United States Patent [19]

Nakahara et al.

[11] **3,754,389**

[45] **Aug. 28, 1973**

[54] **YARN GUIDING MECHANISM IN A TWO-FOR-ONE YARN TWISTER**

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[22] Filed: **Jan. 25, 1971**

[21] Appl. No.: **109,698**

Related U.S. Application Data

[62] Division of Ser. No. 831,054, June 6, 1969, Pat. No. 3,636,698.

[30] **Foreign Application Priority Data**

June 8, 1968 Japan 43/39559

[52] **U.S. Cl.** **57/58.83,** 57/58.86

[51] **Int. Cl.** **D01h 1/10,** D01h 7/86

[58] **Field of Search** 57/34, 106, 58.72, 57/58.83, 58.84, 58.86

[56] **References Cited**

UNITED STATES PATENTS

2,785,526	3/1957	Keith	57/58.83 X
3,159,962	12/1964	Franzen	57/58.83 X
3,177,643	4/1965	Halleux et al.	57/58.83 X

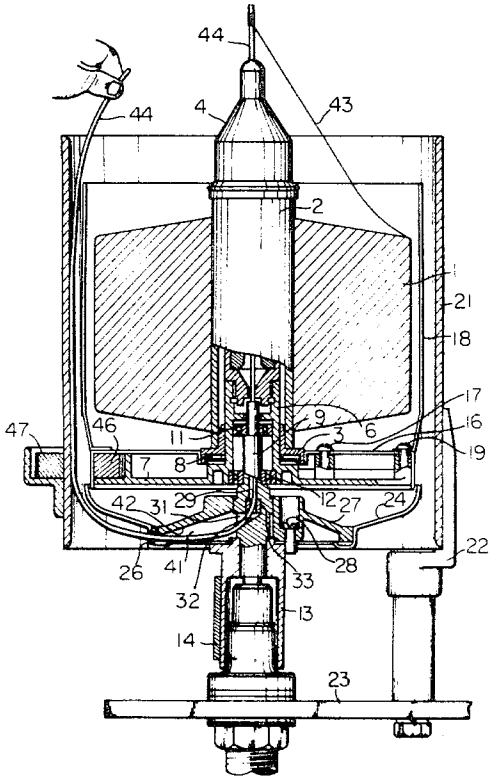
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[57] **ABSTRACT**

In a two-for-one yarn twister, a specially shaped yarn guide path is formed radially extending from a central longitudinal aperture of a spindle to a peripheral yarn guide of a storage disc. Further, a successive yarn guide path from the peripheral yarn guide towards an upper yarn guide member is given as a clearance between an inside and outside balloon limiting mantle.

