Oct. 11, 1949. J. K. COCHRAN 2,484,016

DOUBLE TWIST SPINDLE

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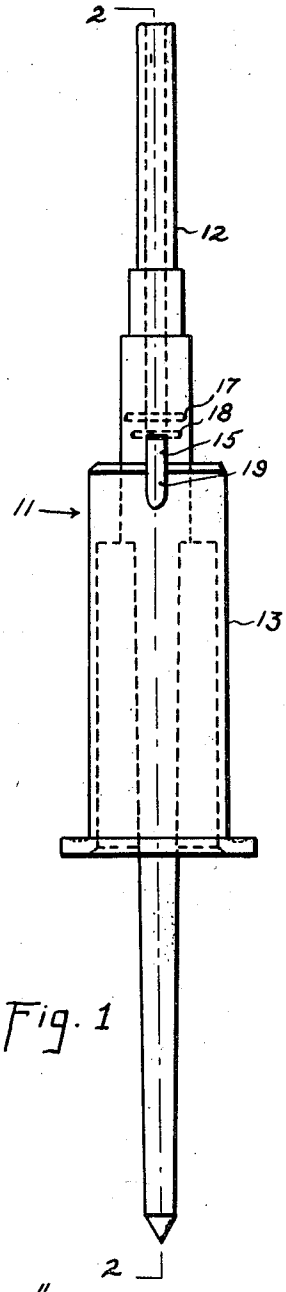


Fig. 1

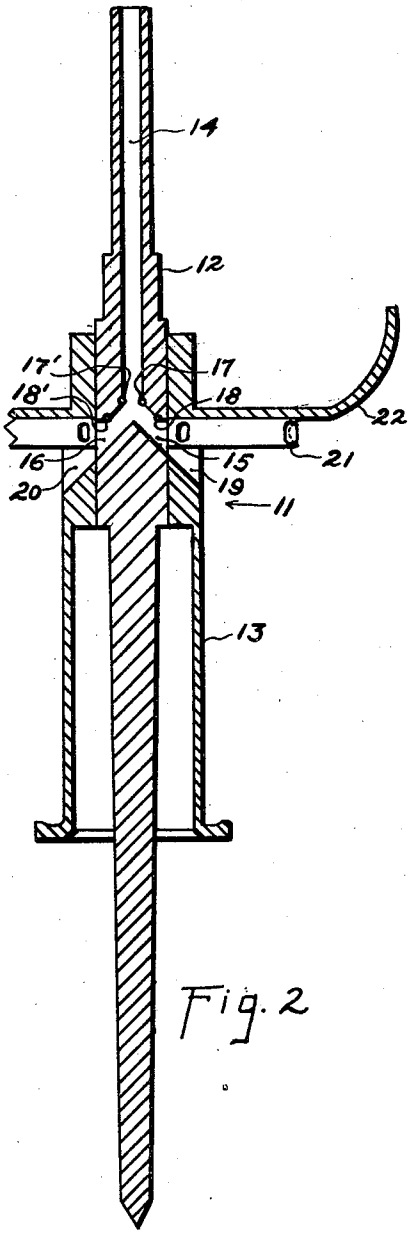


Fig. 2

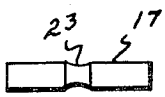


Fig. 3

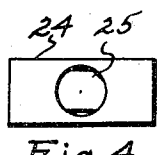


Fig. 4

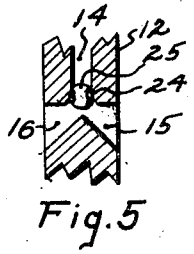


Fig. 5

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DOUBLE TWIST SPINDLE

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10 Claims. (Cl. 57—58)

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This invention relates to a double twist spindle for textile yarns, so called, because two turns of twist are inserted in the yarn for each revolution of the spindle.

