April 12, 1960 R. D. HEFFELFINGER ET AL 2,932,151

YARN TWISTER

Filed March 4, 1958

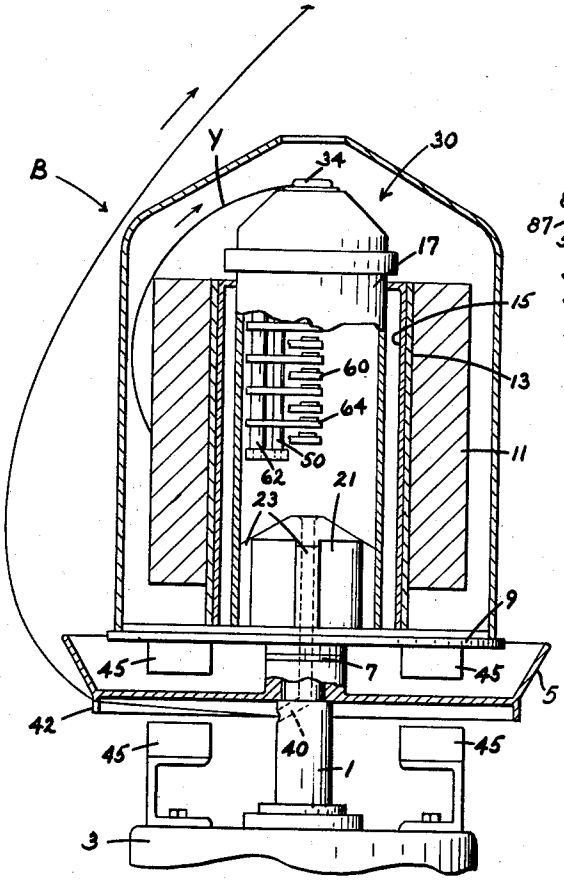

Fig. 1

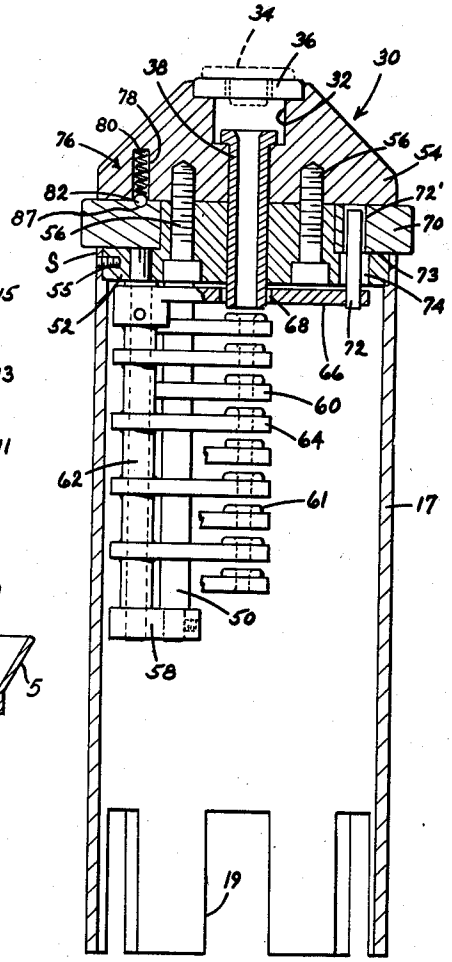

Fig. 2

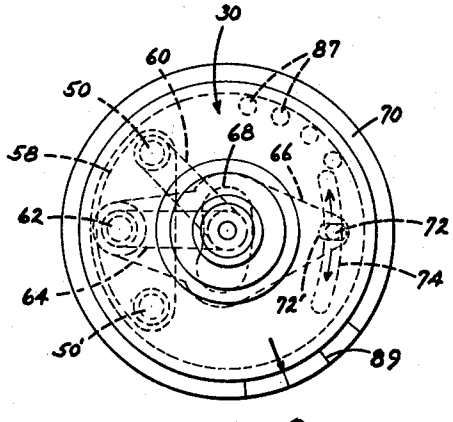

Fig. 3

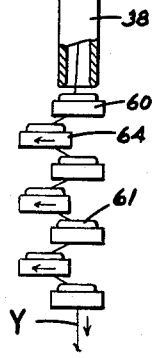

Fig. 4

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2,932,151

YARN TWISTER

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4 Claims. (Cl. 57—58.86)

The present invention relates to a yarn-twisting apparatus such as a two-for-one yarn twister. In particular, the invention relates to a yarn-twisting apparatus having an adjustable tensioning mechanism whereby the tension applied to the yarn being twisted may be more accurately varied and controlled as desired.