5 Claims, 4 Drawing Figures



Patented Aug. 28, 1973 3,754,389

Fig. 1

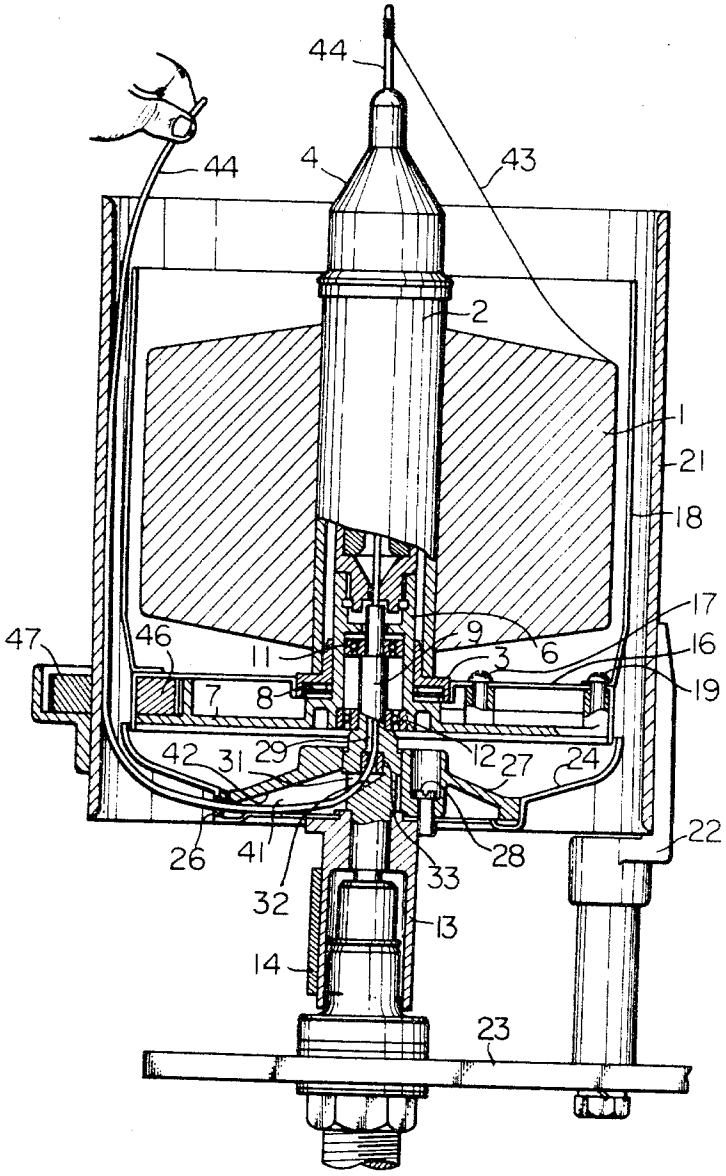


Fig. 2A

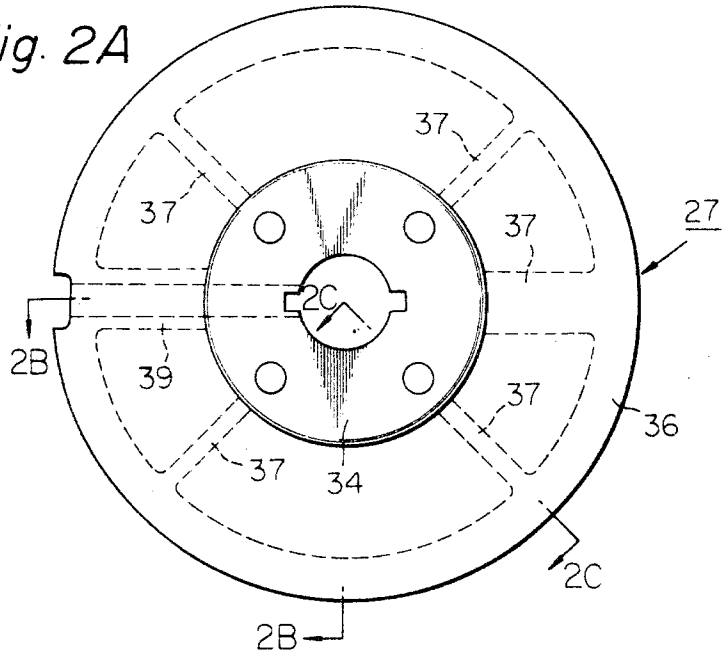


Fig. 2B

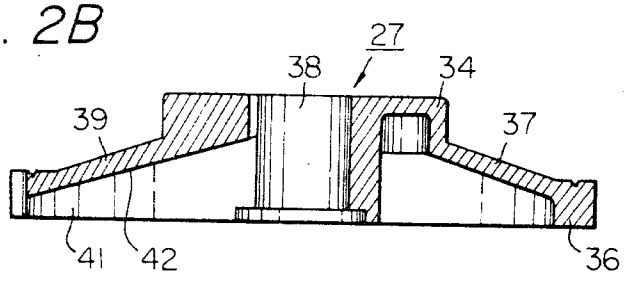
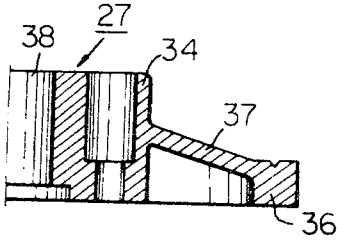


Fig. 2C



YARN GUIDING MECHANISM IN A TWO-FOR-ONE YARN TWISTER

This is a division of application Ser. No. 831,054 filed June 6, 1969, now U.S. Pat. No. 3,636,698.

