April 19, 1960 K. A. LANDOLT 2,932,936

BALLOON CONTROL FOR DOUBLE TWIST SPINDLES

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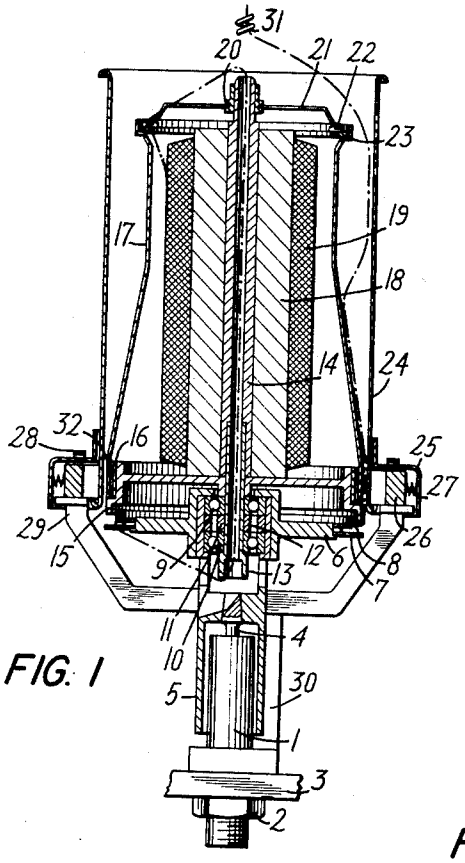


FIG. 1

FIG. 4

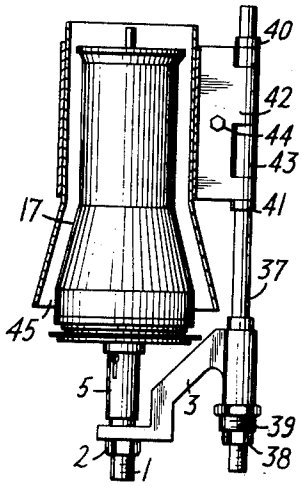


FIG. 5

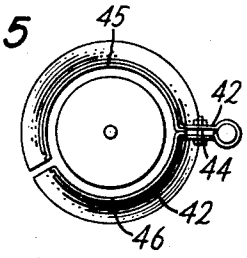


FIG. 2A

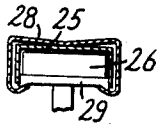
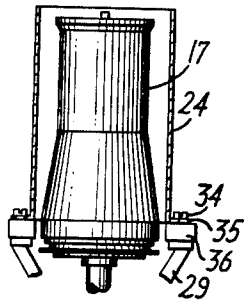


FIG. 3



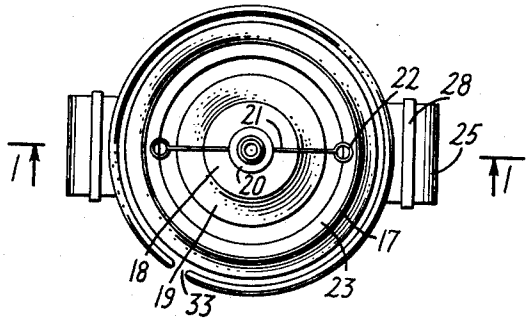


FIG. 2

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BALLOON CONTROL FOR DOUBLE TWIST SPINDLES

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3 Claims. (Cl. 57—58.83)

In connection with double twisting spindles, various proposals have already been made to provide so-called limiting rings, in order to reduce the thread tension and the space required. Such rings, however, have the drawback that they cause too great friction upon the thread, which is particularly apparent when fine yarns or wholly synthetic yarns such as artificial silk, are handled. This friction causes the thread to become rough because of the breaking of individual fibrillae.

According to the present invention, I have now succeeded not only in eliminating this drawback, but in simultaneously obtaining an extremely effective reduction of the thread tension and of the space required, and at the same time I have provided a construction in which the entire spindle is very effectively protected against outside influences.

A characteristic feature of my device lies in the fact that the double twisting spindle is surrounded by at least one balloon limiting mantle, whereby the distance from the top to the bottom limiting edges is greater than the internal diameter of the limiting surface.