It has been found that good "balloon" control of a yarn during the twisting operation can be effectively achieved when dealing with a wide range of yarn denier by providing a yarn-tensioning device within the body of the twisting apparatus. In addition, it has been found desirable to provide adjusting means for this tensioning means whereby fine adjustments in the applied tension may be achieved and whereby the tensioning assembly may prove more adequate for a wide range of yarn denier. Also, with certain types of yarn, it is desirable that the tension-applying assembly have a torsional action upon the yarn in order that the twist will enter the yarn gradually over a given length rather than at one concentrated point in order to prevent the formation of small loops within the individual filaments making up the yarn. Such action is more easily achieved with the use of an adjustable tensioning assembly of the above nature.

It is therefore one object of the invention to provide a novel and improved yarn twisting apparatus wherein there is provided an adjustable tensioning assembly for use with traveling yarn which may be easily operated to control the tension applied to the yarn.

It is another object of the invention to provide a novel and improved adjustable tension device for use in yarn-twisting apparatus wherein the tension applied to the yarn may be easily adjusted by merely rotating a hand control member supported by the yarn-twisting apparatus.

Still another object of the invention is to provide a novel and improved yarn-twisting apparatus of the above objects wherein the position of the adjustable tensioning assembly is set after adjustment through a self-locking arrangement.

Other objects and advantages of the invention will become apparent from a study of the following description and drawing wherein:

Figure 1 is an elevation partially in section of the novel and improved yarn-twisting apparatus;

Figure 2 is an enlarged view partially in section of the adjustable tensioning assembly and its housing;

Figure 3 is a top view of the housing and tensioning assembly of Figure 2; and

Figure 4 is an enlarged detail of a portion of the tension assembly of Figure 2.

As mentioned above, the adjustable tensioning means is incorporated with the general type of two-for-one twisters now in use. For purposes of description, the adjustable tensioning assembly will be described in conjunction with the type of two-for-one yarn twister as shown in Figure 1 of the drawing.

As seen in Figure 1, the two-for-one twister includes a drive shaft 1 driven by a suitable motor 3. Secured to the drive shaft 1 is a yarn twist applying disc 5 which rotates with the drive shaft. Floatingly mounted upon the uppermost end of the drive shaft through a suitable washer 7 is a platform support 9 which is designed to support a yarn package 11 collected on a suitable bobbin 13. As shown in the drawing, the bobbin 13 is positioned over a support can 15 which is also supported on the platform 9. Concentric with the can 15 is a tubular housing 17 which has slots 19, 19 in the lower end thereof (see Figure 2) and which also rests upon the platform 9. A housing centering and locking member 21 having fingers 23, 23 which fit into the slots 19, 19 to lock the housing 17 in centered position on the platform 9 is also secured to the platform 9. It should be pointed out that the support can 15 for the yarn bobbin 13 is centered upon the platform 9 through contact of the inwardly extending top edge of the can with the periphery of the housing 17.

A bonnet 30 is supported by the housing 17 with the base portion of the bonnet lying within the housing interior to form a sliding fit with the housing wall. The bonnet 30 includes an aperture 32 (Figure 2) extending vertically through the bonnet. A primary tension button or weight 34 may be, if desired, loosely suppported by a suitable apertured disc 36 (Figure 2) mounted within the aperture 32 at the top portion thereof. A guide tube 38 is inserted within the aperture 32 to provide a smooth surface for the yarn as it travels therethrough. It should be pointed out, however, that the use of the tension button 34 may be eliminated, if desired, since a primary tension will be applied to the yarn anyway as it passes through the aperture 32 against the aperture wall.