The present invention relates to an improvement in the yarn guiding mechanism in a two-for-one yarn twister, more particularly relates to an improvement in the yarn guiding mechanism in the two-for-one yarn twister of a type such as disclosed in the U. S. Pat. application Ser. No. 645,987 filed on June 14, 1967, now U.S. Pat. No. 3,445,998.

In the yarn twisting mechanism of the two-for-one yarn twister of the above-described type, the yarn is firstly drawn out from a package rotatably mounted on the twister, advanced downwardly through a central longitudinal aperture of a package supporting holder and a tensioning device disposed to a top of the holder, further advanced into a longitudinal hollow of a spindle, drawn out from the hollow of the spindle through a lateral opening of the spindle, passed through a yarn guide disposed to a periphery of a storage disk which is rotatable with the spindle and conducted upwardly to a suitable yarn guide member positioned above the before-mentioned tensioning device with its ballooning being limited by a cylindrical mantle disposed to the twister encompassing the package.

Although the two-for-one yarn twister of the above-described type is provided with an appreciable advantage in the prevention of excessive tension application on the processing yarn and in the effective compensation of the yarn tension fluctuation, there is an inevitable operational difficulty in initially conducting the yarn along the above-described path, that is, from the package to the upper yarn guide member. Conventionally, the above-described initial conducting of the yarn is carried out in two steps. In the first place, using a suitable yarn conductor on a pneumatic sucking device, the yarn is conducted from the package to the yarn guide of the storage disc. Next, the yarn is brought from the yarn guide of the storage disc to the upper yarn guide member by hand. Such a two-stepped initial conducting of the yarn is so complicated and troublesome to operate that it often-times forms a bar in enhancing the operational efficiency in the two-for-one yarn twisting operation. Further, as it is practically difficult or impossible to conduct the yarn by hand from the yarn guide of the storage disc to the upper yarn guide member through a narrow clearance between the peripheral surface of the yarn package and the balloon limiting mantle, it is usual to form a vertical slit through the mantle and to pass the yarn upwardly through the slit. The mantle is purposed for limiting the inevitable ballooning of the yarn during the two-for-one yarn twisting operation and, accordingly, the yarn rubs the inside wall of the mantel. During this rubbing, the yarn is apt to be damaged, or sometimes broken, because of the presence of the above-described vertical slit formed through the mantle, that is, the presence of such a slit disturbs smoothness of the inside wall surface of the mantle. Thus, demand for the provision of the balloon limiting mantle is inconsistent with demand for easy initial yarn conduct.

A principal object of the present invention is to provide an improved yarn guiding mechanism of a two-for-one yarn twister wherein the initial conduct of the yarn from the package to the upper yarn guide member is carried out with ease in a single step.

A further object of the present invention is to bring about an improvement in the yarn guiding mechanism in a two-for-one yarn twister whereby the two-for-one yarn twisting operation can be performed without damaging or breaking the ballooning yarn.

In order to attain the above-described objects of the invention, the improvement in the yarn guide mechanism of the present invention comprises, in combination, a spindle having a central longitudinal aperture and an outwardly diversing lateral opening connected to the central longitudinal aperture, and a flange secured to the spindle and rotatable together with the spingle. The divergence of the lateral opening is so formed that the ceiling of the opening is substantially horizontal and the floor of the opening is outwardly and downwardly declined. A boss portion of the flange is secured to the periphery of the spindle and the flange is provided with a particularly shaped yarn conducting path. Inlet of the yarn conducting path is a facing arrangement with the diverged outside terminal of the lateral opening of the spindle and an outside terminal of the yarn conducting path is directed toward the storage disc yarn guide. The ceiling of the yarn conducting path is downwardly declined from the inside terminal towards the outside terminal thereof and the floor of the yarn conducting path is defined by the upper surface of the storage disc. If desired, a small piece made of a material having a smooth surface and a large resistance against friction, such as ceramic, may be disposed within the spindle at a connection of the central aperture with the lateral opening. An outside mantle is disposed to the framework of the twister encircling the inside ballon limiting mantle disposed to a stationary disc of the twister. This outside mantle is purposed for limiting the ballooning of the yarn running from the yarn guide of the storage disc to the upper yarn guide member.