My device therefore does not have a limiting ring but, instead, has a limiting mantle, which surrounds, to a certain extent as a protecting shell, a substantial portion of the double twisting spindle, particularly the upper portion.

A further important feature of the invention consists in the fact that the limiting mantle is at least partly slit at least at one point along its periphery, with the edge of the slit lying outside the inner circular surface and suitably rounded. By reason of this feature, it is possible to thread the yarn in the simplest manner, and one is surprised to find that the rounded slit has not the slightest adverse influence on the thread balloon.

The above-mentioned limiting mantles can be adopted for all types of double twisting spindles, no matter of what design. They are however especially suitable for spindles which tend to produce slight thread tensions, i.e. spindles which work with so-called adjacent double-balloons, e.g. spindles which have a stationary run-over member on which the balloon is supported and which have a so-called reserve brake on the rotating member.

When applied to such spindles it is, according to the invention, important that the limiting mantle be given a length such that, when the spindles are being started, it temporarily limits the forming single balloon so effectively that the adjacent double balloon can form. With such double twisting spindles the new mantle is particularly effective, since it not only reduces thread tension and space required, but at the same time it also effectively protects the stationary run-over member against all external influences, especially since the limiting mantle according to the invention projects higher than the run-over member and the bobbin within it.

With the new limiting mantle, a surprising effect also

arises in connection with the last-mentioned double twisting spindles, in that the wearing by friction of the yarn is very considerably reduced, although the thread balloon in addition rubs on the inner side of the mantle at a high speed. Artificial silk with fine fibrillae, or entirely synthetic yarns which hitherto could not be twisted perfectly at very high speeds, can now with the limiting mantle be at once twisted and without any roughening, even at still higher speeds, when the mantle must of course have a smooth inner surface.

According to the invention, the best results have been obtained with a mantle consisting of sheet aluminium, polished internally and anodic oxidised, since a minimum of dust will deposit on it, and such mantles are also cheap to manufacture. The smaller the internal diameter of the limiting mantle, the better will be the results obtained with it. In order to keep the distance of the limiting mantle from the stationary run-over member as small as possible, it is therefore especially advantageous that the magnets, for instance, which serve to hold the run-over member firm, act through the limiting mantle on the parts of the spindle that have to be kept at rest, and then the limiting mantle is with advantage at the same time formed as magnet holder on its outer side.

For the same reason, it may in certain cases be advantageous that the limiting mantle runs not cylindrically, but also tapered at certain parts, in order in this manner to suit itself at least partly to the shape of the run-over member narrowing upwards, and in order in this manner to obtain the smallest possible distance between the run-over member and the limiting mantle.

In order in such cases to be able nevertheless to dismantle the actual double twisting spindle easily, it is then advantageous if the limiting mantle consists lengthwise of at least two parts, each of these parts being swivably fixed by itself on a pivot pin located outside the spindle.

In the accompanying drawing the invention is illustrated in three examples of execution, where:

Fig. 1 shows a longitudinal section through one example of execution of a vertical uptwister spindle, which works with a so-called adjacent double balloon,

Fig. 2, the corresponding view from above,

Fig. 2*a*, a detail, namely the fixing of the limiting mantle at the spindle,

Fig. 3, another possibility of the fixing, whilst

Fig. 4 shows a third example of execution in elevation, and

Fig. 5 also the third example of execution in plan.

The spindle lower part 1, designed as usual and not described in detail, is fixed by means of nut 2 to the machine frame 3 (see Figs. 1 and 4). The machine frame may then with advantage consist of a so-called swiveling arm (see Fig. 4). The spindle upper part consists of the shaft 4, which as usual is supported in the spindle lower part 1. The wharve 5 is rigidly connected to shaft 4. Wharve 5 is as usual driven by a horizontally running belt (not shown). Fixed on wharve 5 is the rotating member 6, on which the sheet-metal rings 7 and 8 are fixed. The sheet-metal rings 7 and 8 contain the so-called reserve brake and a carrier slit for the thread.

