Nov. 5, 1946. J. BELLEZZA, JR 2,410,419

SNUBBER ROLLER

Filed Aug. 19, 1943

Fig. 1.

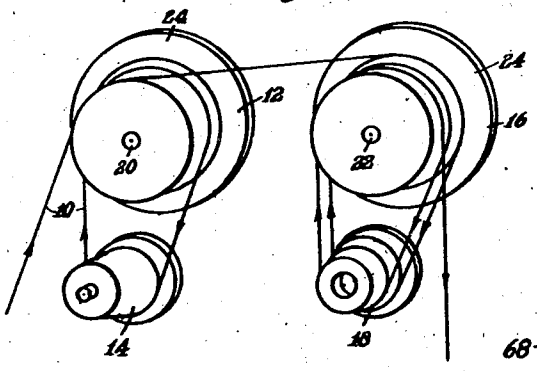


Fig. 5.

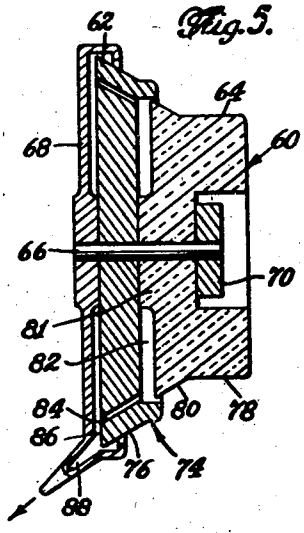


Fig. 4.

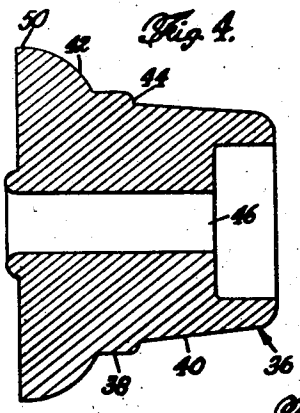


Fig. 2.

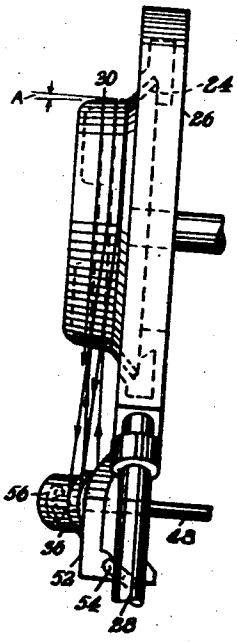
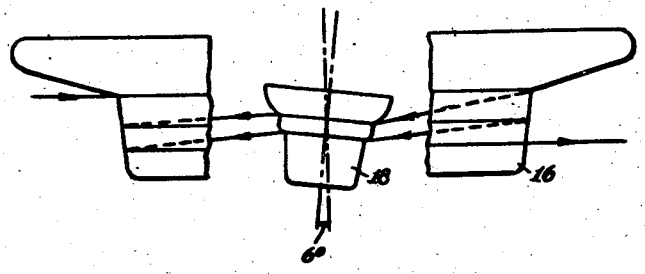


Fig. 3.



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Patented Nov. 5, 1946 2,410,419

UNITED STATES PATENT OFFICE

2,410,419

SNUBBER ROLLER

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Application August 19, 1943, Serial No. 499,285

12 Claims. (Cl. 57—1)

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This invention relates to a snubber roller for displacing a yarn passing about a roller one or more times to prevent the yarn from tracking on itself and from wrapping upon said snubber roller.

Although the invention is capable of many different uses, for convenience it will be described in connection with the stretching of yarn between two positively driven feed wheels and wherein the yarn is passed a plurality of times around at least the second feed wheel.

