Aug. 16, 1949. R. H. CARTER 2,478,927

THREAD BRAKE FOR DOUBLE TWISTERS

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Fig. 1.

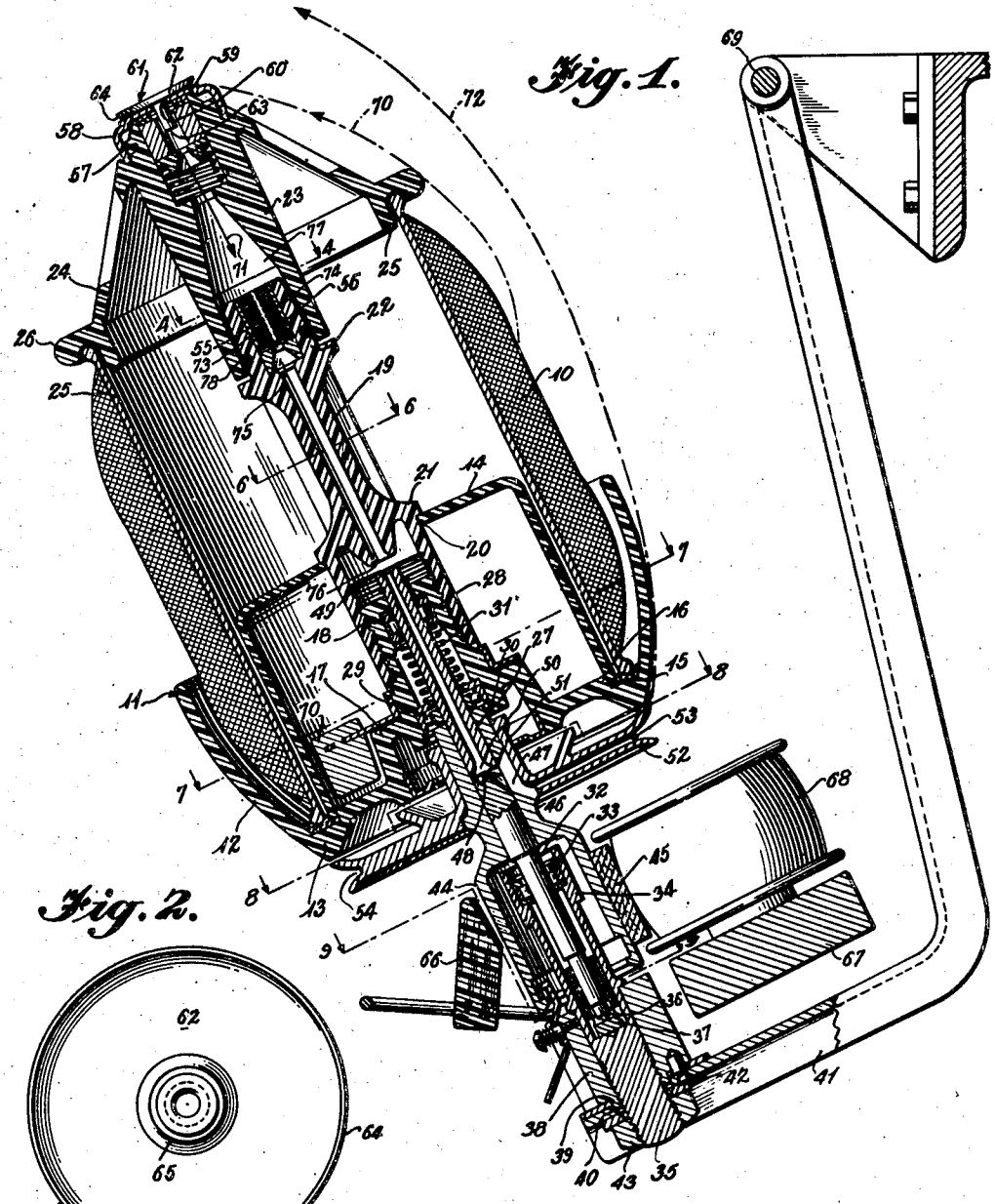
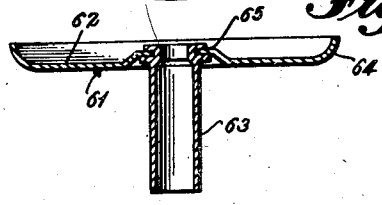


Fig. 2.

