front drawing rolls in longitudinal alignment with the center line of said two side-by-side rovings, resisting the movement of the continuous filament yarn from the supply thereof

to the front drawing rolls to maintain the continuous filament yarn under a substantial predetermined tension as it is fed to the front drawing rolls, and thereafter spinning the ribbon of staple fibers about the continuous filament yarn.

17. The method of producing a core yarn on a ring spinning frame having a roving creel, drawing rolls, a spindle and a ring and traveler; comprising the steps of feeding three separate rovings from said roving creel to the front drawing rolls in side-by-side relationship, feeding a continuous filament yarn from a supply thereof to the front drawing rolls, guiding the continuous filament yarn closely adjacent the front drawing rolls but ahead thereof to a position between the front drawing rolls in longitudinal alignment with the center line of said three side-by-side rovings, resisting the movement of the continuous filament yarn from the supply thereof to the front drawing rolls to maintain the continuous filament yarn under a substantial predetermined tension as it is fed to the front drawing rolls, and thereafter spinning the ribbon of staple fibers about the continuous filament yarn.

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