In copending application of Emerson A. Tippetts and Howard W. Swank, Ser. No. 499,162, filed on even date herewith, there is disclosed a procedure for stretching of a freshly produced yarn between two positively driven feed wheels wherein the yarn passes one or more times around the first feed wheel and a plurality of times around the second feed wheel and, during the passage over and around the feed wheels, the yarn is passed under a freely rotatable displacement snubber roller to prevent the yarn from tracking on itself on the successive passage of the yarn about the feed wheel and to impart a twist thereto. The twist is imparted to the yarn at a point immediately prior to its contact with the snubber roller. Because of the twist, the yarn passing under the snubber roller is well bundled and broken filaments are not picked up and wrapped around the snubber roller but are carried along as part of the continuous filament bundle. In its travel from the snubber roller back to the feed wheel, the twist is removed. However, due to the brief existence of the twist, the many filaments comprising the yarn are more closely bundled together than they would be otherwise and the yarn is prevented from being spread out as a wide ribbon.

The said copending application of Tippetts and Swank discloses a one-piece snubber roller for use when the yarn passes a plurality of times about the feed wheel. That snubber roller is provided with two or more thread-contacting portions of the same diameter and a corresponding number of flanges projecting from the respective thread-contacting portions. When any filament wraps occur, they may be removed only with difficulty as, for instance, by removing the roller from its shaft and cutting the wrap therefrom.

An object of this invention is to provide a new and improved snubber roller which will impart a temporary twist to each successive passage of the yarn from the feed wheel to the snubber roller. Another object of this invention is to provide a snubber roller which is of a construction

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that permits easy removal of any filament wraps which may occur. Other objects of this invention will become apparent hereafter.

The objects of the invention are generally accomplished by providing a snubber roller with a plurality of stepped thread-contacting portions constructed with a slight taper toward the front of the roller and a flanged portion in advance of each step. The snubber roller is so positioned relative to the feed wheel that each successive passage of the yarn from the feed wheel to the snubber roller will first contact the respective flanged portions and be rolled onto the corresponding thread-contacting portion, whereby twist will be imparted to the yarn. In each successive passage from the snubber roller back to the feed wheel the twist leaves.

The details of the invention will become more apparent by reference to the accompanying drawing when taken in connection with the following detailed description.

In the drawing,

Figure 1 is a diagrammatic perspective view generally showing the arrangement of two positively driven feed wheels for stretching yarn and the snubber rollers;

Figure 2 is a side elevation showing the arrangement of the feed wheel and the snubber roller;

Figure 3 is a top plan view, partly broken away for clarity, to more clearly show the arrangement of the snubber roller and the feed wheel;

Figure 4 is a cross-section of one form of the snubber roller; and

Figure 5 is a cross-section of the preferred form of snubber roller.

Referring now to the drawing wherein like reference numerals designate like parts, the reference numeral 10 designates a multi-filament yarn withdrawn from a spinning bath in which a viscose solution is extruded through a multi-orifice spinneret (the spinneret and the bath not being shown) by a positively driven feed wheel 12 around which the yarn is wrapped one or more times. In its passage over and around the feed wheel, the yarn is passed under a freely rotatable snubber roller 14. From the wheel 12, the yarn is passed over and a plurality of times around a second positively driven feed wheel 16. The yarn 10, in its passage around the second feed wheel 16, also passes under a freely rotatable snubber roller 18. The feed wheels 12 and 16 are mounted on shafts 20 and 22 respectively, which are driven by means (not shown) at such rates that the peripheral speed of the wheel 16 is greater than

that of the wheel 12 whereby the yarn between the feed wheels is stretched. After leaving the feed wheel 16, the yarn is wound in a suitable collection device (not shown).

If desired, a hot aqueous liquid jet may be applied to the yarn 10 while it is on the feed wheel 12, as fully explained in said copending application of Tippetts and Swank.