Fig. 3.



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Fig. 7.

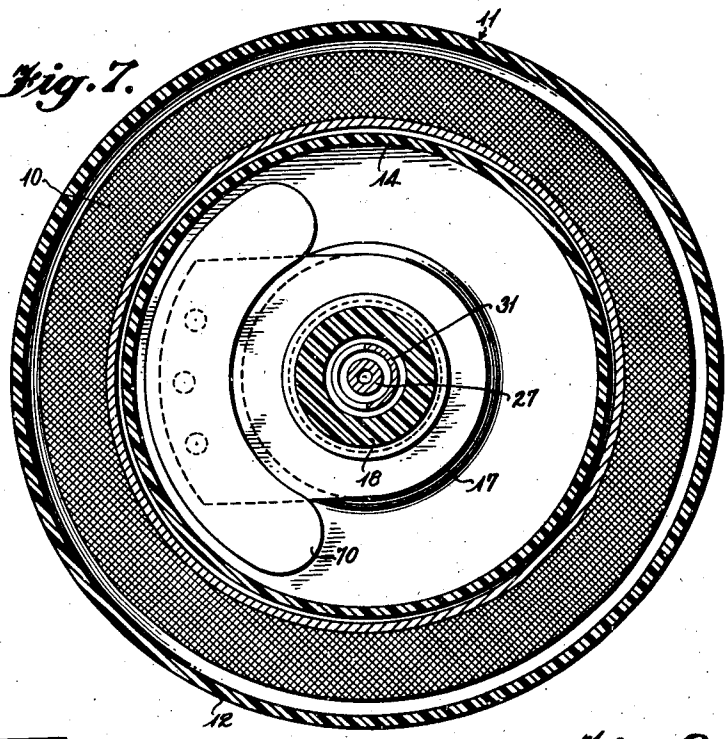


Fig. 4.

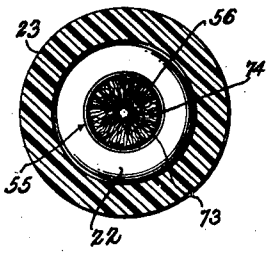


Fig. 5.

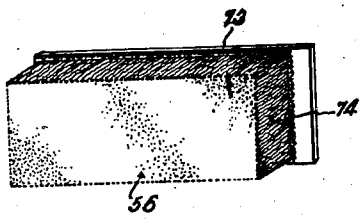


Fig. 6.

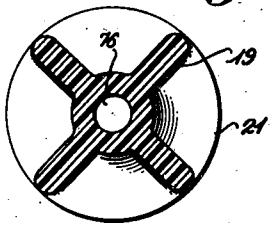


Fig. 8.

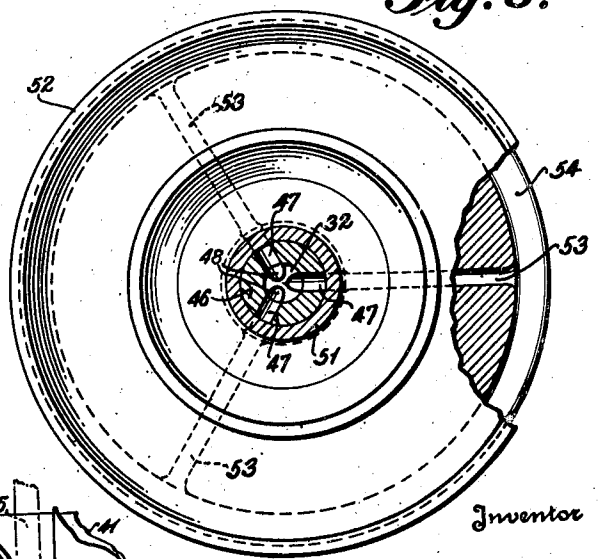
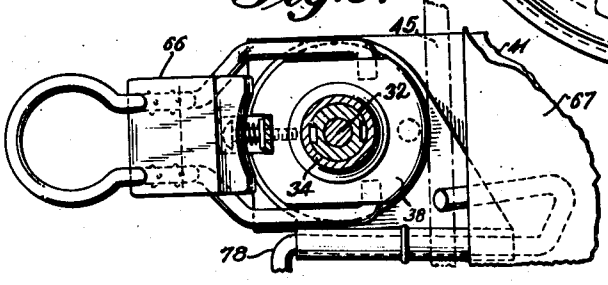