In the apparatus used in spinning or twisting textile yarns, a supply package or spool of yarn may be supported by a spindle which rotates at a rapid speed within the package carrier while the carrier and package itself remain comparatively stationary. The yarn from the supply package is fed through a longitudinal bore or passage in the spindle in an over-end relation, entering the spindle at the top of the longitudinal bore and being delivered from the spindle by a transverse passage at a point just above the whorl part of the spindle. The yarn then normally passes around a storage ring and upwardly over a thread guide to a rotating take-up spool. The initial twist of the yarn is inserted within the longitudinal bore of the spindle, that is, between the supply package and the transverse yarn delivery point of the spindle. Additional twist is inserted after the yarn leaves the spindle and before it reaches the take-up spool.

In the past, a commonly used construction of double twist spindle has comprised a shank or blade portion made up of more than one piece so that each of the internal passages or bores could be polished to obtain a smooth surface over which the yarn might pass. This smooth surface is necessary in order to avoid excessive abrasion of the textile yarn. The blade portions after being finished and polished are normally fitted together and the entire blade structure then fitted to a whorl portion, and yarn storage disc completing the rotating part of the spindle. Such a construction is complicated and expensive, and difficult to assemble concentrically and in balance.

Therefore, it is an object of this invention to provide a new and improved construction for a double twist spindle which will be stronger and be nearly concentric.

It is another object of this invention to provide a double twist spindle in which the blade portion is made of one piece.

It is another object of the invention to provide a double twist spindle having a construction which will provide a smooth passage for the textile yarn without the necessity of polishing the internal bore or passage in the spindle shank.

It is among the objects of this invention to provide easily replaceable pins at points of maximum wear, thus making it unnecessary to refinish or replace the spindle blade when through use these points become worn; to provide pins which are rotatable so as to present greater wearing surface to the yarn; to provide pins which may readily be formed to provide a guide for the yarn.

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Further objects will be apparent to those skilled in the art after a study of the following description, claims and drawings, in which—

Figure 1 is a side elevation of a double twist spindle constructed in accordance with this invention;

Figure 2 is a cross sectional view through 2—2 of Figure 1 with a yarn storage disc in place;

Figure 3 is an enlarged view of a modified form of pin;

Figure 4 is an enlarged view of another modified form of pin; and

Figure 5 is a modification showing the use of the pin of Figure 4 in the spindle.

In accordance with this invention, the double twist spindle blade may be constructed of one piece, namely, a one piece blade or shank portion. Such a one piece blade portion has not been made heretofore since it is not feasible with present known manufacturing facilities to provide a polished internal surface or hollow bore which extends longitudinally through the blade of the spindle and transversely out. In accordance with this invention the longitudinal bore may be drilled but the necessity of internal polishing is avoided by the placement of smooth pins extending transversely of the blade at the points at which yarn changes direction in the internal passages of the blade. These pins, so placed, provide the necessary smooth passage for the textile yarn and are easily replaceable when worn and which can be made of synthetic sapphire, carboloy or other wear resistant material. Such pins may easily be replaced if they become worn and also can be formed to provide guides for the yarn. Further the pins may be rotatable, so as to present to the yarn a greater wearing surface.

The structure in accordance with this invention may be seen by referring carefully to Figure 2 in which there is illustrated a spindle generally indicated by the character 11 having a blade portion 12 and a whorl portion 13. As may be seen, the blade portion 12 is constructed of one piece and has an internal bore or passage 14 drilled longitudinally from the top. At a point on the blade, near the yarn storage disc 22 and above the whorl 13, the passage turns at an angle, so as to lead to the outside of the spindle blade.

For commercial reasons it is desirable that two transverse passages be provided at this point,

providing two outlets which are diametrically opposite. This is desirable for balance and in order that one of the passages may be more conveniently positioned when the spindle is initially threaded. The two transverse passages are indicated at 15 and 16, Figure 2.

The whorl portion, which may be separately machined, is fitted to the blade portion as indicated. Two diametrically opposite slots 19 and 20 may be provided in the upper shoulder of the whorl portion so as to be aligned with the respective passages 15 and 16 provided in the blade portion 14. In this way, two diametrically opposite openings are provided in the spindle providing outlets for the textile yarn.