Each feed wheel is provided at the rear thereof with an upwardly inclined flange 24, from which any liquid applied to the feed wheel is discharged into a collecting shroud 26 from which it is removed by a conduit 28. In order that the liquid be discharged from the feed wheel only at the flange 24, the thread-contacting portion 30 of the feed wheel is constructed with a slight taper, as indicated by the reference character A in Figure 2, to insure that the centrifugal force will drive the liquid from the thread-contacting portion 30 of the feed wheel to the point of the flange 24 before discharging it from the wheel. While this taper A may be as little as 1°, it is preferably greater than 3°, but in no case more than 6° or 8°.

The feed wheels are constructed of such surface materials that sulfur and sludge from the bath will not adhere in the yarn path, forming ridges from which any liquid will be discharged without flowing to the flange. A glass surface has given satisfactory results.

The snubber roller 14, in the event that the yarn is passed only once thereunder and the tension differential between the oncoming yarn and the leaving yarn is not too great, is of the type and design and position as described in said copending application of Tippetts and Swank. However, when this differential is large, then the yarn is given two or more passes around the feed wheel, and a snubber roller of the type shown in Figures 4 and 5 is used. Since the tension differential between the oncoming yarn and the yarn leaving the second feed wheel 16 is relatively large, the snubber roller shown in Figure 4 or 5 is generally there used.

Referring now to Figure 4, the reference numeral 36 designates a one-piece two-step snubber roller, in which the reference numerals 38 and 40 designate the large and small steps respectively. As shown in Figure 4, each of the steps 38 and 40 are preferably constructed with a slight taper toward the front of the roller and the snubber roller 36 is provided with an inclined portion 42 immediately preceding the step 38 and an inclined portion 44 immediately preceding the step 40. The snubber roller 36 is provided with a central bore 46 whereby it may be freely rotatably mounted on a shaft 48. The rear flange 50 of the snubber roller 36 is positioned, as shown in Figure 2, within a shroud 52, which is adapted to receive any liquid from the snubber roller 36 and conduct it to the conduit 28 through a conduit 54. In the form shown in Figure 4, the snubber roller 36 is provided with a recess in the front face thereof into which one end of the shaft 48 may project and on which a locking member 56 may be secured to retain the roller on the shaft.

The snubber roller 36 is mounted in front of the plane drawn perpendicular to the feed wheel shaft at the tangent point of first contact of the thread with the feed wheel by a small amount, and the axis of the snubber guide is horizontally rotated out of the vertical plane passing through the axis of the feed wheel by a small angle of approximately 6° or 8° (see Figure 3). By locating the snubber guide in this manner, the yarn 10

coming from the feed wheel first contacts the snubber roller at the inclined portion 42, and, due to the askew position of the snubber roller, rolls down into the thread path of the large step 38. Because the yarn rolls on itself in coming from the inclined portion 42 to the thread path on the large step 38, it develops temporarily a certain amount of twist. The twist actually takes place between the point at which the yarn leaves the feed wheel and the contact point with the snubber roller 36, so that the yarn contacting the snubber roller 36 is well bundled and broken filaments are not picked up and wrapped around the snubber roller but are carried along as part of the continuous filament bundle. When the yarn passes from the large step and travels back to the feed wheel, the twist is removed. However, due to the brief existence of the twist, the many filaments comprising the yarn are more closely bundled together than they would be otherwise. The yarn, in passing back to the feed wheel, passes around the feed wheel in spaced relationship to the prior pass of the yarn thereabout, and the yarn leaving the feed wheel in this second pass, in its passage to the snubber roller, contacts the snubber roller in its second passage thereto at the inclined portion 44, from which it rolls into the thread path on the small step 40. The twist is imparted to the yarn during this operation and it leaves the yarn in its passage back to the feed wheel as previously described in connection with the large step. It is clear that the yarn in each successive passage to the snubber roller 36 is given a twist.

The slipping of the yarn on the small step 40 of the snubber roller 36 is eliminated by making the percentage difference between the circumferences of the two steps not greater than the yarn is capable of absorbing through contraction and subsequent stretching at the desired tension in the yarn between the point it leaves the small step and the feed wheel. The same effect may be accomplished by utilizing a feed wheel having a taper sufficient to permit the yarn to contract between the two wraps around the snubber roller to a degree almost equal to the percent difference between the circumferences of the two steps. The degree of taper and the percent difference in circumferences of the steps are so chosen as to give the proper minimum tension in the second pass.