Further features and advantages of the art of the present invention will be apparent from the ensuing description, reference being made to the accompanying drawings; in which

FIG. 1 is a partly sectional side view of a two-for-one yarn twister whereto an embodiment of a yarn guiding mechanism of the present invention is applied,

FIG. 2A is a plan view of a flange member used in the embodiment shown in FIG. 1,

FIG. 2B is a sectional side view of the flange member shown in FIG. 2A taken along the line 2B—2B in FIG. 2A,

FIG. 2C is a fragmental sectional side view of the flange member shown in FIG. 2A, taken along the line 2C—2C in FIG. 2A.

Referring to FIG. 1, an embodiment of the improved yarn guiding device of the present invention is illustrated. In the embodiment, a yarn package 1 is wound on a yarn bobbin 2 a lower end of which is inserted over a bearing cover 3 and an upper end of which is provided with a detachably engaged upper tension device 4. The bearing cover 3 is rotatably inserted over an upper cylindrical protuberance 6 of a stationary disc 7 by way of a bearing 8. The stationary disc 7 is supported by an upper portion of a spindle 9 by way of pairs of bearings 11 and 12 and a lower end of the spindle 9 is fixedly engaged with a spindle whorl 13 which is rotated by a frictional contact with a driving belt 14. An upper cover 16 is secured to the stationary disc 7 by screws 17 and a cylindrical inside balloon limiting

mantle 18 is secured to the upper cover 16 by screws 19 encircling the package 1 with adequately spaced relationship. Spacedly encircling this inside mantle 18, a cylindrical outside balloon limiting mantle 21 is disposed being supported by a bracket 22 secured to the framework 23 of the twister. This outside mantle 21 is not provided with any slit for passing the yarn, making it different from the conventional ones.

A plurality of inside magnets 46 are secured to the periphery of the stationary disc 7 and, in a spacedly facing arrangement with the inside magnets 46, a plurality of outside magnets 47 are secured to the outside mantle 2. Due to an attracting force between the magnets 46 and 47, the stationary disc 7 can be maintained stationarily regardless of the rotation of the spindle 9.

In the above-described mechanical construction of the twister, the improvement in the yarn guiding mechanism of the present invention is as hereinafter described. A storage disc 24 is secured to the upper flanged portion of the spindle whorl 13 and at least one yarn guide 26 is disposed to a bottom periphery of the spindle whorl 13 as is shown in the drawing. At a position in between the bottom surface of the stationary disc 7 and the upper surface of the storage disc 24, a flange member 27 is disposed being combined with the upper flanged portion of the spindle whorl 13 by a screw 28 in a condition rotatable with the spindle 9. The spindle 9 is provided with a central longitudinal aperture 29 and an outwardly diverging lateral opening 31 connected to the longitudinal aperture 29. The ceiling wall of the opening 31 is substantially horizontal and the bottom wall 32 of the opening 31 is formed as outwardly and downwardly declined with respect to a longitudinal axis of the spindle 9. If desired, a small piece 33 made of a material having a smooth surface and a large resistance against friction, such as ceramic, may be disposed within the spindle 9 at a connection of the longitudinal aperture 29 with the lateral opening 31. Referring to FIGS. 2A, 2B and 2C, the mechanical structure of the flange member 27 is illustrated. The flange member 27 includes a boss 34, a rim 36 and a plurality of arms 37 connecting the rim 36 to the boss 34, and the boss 34 is provided with a central aperture 38 receptive of the spindle 9. An arm 39 of greater size extends radially from the boss 34 towards the rim 36 and a tunnel 42 is formed through the greater sized arm 39. The ceiling wall 42 of the tunnel 41 is downwardly and outwardly declined from the inside terminal to the outside terminal of the tunnel 41. The flange member 27 of the above-described mechanical structure is disposed to the twister as already mentioned in such a manner that the inside terminal of the tunnel 41 meets the outside terminal of the lateral opening 31 of the spindle 9 while the outside terminal of the tunnel 41 faces the yarn guide 26 of the storage disc 24. The dimension of the tunnel 41 should be so selected so that the dimensions of the inside terminal of the tunnel 41 is larger than those of the outside terminal of the lateral opening 31 of the spindle 9. The bottom wall of the tunnel 41 is defined by the upper surface of the bottom portion of the storage disc 24. Thus, a successive yarn path is formed by the combination of the central longitudinal aperture 29 of the spindle 9 with lateral opening 31 of the spindle 9, the tunnel 41 of the flange member 27, the yarn guide 26 of the storage disc 24 and a clearance formed between the outside and the inside balloon limiting mantles 18 and 21.