In operation, the yarn Y travels upwardly from the yarn package and downwardly through the aperture 32 being tensioned while it passes under the tension button 34. From this point, the yarn travels downwardly through the interior of the housing 17 and through a passageway 40 which extends through the housing locking means 21 and the drive shaft 1 to open upon the periphery of the drive shaft 1 as shown in Figure 1. From the passageway 40, the yarn is laced through a slot 42 of the twisting disc 5 whereupon a balloon B is formed within the yarn as it passes upwardly to a suitable collecting unit not shown. Opposing magnets 45, 45 mounted upon the underside of the yarn package platform 9 and upon the top wall of the motor 3 serve to prevent the platform 9 from rotating with the drive shaft 1. As the yarn-twisting disc 5 rotates, it of course applies a twist to the yarn passing through the slot 42 of the twist-applying disc.

As mentioned above, the invention resides in the adjustable tensioning device, which may be termed a secondary tensioning device, and in the combination of the device with a yarn-twisting assembly. As seen in Figures 2 and 3, a pair of fixed posts 50, 50' are secured to and depend from the lower portion 52 of the bonnet 30. As seen more clearly in Figure 2, the lower portion 52 is secured to the upper portion 54 of the bonnet 30 by retaining screws 56, 56. The lower portion 52, and thus the entire bonnet 30, is secured to the housing 17 by a pin 55 which rests in a slot S of housing 17 to prevent the bonnet 30 from rotating. The opposite ends of the fixed posts 50, 50' are anchored in an anchor plate 58 with the posts forming the only means of support for the anchor plate 58. As seen in Figure 3, the posts 50, 50' lie in spaced-apart relationship and are anchored to the opposite ends of the plate 58.

Secured to and extending laterally from the post 50 are a plurality of fixed vertically disposed and spaced-apart yarn-guide fingers 60, 60 which carry eyelet guides 61 at their free extremities through which the yarn passes. These guide fingers 60, 60 extend toward the center of the housing from the post 50 so that the eyelets 61 of the fingers lie directly in alignment with the guide tube 38 supported within the aperture 32 of the bonnet 30. Pivotally supported in and depending from the lower portion 52 of the bonnet 30, is a shaft 62. The shaft 62 is also pivotally supported at its opposite end in and at the center point of the anchor plate 58. Secured to and extending laterally from the shaft 62 in fixed manner are yarn-guiding fingers 64, 64 which also carry eyelet guides 61 at their free extremities through which the yarn travels. As seen in Figures 2 and 4, the fingers and eyelet guides of the pivotal shaft will cooperate in interdigitating fashion with the fingers and eyelets of the fixed post 50. The tension applied to the yarn passing through the eyelets of both the fixed fingers and the pivotal fingers in alternating manner will depend upon the extent to which the eyelets of the pivotal shaft are brought into or out of alignment with the eyelets of the fixed post 50 as will be described hereinafter.

To pivot the shaft 62 whereby the yarn-guiding fingers 64, 64 are brought into or out of different degrees of alignment with the fixed yarn-guide fingers 60, 60, a pivot link or plate 66 is secured to pivotal shaft 62 at the upper end thereof to extend laterally therefrom across the interior of the housing 17. An arcuate slot 68 is cut through the link 66 to accommodate the tube guide 38 which extends below the plate whereby the plate may be moved back and forth across the housing interior to rotate the pivotal shaft and the fingers 64 extending therefrom.

To rotate the link 66 and the pivotal shaft 62, the link 66 is connected by a pin 72 with a manually rotatable ring 70 supported upon the bonnet 30. As seen in Figure 2, the lower portion 52 of the bonnet 30 is cut out for a portion of its periphery to provide a recessed shoulder 73 upon which the rotatable ring 70 is seated. The pin 72 rides in a small radial slot 72' cut into the ring 72. To provide clearance for movement of the pin 72 through the lower portion 52 of the bonnet 30, an arcuate slot 74 (see Figure 3) through which the pin 72 extends is cut through the lower portion 52 of the bonnet 30.