Instead of the single one-piece stepped snubber roller as previously described, a snubber roller having freely rotatable, independent rollers for each passage of the yarn thereabout may be used and is preferred when the yarn denier is large. Such a roller is shown in Figure 5 and is designated generally by the reference numeral 60. The snubber roller 60 comprises two rollers 62 and 64 which are independently and freely rotatable on a stub shaft 66, one end of which is fixedly mounted in a shroud 68, the other end being capped by a press-fit washer 70 or other suitable device to hold the rollers in place. The roller 62 is provided with a substantially cylindrical body 74 and an inclined flange 76 at the rear thereof. The roller 64 is also provided with a substantially cylindrical body 78 and an inclined flange 80. The rotatable roller 64 is smaller than the rotatable roller 62 and it is so mounted that the body 74 of the roller 62 overlaps and is slightly spaced from the flange 80 of the roller 64. As shown in Figure 5, the roller 64 is provided with a boss 81 on the rear thereof which is positioned in a recess 82 in the front

face of the rotatable roller 62. Any liquid on the small rotatable roller 64 is thrown over the rounded shoulder of the roller 62 and discharged therefrom into a collecting shroud 86, or is conveyed to the recess 82 from which it is conducted by means of a duct 84 to the collecting shroud 86 from which it is discharged by means of a conduit 88. It will be apparent that any liquid from the rotatable roller 62 will be discharged into the collecting shroud 86.

It is to be noted that the two independent rollers 62 and 64 of the snubber roller constitute steps and that the respective bodies 74 and 78 thereof are each constructed with a slight taper toward the front of the roller. The slight taper facilitates the removal of any wraps (which may form) from the front of the roller and discharge of the bath backward to the flange of the roller. Also, the slight taper permits the yarn to push forward out of the thread path any small wrap which may form.

The two-piece snubber roller 62 is mounted in the same askew position relative to the feed wheel as was described in connection with the positioning of the snubber roller 36 with respect to the feed wheel. In operation, the thread passing from the feed wheel will contact the rotatable roller 62 at the flange 76 thereof, from which it will roll onto the substantially cylindrical portion 74, whereby twist will be imparted. In the second passage of the yarn from the feed wheel to the snubber roller, the yarn will engage the second rotatable roller 64 on the flange 80 and roll therefrom onto the substantially cylindrical body 78, whereby twist will be imparted thereto. In each of the successive passages of the yarn from the respective rotatable roller back to the feed wheel, the twist will leave and the yarn will be presented to the feed wheel at a position such that the yarn will be spaced from the preceding path of travel of the yarn therearound.

In the two-piece snubber roller 60, the differences in circumference between the thread path about the rotatable rollers 62 and 64 are immaterial since each of these elements is independently rotated and is driven by the yarn passing therearound.

If more than two passes are desired about the snubber roller, the latter may be provided with a corresponding number of stepped portions and flanges.

Though the angularity of the flanged portions may vary within rather wide limits, satisfactory results are secured when the flanges are at angles of 40° to 60°, and preferably 50°, to the axis of the snubber rollers.

The snubber rollers herein described are constructed of such surface material that any of the ingredients adhering to the yarn passing therearound will not deleteriously affect the snubber rollers in any manner which might damage the yarn. A snubber roller provided with a glass surface or formed of a phenol formaldehyde or similar resin has given satisfactory results.

The one-piece stepped roller can be manufactured more economically, and in operation can be more easily strung up, than the two-piece snubber roller. In addition, the one-piece snubber roller can be made heavier and, therefore, is less subject to breakage and has a longer life than the two-piece roller. For these reasons, the one-piece snubber roller is preferred in certain instances when the yarn denier is not too large.