In the above-explained mechanical structure of the yarn guide mechanism of the present invention, the initial yarn guide operation of the present invention is carried out in the manner hereinafter described. Firstly, a free end of a yarn 43 is drawn out by hand from the package 1 and the free end thereof is connected to an end of a yarn conductor 44 of a flexible nature. Next, another end of the yarn conductor 44 is inserted into a central aperture of the upper tension device. By further inserting the yarn conductor 44 by hand, the free end of the conductor 44 advances downwardly through the longitudinal aperture 29 of the spindle 9. When the end reaches the bottom wall 32 of the lateral opening 31 of the spindle 9, the advancing direction of the conductor's end is changed towards the tunnel 41 of the flange member 27 due to declination of the bottom wall 32. During further advancement, the conductor's end is conducted toward the yarn guide 26 of the storage disc 24 due to declination of the ceiling wall 42 of the tunnel 41. Passing through the yarn guide 26, the conductor's end now comes in contact with the inside wall of the outside mantel 21 and performs an upward directional change. By further insertion of the conductor 44 into the central aperture of the upper tension device 4, the conductor's end advances upwardly through the clearance defined by the inside and outside balloon limiting mantles 18 and 21 and, finally, reaches the upper brim portion of the outside mantle 21. Then, by pulling out the conductor's end by hand as shown in FIG. 1, a leading end of the ayrn 43 can be easily brought to an upper brim position of the outside mantle 21 and by hand extended to a yarn guide, such as a snail wire, positioned above the twister (not shown).

In case it is required, the lower brim portion of the outside mantle 21 may preferably converge inwardly for the purpose of easy upward guiding of the leading end of the conductor 44 coming out of the yarn guide 26 of the storage disc 24.

One end of the yarn conductor 44 to be tied to the yarn 43 may be roughened or provided with cuts or recesses for assuring stable connection of the two. Further, the tunnel 41 of the flange member 27 may be of another style as long as it is provided with an outwardly and downwardly declined ceiling wall for conducting the leading end of the yarn conductor 44 smoothly towards the yarn guide 26 of the storage disc 24.

What is claimed is:

1. In a two-for-one yarn twister including an upper tension device, a spindle having a central longitudinal aperture, a stationary disc, an inside ballon limiting mantle secured to said stationary disc. a storage disc rotatable with said spindle and at least one yarn guide disposed at the periphery of said storage disc; the improvement which comprises

a lateral opening formed in said spindle and connectable with said central longitudinal aperture, said spindle having a ceiling wall and a downwardly and outwardly declined bottom wall,

a flange member disposed between said stationary disc and said storage disc rotatable with said spindle and having a yarn guide path the ceiling wall of which is outwardly and downwardly declined, and

an outside balloon limiting mantle secured to a frame of said twister encircling said inside balloon limiting mantle in a spaced relationship and an inside terminal of said yarn guide path of said flange member meeting with an outside terminal of said

lateral opening of said spindle whereby an outside terminal of said yarn guide path of said flange member faces said yarn guide of said storage disc.

2. The improvement of claim 1 wherein the dimensions of said inside terminal of said yarn guide path of said flange member are not smaller than those of said outside terminal of said lateral opening of said spindle.

3. The improvement of claim 1 wherein a lower brim of said outside mantle is converged inwardly towards said spindle.

4. The improvement of claim 1 wherein said flange member includes a boss, a rim and arms for connecting said rim to said boss, and said yarn guide path is a tunnel excavated through one of said arms.

5. The improvement of claim 1 in which there is further provided a small ring-shaped member disposed within said spindle at a connection of said central longitudinal aperture with said lateral opening of said spindle, said small ring-shaped member being made of a material having a smooth surface and a substantially large value resistance against frictional contact with yarn.

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