The intersection of the transverse outlets 15 and 16 with the longitudinal passage 14 will form contact points over which the textile yarn will be drawn as it passes through the spindle during operation. Unless smooth, the surface of the contact point would, of course, cause abrasion of the yarn. In accordance with this invention, small cross holes are bored transversely through the shank or blade 12 at points corresponding to the intersection of the openings 15 and 16 with longitudinal bore 14. Through these small transverse or cross holes, small smooth finished pins 17 may be inserted. As may be seen, by referring carefully to Figure 2, these pins 17 are located at the contact points in such a way that the side of the pin will project into the opening at the intersection of the bore 14 and passages 15 and 16. Since these pins have a smooth finish or surface they provide a smooth and easily renewable surface over which the yarn may pass.

In the preferred embodiment these pins may be of synthetic sapphire. In order that the smooth finish may not be roughened in any way in the course of constructing the spindle it is preferred that the pins be of slightly less diameter than the holes in which they are inserted. While synthetic sapphire has been suggested as a preferred form it is obvious that these pins could be of steel or other material having a smooth surface to act as a suitable guide or passage for the yarn.

Since the pins are straight, the drilling of the cross holes transversely of the spindle blade is a relatively simple matter. In the particular construction shown in the drawings, four pins have been provided for additional wearing surface and to prevent abrasion when either passage 15 or passage 16 is used. Two of the pins have been provided at opposite sides representing the respective intersections of the passages 15 and 16 with the longitudinal bore 14. Two additional pins are provided near the outer end representing the intersection of the passages 15 and 16 with the outer wall of the blade 12 since it is obvious that other contact points over which the yarn will pass will result at the points indicated. The additional pins indicated at 18 and 18' are installed in the same way as described above in connection with pins 17 and 17'. From the practical standpoint, it is preferred that the upper edge of the openings 15 and 16 be drilled normal to the axis of the longitudinal bore 14 in order that the corner resulting from the intersection of the openings 15 and 16 with the wall of the blade 12 will be located slightly within the outer edge of the blade 12. This is to provide a more convenient position for drilling a suitable hole for support of the pins 18 and 18'. Thus, the pins 18 and 18' will be positioned on the spindle

blade at a point somewhat lower than the pins 17 and 17', as may be seen in Figure 1 and will be closer to the outside of the spindle blade. In this position, in which as before, the side of the pins project into the passages 15 and 16, a smooth, easily renewable surface is provided for the passage of the yarn. From the pins 18 and 18' the yarn extends to a storage wheel 21 and, thus, does not contact any rough edge of the drilled openings 15 and 16.

In the construction of the spindle as described and illustrated, the blade portion 12 may be machined and the center hole drilled simultaneously. After this operation, the blade may be ground to the desired dimensions and the small cross holes for the pins drilled either before or after the heat treatment. The internal holes or bores in the spindle may be cleaned by a rotating hand tool, a sandblast or by pumping an abrasive solution through the bore to carry away any burrs or chips that might remain.

The whorl portion may be separately machined and fitted onto the blade. However, the machining of the whorl may take place after it has been fitted on the blade. Also, as will be recognized by those skilled in the art, the blade portion of the spindle may be drilled after the whorl has been fitted on the blade, if desired. In accordance with the construction, the steps in machining and drilling the spindle may take place in any desired order in accordance with any desired practice in the industry.

The pins 17 and 18 may be held in place in their respective cross holes by the yarn storage disc which is normally provided. As may be seen in the drawings, the yarn storage disc 22 is fitted about the spindle blade so as to cover the ends of the openings in which are inserted the pins 17 and 18 over which the yarn runs as it passes through openings 15 or 16 to that portion of the yarn storage disc 22 indicated at 21.

While the yarn storage disc may conveniently be used to seal the open ends of the pin holes, it will be apparent that other means may be used to retain the pins in position such as, for instance, peening the end of the hole.

It will be recognized that with this construction, the pins may readily be replaced if they become worn through use. It is a relatively simple matter to replace worn pins and retain the original spindle. Thus, a spindle may last for a long period of time as compared to the former practice in which it was necessary to replace the entire spindle when the internal passage thereof became unduly worn.