The snubber rollers herein described are admirably suitable for use in a process wherein the yarn on the first roller is treated with a hot aqueous liquid, as described in the previously-mentioned copending application of Tippetts and Swank.

Though preference is herein shown for the use of the apparatus in connection with freshly prepared multifilament yarn produced by the viscose process, the invention is not restricted thereto. The snubber roller and the arrangement thereof with the feed wheel may be used for stretching (by two positively driven feed wheels) any type of yarn irrespective of its manufacture or indeed in any operation wherein a yarn is passed a plurality of times around a wheel or roller and there is a great tension differential between the oncoming yarn and the leaving yarn.

Since it is obvious that many changes and modifications can be made in the above-described details without departing from the nature and spirit of the invention, it is to be understood that the invention is not to be limited thereto except as set forth in the appended claims.

I claim:

1. For use in combination with a wheel over and about which a yarn passes a plurality of times, a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout and having a plurality of steps, the first step which cooperates with the yarn having the largest diameter and each succeeding step which cooperates with the respective successive pass of the yarn over and about said wheel being of a diameter less than the preceding step, the succeeding steps being forwardly of said first step in the direction toward the front of said snubber roller, and means on said roller before each step to impart a twist in the yarn as it passes from the wheel to said snubber roller.

2. For use in combination with a wheel over and about which a yarn passes a plurality of times, a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout and having two steps, the first step which cooperates with the yarn being of a diameter greater than the second step which cooperates with the respective successive pass of the yarn over and about said wheel, said second step being forwardly of said first step in the direction toward the front of said snubber roller, and a flange on said roller immediately before each step to receive the yarn from said wheel and permit it to roll therefrom onto the respective step and impart a twist in said yarn.

3. For use in combination with a wheel over and about which a yarn passes a plurality of times, a freely rotatable one-piece snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout and having a plurality of steps, the first step which cooperates with the yarn having the largest diameter and each succeeding step which cooperates with the respective successive pass of the yarn over and about said wheel being of a diameter less than the preceding step, the succeeding steps being forwardly of said first step in the direction toward the front of said snubber

roller, and a flange on said roller immediately before each step to receive the yarn from said wheel and permit it to roll therefrom onto the respective step and impart a twist in said yarn, the difference in circumference between the larger and smaller steps being not greater than the yarn is capable of absorbing during contraction and stretching in its travel respectively to and from the smaller step.

4. For use in combination with a wheel over and about which a yarn passes a plurality of times, a freely rotatable snubber roller guide, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout and comprising a plurality of independently rotatable rollers mounted on a common shaft, the thread-contacting portion of the first roller which cooperates with the yarn having the largest diameter and the thread-contacting portion of each succeeding roller which cooperates with the respective pass of the yarn over and about said wheel being of a smaller diameter than the thread-contacting portion of the preceding roller, said succeeding rollers being forwardly of the said first roller in the direction toward the front of said snubber roller, each of said rollers having means to impart a twist to the yarn.

5. For use in combination with a wheel over and about which a yarn passes a plurality of times, a freely rotatable snubber roller guide, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout and comprising two independently rotatable rollers on a common shaft, each of said rollers having a thread-contacting portion and a flange immediately before said thread-contacting portion to receive the yarn from said wheel and permit it to roll onto said thread-contacting portion to impart a twist therein, the thread-contacting portion of the first roller which cooperates with the yarn being of a larger diameter than the thread-contacting portion of the second roller, said second roller being forwardly of the first roller in the direction toward the front of said snubber roller guide.

6. In combination, a feed wheel over and about which a yarn is passed a plurality of times and a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout, said snubber roller being mounted askew to said wheel and having a plurality of steps, the first step which cooperates with the yarn having the largest diameter and each succeeding step which cooperates with the respective successive pass of the yarn over and about said wheel being of a diameter less than the preceding step, the succeeding steps beir forwardly of said first step in the direction toward the front of said snubber roller, and means on said roller before each step to impart a twist in the yarn as it passes from said feed wheel to said snubber roller.