Fig. 9.



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2,478,927

THREAD BRAKE FOR DOUBLE TWISTERS

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Application December 31, 1947, Serial No. 794,963

3 Claims. (Cl. 57—58)

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This invention relates to twisting spindles, especially of the double twist type and more particularly to improvements in methods and means for controlling the passage of yarn or thread through the spindle during the high speed operation thereof.

One of the objects of the invention is to provide means adapted, in cooperation with the tensioning devices used on such spindles, to prevent feeding of yarn therethrough when the yarn or thread breaks on its way to the take-up device and the continued but improper collection of such thread on high speed operating portions of the spindle.

It is another object of the invention to provide a method for preventing the collection of fly-waste on the storage wheel of a twisting spindle by controlling the passage of the yarn through the spindle.

A further object is to provide an arrangement adapted for practising the method and which arrangement can be readily applied to existing twisting spindles.

A still further object is so to constitute the arrangement of the devices and elements used for practising the method that they can be readily placed in operative position in the spindle and easily interchanged and replaced.

Another, still further object of the invention is to constitute the operative member of the arrangement as a prefabricated unit adapted for rapid insertion in a spindle.

In double twist spindles of this type the twisting portion of the spindle, comprising the whorl or belt-driven pulley and the storage wheel, revolves at high speed while the yarn package from which the yarn is drawn remains relatively stationary, being adapted to turn when accidentally carried along or to be turned manually at low speed. The yarn, withdrawn from the package, passes downwardly through the hollow spindle and emerges from a port in the storage wheel around which it becomes wrapped to a greater or lesser extent. It then passes outwardly and in spaced relation around the yarn package, to form the so-called "balloon", characteristic of the free-balloon double twist type of spindle. The twisted thread then passes to a suitable take-up device. The size of the balloon is governed by the rotational speed of the spindle, speed of thread take-up, denier of the yarn being twisted and on certain other factors, as for example, the fact that the spindle speed is adjusted to conform to the spacing prevailing between a plurality of spindles.

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When a so-called "free balloon" is used in contrast to one of restricted extent, the pull or tension exerted on the delivered yarn is uniform and this results in a desirable uniform density of the take-up package. The centrifugal force exerted on the thread during the ballooning, as a function of the denier of the yarn, spindle speed and other factors, influences the pull exerted upon the yarn as it is drawn from the supply package. Hence a balloon of large denier yarn tends to draw the yarn from the package at a faster rate than a balloon of smaller denier yarn.