As pointed out previously, there is a slight clearance between the pin and the hole in which it is inserted. Thus since the pin is relatively loosely mounted, it is rotatably in position. This has the distinct advantage of offering a greater wearing surface decreasing the amount of wear on any particular point due to the yarn.

The pins 17 and 18 may have a cylindrical surface over which the yarn may pass. However, it will be recognized that if desired, the pins may be formed to present a yarn guide. Such a pin is illustrated in Figure 3, in which the cylindrical surface has an annular groove 23 therein. It will be apparent that the particular form of pin is for illustrative purposes only, and that other forms may be used if desired. Also multiple grooves may be provided.

Another form of pin which may be used is illustrated in Figure 4. The pin 24 shown in Figure 4 may be of slightly greater diameter

than the internal passage 14 of the spindle shank 12. A transverse opening 25 is provided for the pin 24. This opening 25 may be polished to a smooth surface. The pin 24 is inserted transversely in the spindle shank 12 at the intersection of the opening 14 with the transverse openings 15 and 16. This is illustrated in Figure 5 showing only that particular portion of the spindle. The remainder of the spindle is the same as illustrated in Figure 2. In this position the opening 25 will be in alignment with the longitudinal opening 14 of the spindle shank 12. The polished sides of the opening 25 in pin 24 provide the bearing surface for the yarn.

Thus, it will be apparent that there is provided a spindle having a one piece blade portion and a longitudinal bore having a smooth passage for the textile yarn without the necessity of polishing the internal bore. A smooth easily renewable surface is provided by pins at points of contact indicated at 17, 17' and 18, 18' to the yarn as it passes through the spindle. It will be apparent that the additional pins may be inserted at other points in the spindle if necessary or desirable.

While a preferred embodiment of the invention has been illustrated and described, it will be apparent that various modifications are possible without departing from the scope of the invention.

What is claimed is:

1. A double twist spindle for textile yarns having a shank portion having an internal longitudinal passage and a transverse hole therein and a smooth finished elongated pin supported in said transverse hole and having the side thereof projecting into said internal passage.

2. The combination according to claim 1 in which the pin is replaceable.

3. The combination according to claim 1 in which the pin is rotatable.

4. The combination according to claim 1 which has a grooved surface as a yarn guide.

5. A double twist spindle for textile yarns comprising a shank portion and a whorl portion, said shank portion having a longitudinal bore and transverse holes therein and an outlet passage and having smooth surfaced elongated pins mounted in said transverse holes, the side surface of said pins projecting into said bore and said outlet passage.

6. A double twist spindle for textile yarns comprising a shank portion and a whorl portion, said shank portion having a longitudinal bore therein, an outlet passage, a transverse hole at the intersection of said bore and said outlet passage and an elongated smooth surfaced pin in said transverse hole with a side surface thereof projecting into said passage at said intersection, the ends of said hole being closed to retain said pin in position.

7. A double twist spindle for textile yarns comprising a shank portion and a whorl portion, said shank portion being constructed of one piece and having a longitudinal bore therethrough and an outlet, and a smooth surfaced pin inserted in a hole in said shank transversely thereof with the side surface of said pin projecting into said bore.

8. A double twist spindle for textile yarns having a shank portion with an internal passage therein, and a smooth finished pin inserted in a small transverse hole in said shank with the side surface thereof projecting into said internal passage and means for covering the end of said transverse hole.

9. A double twist spindle for textile yarns having a shank portion and a whorl portion, said shank portion having a longitudinal bore and a transverse outlet passage, and small cross holes extending transversely through said shank portion along the side of said bore, smooth finished pins inserted in said holes with the sides thereof projecting into said bore and means for retaining said pins in said holes.

10. A double twist spindle for textile yarns having a shank portion with an integral passage therein, and a smooth finished pin inserted in a transverse hole in said shank, said pin having a transverse opening therethrough in alignment with said internal passage.

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REFERENCES CITED

The following references are of record in the file of this patent:

FOREIGN PATENTS

Number	Country	Date
324,544	Great Britain	Jan. 30, 1930