7. In combination, a feed wheel over and about which a yarn is passed a plurality of times and a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout, said snubber

roller being mounted askew to said wheel and having a plurality of steps, the first step which cooperates with the yarn having the largest diameter and each succeeding step which cooperates with the respective successive pass of the yarn over and about said wheel being of a diameter less than the preceding step, the succeeding steps being forwardly of said first step in the direction toward the front of said snubber roller, and a flange on said roller before each step to receive the yarn from said wheel and permit it to roll onto the respective step.

8. In combination, a feed wheel over and about which a yarn is passed a plurality of times and a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout, said snubber roller being mounted askew to said wheel and having two steps, the first step which cooperates with the yarn being of a diameter greater than the second step which cooperates with the respective successive pass of the yarn over and about said wheel, said second step being forwardly of said first step in the direction toward the front of said snubber roller, and a flange on said roller before each step to receive the yarn from said wheel and permit it to roll onto the respective step, the difference in circumference between the larger and smaller step being not greater than the yarn is capable of absorbing during contraction and stretching in its travel respectively to and from the smaller step.

9. In combination, a feed wheel over and about which a yarn is passed a plurality of times and a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout, said snubber roller being mounted askew to said wheel and having a plurality of independently rotatable rollers mounted on a common shaft, the thread-contacting portion of the first roller which cooperates with the yarn having the largest diameter and the thread-contacting portion of each succeeding roller which cooperates with the respective pass of the yarn over and about said wheel being of a smaller diameter than the thread-contacting portion of the preceding roller, said succeeding rollers being forwardly of the said first roller in the direction toward the front of said snubber roller, each of said rotatable rollers having means to impart a twist in the yarn.

10. In combination, a feed wheel over and about which a yarn is passed a plurality of times and a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout, said snubber roller being mounted askew to said wheel and having a plurality of independently thread-driven rollers mounted on a common shaft, each of said independently thread-driven rollers having a thread-contacting portion and a flange immediately before said thread-contacting portion to receive the yarn from said wheel and permit it to roll onto said thread-contacting portion to impart a twist therein, the thread-contacting portion of the first roller which cooperates with the yarn having the largest diameter and the thread-contacting portion of each succeeding roller which cooperates with the respective pass

of the yarn over and about said wheel being of a smaller diameter than the thread-contacting portion of the preceding roller, said succeeding rollers being forwardly of the said first roller in the direction toward the front of said snubber roller.

11. In combination, a feed wheel over and about which a yarn is passed a plurality of times and a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout, said snubber roller being mounted askew to said wheel and having two independently thread-driven rollers mounted on a common shaft, each of said independently thread-driven rollers having a thread-contacting portion and a flange immediately before said thread-contacting portion to receive the yarn from said wheel and permit it to roll onto said thread-contacting portion to impart a twist therein, the thread-contacting portion of the second independently rotatable roller being smaller in diameter than the thread-contacting portion of the first independently rotatable roller, said second independently rotatable roller being forwardly of said first independently rotatable roller in the direction toward the front of said snubber roller.

12. In combination, a feed wheel over and about which a yarn is passed a plurality of times and a freely rotatable snubber roller, about which the yarn passes between each successive pass around said wheel, to cause the yarn to pass around said wheel in spaced relationship to the prior pass of the yarn thereabout, said snubber roller being mounted askew to said wheel and having two independently thread-driven rollers mounted on a common shaft, each of said independently thread-driven rollers having a thread-contacting portion and a flange immediately before said thread-contacting portion to receive the yarn from said wheel and permit it to roll onto said thread-contacting portion to impart a twist therein, the thread-contacting portion of the second independently rotatable roller being smaller in diameter than the thread-contacting portion of the first independently rotatable roller, and the thread-contacting portion of the said first roller overlapping and spaced from the flange of the said second roller.

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