In order to regulate the pull of the balloon on the yarn drawn from the package it is necessary to interpose suitable braking or tensioning means in the path traversed by the yarn on its way from the supply package to the ballooning zone, such tensioning means being adjusted in accordance with the denier of the yarn. The major portion of the braking or tensioning applied to yarn in a free balloon type of spindle is preferably applied to the yarn at the place where it enters the spindle on its downward travel therethrough, i. e. at the top end of the spindle or cap, the tensioning at this point being effected by suitable members which are caused to bear against the yarn. A supplementary amount of tension however is created by the action of the storage wheel at the lower end from a port of which the yarn issues and around the grooved surfaces of which it wraps to a greater or lesser extent. This supplementary tension depends on various factors inherent during a given twisting operation and cannot readily be controlled. Its magnitude however is of importance when considered in conjunction with the tension applied to the yarn before it passes through the spindle, and the two tensions must be correlated to each other. The storage wheel and its grooved surface in a spindle of this type is of great importance in that its use is necessary in order to insure the production of a free balloon of yarn about the spindle as well as uniform balloon tension. However its operation is attended by the drawback that, if the yarn breaks at a point within the balloon or between the balloon and the take-up device, the thread, although no longer passing to the balloon and to the take-up device, nevertheless continues to be drawn from the supply package, passes through the spindle and wraps up as a layer on the thread storage wheel. The thread thus wrapped on the storage wheel slips to a certain extent, and centrifugal force tends to throw it outwardly in the form of an annulus rotating at high speed. This so-called fly-waste constitutes a source of danger

in that if it builds up sufficiently it may strike operating personnel or contact with adjacent spindles and interferes with their operation. A primary object of the invention therefore is to provide a method and means for preventing the accumulation of such fly-waste.

An embodiment of the invention is illustrated in the accompanying drawing, where:

Fig. 1 is a vertical sectional view of a twisting spindle provided with the arrangement of the invention.

Fig. 2 is a top view of a tensioning member suitable for use with the spindle shown in Fig. 1.

Fig. 3 is a section through the tensioning member of Fig. 2.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1.

Fig. 5 is a perspective view of the yarn passage control element before insertion in the spindle assembly.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 1.

Fig. 7 is a similar view taken on line 7—7 of Fig. 1.

Fig. 8 is a sectional view taken on line 8—8 of Fig. 1 showing the storage wheel.

Fig. 9 is a view partly in section showing a latch-out device and braking means used for stopping the spindle.

Referring in detail to the drawing, a form of spindle to which the invention is applicable is shown as a whole in section as a structure having a conical top, the entire structure being shown tilted from the vertical.

The numeral 10 designates a package of untwisted yarn carried by a holder 11. Holder 11 comprises an upstanding bowl 12 having a base 13. The bowl encloses the lower portion of the yarn package, the wall thereof however being spaced from the exterior of the package to permit unwinding of the yarn. An inverted cup 14 is placed upon base 13 and engages in an annular groove 15 in the base. Cup 14 adjacent its lower edge abuts against shoulder 16 for concentrically aligning the cup within bowl 13. Extending upwardly within the inverted cup 14 is a raised hollow central pedestal 17 formed on base 13 and an externally threaded boss 18 is formed integral with the pedestal. A central guide tube 19 is threaded upon boss 18 and extends upwardly through an opening 20 in cup 14. Guide tube 19 is provided with an annular flange 21 which engages the edge of opening 20 of the cup 14 for causing the cup 14 to fit tightly within groove 15 when the guide tube is screwed in position upon the boss 18. Guide tube 19 is reduced at its upper end as at 22 and is adapted to receive thereover an inner annular boss 23 of cap 24, a rubber ring 78 serving to prevent vibrations between these two members. Cap 24 is of conical formation and is provided with flanges 25 and 26, respectively, providing a groove for engaging the upper edge of the bobbin of package 10. The construction thus described is arranged to properly position and retain package 10 in aligned position with respect to bowl 12 and the opening provided within the pedestal projection 17 of base 13. As hereinafter pointed out the package in operation is normally maintained against rotation at an angle of approximately 25° to the vertical.

A hollow spindle 27 extends upwardly through tubular boss 18, pedestal 17 and terminates below the opening of guide tube 19. A roller bearing 28 is mounted within a recess in boss 18 and engages the interior wall thereof and the exterior

of spindle 27 for maintaining the parts in position for relative rotation. A bearing 29 is arranged within pedestal 17, said bearing engaging the spindle 27 for maintaining the spindle in proper position with respect to base 13 at this point. Bearing 29 is maintained in position by spring ring 30 fitting in an appropriate groove and roller bearing 28 is maintained in proper elevation with respect to bearing 29 by means of coil spring 31.