As also mentioned above, the adjusting ring 70 has a self-locking assembly generally indicated at 76 (Figure 2) whereby once the pivotal shaft 62 is adjusted to the desired position by rotation of the ring 70, it will automatically be locked in that position during operation. As seen in Figures 2 and 3, the self-locking assembly 76 consists of a vertically disposed recess 78 cut into the upper portion 54 of the bonnet 30. A tension spring 80 is loosely supported within the recess 78 and has secured thereto a small metal ball 82 preferably formed of a hard metal. The ball member 82 is thus urged against the upper face of the ring 70 by the tension spring 80. Cut into the upper face of the ring 70 are a plurality of semicircular indents 87, 87. These indents 87, 87 are located in spaced-apart relationship and follow an arcuate path as defined by the path of the ball member along the face of the ring as the ring is rotated (see Figure 3). The path is of short duration.

When adjusting the position of the pivotal shaft 62, the ring 70 is rotated in a clockwise or counterclockwise direction depending upon whether or not increased or decreased tension is desired. As seen in the drawing, a clockwise rotation of the ring 70 will pivot the shaft 62 and the fingers 64, 64 secured thereto further out of alignment with the fixed fingers 60, 60 to increase the tension upon the yarn traveling through the eyelets of the fingers. Decreased tension upon the yarn will be achieved through a counterclockwise rotation of the ring 70 and shaft 62.

Since the indents 87, 87 are spaced apart from one another, the ball member 82 will be forced out of one of the indents, being urged against and over the edge of the indent, as the ring 70 is rotated. The ball member 82 then becomes lodged in the next succeeding indent through expansion of the spring 80 when the ball moves over the next indent which action may be repeated with regard to the remaining indents until the desired degree of tensioning is achieved. When the ball member 82 becomes lodged within an indent 87, the ring 70, the pivotal shaft 62 and the guide fingers 64, 64 are locked in position. Further rotation of the ring 70 is required to unlock the assembly from its set position.

Suitable indicia 89 are marked upon both the upper portion 54 of the bonnet 30 and upon the ring 70. By comparing the cooperating marking or indicia, the operator is able to determine the exact position of the yarn-guide fingers 64, 64 secured to the pivotal shaft 62 with respect to the yarn-guide fingers 60, 60 secured to the fixed post 50.

Figure 4 shows the position of the yarn-guide fingers 64 secured to the pivotal shaft 62 with respect to the fixed yarn-guide fingers 60 after the fingers 64 have been moved out of alignment with the fingers 60.

From an understanding of the above description, it is seen that I have provided a yarn-twisting apparatus wherein the tension applied to the yarn being twisted may be simply and accurately adjusted and controlled as desired.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. A yarn-twisting apparatus comprising a drive spindle, yarn-twisting means secured to and rotatable with the drive spindle, a non-rotatable support for a yarn package which support is floatingly mounted upon the drive spindle to lie above the yarn twist-applying means, a housing supported upon the yarn package support and adapted to lie within the interior of the yarn package, an apertured bonnet supported at the top of the housing through which aperture the yarn passes from the yarn package to the interior of the housing, a fixed post secured at one end to the bonnet, a fixed set of vertically disposed yarn-guide fingers extending laterally from the post, a pivotal shaft depending from the bonnet, a series of yarn-guide fingers extending laterally from the pivotal shaft, said fingers of the pivotal shaft being adapted to interdigitate with the yarn-guide fingers extending from the fixed post upon pivoting of the shaft, a yarn passageway extending through said yarn package support and the drive spindle to open through the drive spindle periphery, said passageway receiving the yarn from the yarn-guide fingers and guiding the yarn to a point where it is picked up by the yarn twist-applying means, a rotatable ring supported within a cutout portion of the bonnet periphery, a pin loosely engaged with the rotatable ring and an arcuate slot extending through that portion of the bonnet underlying the ring whereby the free end of the pin extends through the slot to a point below the bonnet, and a link secured at one end to the pin and at the opposite end to the pivotal shaft whereby when the ring is rotated the pin will move along the slot in the rotated direction to urge the end of the link to which it is secured in the same direction which in turn rotates the link at its opposite end to rotate the pivotal shaft.

2. A yarn-twisting apparatus according to claim 1 comprising self-locking means for locking the rotatable ring in its adjusted position.

3. A yarn-twisting apparatus according to claim 1 comprising indicia on the rotatable ring and bonnet for indicating the position of the yarn-guide fingers supported on the pivotal shaft.

4. A yarn-twisting apparatus according to claim 1 comprising a tension weight loosely supported within the

aperture of the bonnet for increasing the primary tension applied to the yarn.

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