Spindle 27 extends below base 13 and is there provided with a reduced portion 32 about which is encircled a bearing 33, the bearing being retained within an upstanding cup 34 of a non-rotatable bearing support 35. A pivot bearing 36 is provided at the lower end of the spindle, which bearing engages fixed bearing plate 37 carried in the bearing support.

Bearing support 35 is adjustably positioned by means of nut 38 having a reduced section 39 extending downwardly through opening 40 in a pivoted bracket arm 41. A washer 42 is placed over the lower end of the bearing support 35 and the support is held in position upon the bracket by means of lock nuts 43. A belt-pulley or whorl 44 extends over a portion of spindle 27 and the upper portion of bearing support 35 and is integral with the spindle for rotation therewith. The whorl is adapted to engage and disengage a belt 45 in the manner hereinafter set forth. Reduced neck 46 of the whorl is positioned upwardly within the opening in pedestal 17 of base 13, and it engages the inner race of bearing 29. Neck 46 is provided with three radial openings 47 which correspond to, and are in communication with, three openings 48 in the spindle. Openings 48 communicate with the central opening 49 in spindle 27, the lower end of said central opening being flared outwardly as at 50 to aid in the threading up of the device.

Hub 51 of a thread-storage wheel 52 is fixed to the periphery of neck 46 of the belt pulley or whorl, and it is provided with three radial openings 53 which communicate with openings 47. Storage wheel 52 is provided with an annular groove 54 which serves for the storage of yarn. Groove 54 communicates with openings 53.

Within reduced portion 22 of guide tube 19 is a recess 55, in which reposes a member constituted of fur or plush-like material 56, constituting an embodiment of the thread passage control means of the invention and which is hereinafter described in detail. Cap 24 is formed with a threaded central depression 57 into which nose 58 is screwed. Nose 58 has a flat surface 59 and a central opening 60. A thread tensioning member 61 reposes on nose 58 and is constituted as a disc 62 and stem 63, the latter fitting loosely within opening 60 of nose 58. Flat surface 59 of nose 58 is at least equal to, or slightly larger than, disk 62. Disc 62 is provided with an up-turned marginal edge 64 and the disc is riveted to the stem at 65.

In order to drive spindle 27 idlers, one of which is illustrated at 66 are mounted on spindle rail 67 to guide belt 45 in a path adjacent belt pulley or whorl 44. The bracket 41 is constituted as a two-armed lever pivoted at 69 to a support and so arranged as to support the spindle in pendulous fashion and normally to keep the whorl 44 in engagement with the belt 45. In normal operation the portion of the spindle comprising the whorl 44 and storage wheel 52 rotates at high speed whereas the yarn supply package and its support are kept stationary by a counterweight 70 disposed interiorly of the bell member 14. The

package and its support however can turn relatively to the storage wheel. The spindle can be stopped by means of the device shown in Fig. 9 where 78 designates a pivoted, gravitationally actuated latching member cooperating with the spindle rail 67 for holding the whorl 44 out of engagement with drive belt 45 when the pendulously pivoted bracket 41 carrying the spindle oscillates beyond a predetermined limit. The spindle may also be latched out manually by moving the entire unit to latching position and applying the brake 66 to the whorl 44 to stop the spindle. The brake device and latching-out arrangement constitute the subject matter of the copending application of Ralph H. Carter and Chadwick B. Kingsbury, Serial No. 794,964, filed December 31, 1947.

During the twisting operation the yarn drawn from the supply package 10 passes, as indicated at 70, 71 downwardly through the spindle, tension being applied thereto by the disk 61. It emerges through one of the radial ports of the storage wheel 52 and passes upwardly, forming the so-called "balloon" illustratively indicated by the single strand 72 in Fig. 1.

If the thread should break at a point on its way to the twisted thread take-up device, it would still continue to be withdrawn from the supply package, emerge slowly through the port in the storage wheel as aforesaid, and build up on the latter as an accumulation, thus giving rise to the difficulties mentioned above. To prevent this, a member provided with radially outstanding fibers is disposed within the spindle as shown in Figs. 1 and 4 through which the yarn passes on its downward path to the port in the storage wheel. As the yarn feeds slowly through the port of the latter and bulids up on the groove thereof, that portion between the tension device and the storage groove rapidly becomes twisted to a very high degree thus causing it to kink. The thread within the spindle, due to its kinking becomes enmeshed and caught by the radially outstanding fibers of the passage control member aforesaid, and thus the thread is twisted in two. This stops the thread from feeding through the ports of the above-mentioned thread storage wheel and thus the heavy accumulation of thread in the thread storage groove is prevented. This member is preferably formed of fur-like or plush-like material possessing resilient upstanding fibers. It may be conveniently fabricated from a piece of natural or artificial fur, plush or analogous material of soft brush-like constitution as illustratively shown in Fig. 7 where 73 indicates a flexible support such as hide, fabric, plastic or the like for the upstanding fibers, bristles, hairs or the like 74. The element shown in Fig. 5 is formed into cylindrical shape as by overlapping and uniting the bared ends 74 thereof. The formed cylindrical unit may also be confined in a suitable casing, preferably a flexible one. The formed unit is inserted in the above described recess in the member 19 as indicated at 55 in Figs. 1 and 4. The spindle is threaded-up by passing a flexible hook-ended wire through a port of the storage wheel, thence upwardly through the spindle and through the aperture in the top to pull the yarn downwardly through the spindle by means of the hooked end of the wire. The threading-up wire can be readily pushed through the plush-like yarn passage control member so that it does not interfere with the threading-up operation. Additionally, the various openings within the spindle, e. g. 50, 75, 76, and 77 (Fig. 1) are flared or rounded to prevent stubbing of the threading-up wire. Modifications of this invention will be recognized readily by those skilled in the art, and it is desired to cover all modifications coming within the scope of the appended claims.

I claim:

1. In combination with a twisting spindle of the type wherein the yarn is drawn from a relatively stationary supply package and enters said spindle at the top and passes through said spindle and issues at the bottom thereof and is wrapped on and unwrapped from a rapidly rotating storage wheel constituting part of the twisting mechanism to produce a free balloon of yarn about the spindle as it passes in twisted condition to a collection device, braking means bearing loosely against the outside top of said spindle at the place of entry of said yarn to impart normal braking action to said yarn, a broken thread entangling means constituting a yarn path disposed within said spindle intermediate said top and bottom and provided with a multiplicity of spaced resilient bristles extending radially into the hollow interior of the spindle and substantially at right angles to the direction in which the yarn passes through the spindle for entangling the loose end of said yarn and preventing continued passage thereof through said spindle and its collection on said storage wheel in an amount substantially in excess of that required for forming said balloon when said yarn breaks between said storage wheel and said collection device and twists and kinks within said spindle and a pull continues to be exerted on the yarn on said supply package by yarn already collected on said storage wheel and caused by centrifugal force exerted on said collected yarn.

2. A yarn entangling member for double twist spindles as constituted according to claim 1, said member comprising a hollow cylinder lined with a pile fabric, the pile of which extends radially into the hollow interior of the cylinder at right angles to the direction in which the yarn passes through said spindle to define a thread path affording high resistance to movement of kinked yarn and adapted to entangle and hold broken yarn and prevent further travel thereof through said spindle.

3. A yarn entangling member for double twisting spindles as constituted according to claim 1, said member comprising a hollow cardboard cylinder lined with a pile fabric of mohair, the pile of which extends radially into the hollow interior of the cylinder at right angles to the direction in which the yarn passes through said spindle to define a thread path affording high resistance to movement of kinked or over-twisted yarn and adapted to entangle and hold broken yarn and prevent further travel thereof through said spindle.

RALPH H. CARTER.

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