The design of the reserve brake in detail is not critical in the present case. It is only important that a device exists at the rotating member, on which device the thread is additionally braked in varying degree along the periphery of the rotating member when the thread tends to wind itself onto the rotating member. The hollow shaft 13 is supported within the wharve 5 by means of two ball bearings 9 and 10 and the distance rings 11 and 12, the hollow shaft 13 being rigidly connected to the

tube 14 and to the run-over plate 15. The ring 16, which carries the actual run-over member 17, rests on the plate 15. The bobbin 18 with its winding 19 is centered on the tube 14. A bushing 20 is rotatably carried at the upper end of the tube 14, a wire flyer 21, the eyes 22 are supported on a ring 23, being secured to bushing 20. The limiting mantle 24 is rigidly connected to the two magnet casings 25. In the casings 25 there are seated the magnets 26, which are pressed onto the limiting mantle 24 with the springs 27. The casings 25 are fixed on the carrier arms 29 with the stirrup springs 28 (see Fig. 2*a*). The carrier arms 29 in their turn are connected firmly to the spindle lower part 1 by means of supports 30.

The manner of operation of the spindle is as follows: From the winding 19, the thread runs through the eyes 22 of the flyers 21 into the interior of the tube 14. The flyers 21 are thereby carried along by the thread and at the same time act as a brake on the thread, the weight of the flyer being suitable for giving the desired braking effect. The thread runs through tube 14 and hollow shaft 13, and then passes into the carrier slit of the sheet metal ring 7. Over the reserve brake formed by the sheet metal rings 7 and 8, the thread runs over the outer surfaces of plate 15 and run-over member 17, whereby—if the weight of the flyer 21 has been correctly chosen—it detaches itself from the run-over member 17, slides along the inner surface of the limiting mantle 24, and is finally led to the winding-on means through the eye 31. The ring 16, which is preferably formed of iron, is provided with projections 32, which correspond in form with the horseshoe magnet 26. In this way, the upper parts of the spindle are held, as usual, in rest position.

The spindle may be formed of various types of material. Thus, wharve 5, hollow shaft 13, tube 14 and ring 16 are preferably made of iron or the like, and the run-over member 15 is similarly formed of iron which is hard chromium plated on its exterior. Rotating member 6 advantageously is formed of aluminum or synthetic plastics. The sheet-metal rings 7 and 8 are, for instance, made of sheet iron and hard chromium plated. Run-over member 17 and limiting mantle 24 have proved to be most satisfactory when made of anodic oxidised and polished sheet-aluminium or of a suitable aluminium alloy. Bush 20 and ring 23 can be made of fibre or other suitable materials, and flyer 21 of steel wire. It is of course possible to make one or other part also of some other suitable material.

In Fig. 1 it can clearly be seen that, in the lower parts between run-over member 17 and limiting mantle 24, there is only a very small space, just large enough for the thread to be able to swing through without hindrance, and yet so small that the magnets 26 can act powerfully on the projections 32. The smaller the internal diameter of the limiting mantle 24 can be kept, the more likely is it to be effective also with quite fine yarn, and then naturally the space required by the whole spindle is reduced, since the spindles can in fact be set so close to each other on the machine, that one limiting mantle comes against the next, for the limiting mantles are designed in such a way that the yarn balloon can never swell outside them. For this reason, the limiting mantle 24 is also lengthened upwards, so that the yarn balloon no longer touches the uppermost edge of the mantle.

In order to construct the limiting mantle at the same time as protecting mantle, it is preferable to make it of such a length that it extends above the run-over member as well as above the bobbin within it. As can be seen from Fig. 1, the bottom edge of the limiting mantle must be brought fairly far down, in fact so that the tightened thread cannot be caught in the slit of the mantle when the spindles are started. Also the simple balloon forming at the beginning, has to be limited by the mantle in such a way the balloon cannot swell out at its under part, otherwise the formation of an adjacent double balloon would be impeded. In consequence of the cylindrical design of the mantle 24, the actual spindle can at once be withdrawn upwards out of the spindle lower part 1. The limiting mantle 24 is preferably flanged-over at its edges, as also in its longitudinal slit (see Fig. 2). By this flanging, the actual edge of the slit comes slightly outside the inner limiting surface of the mantle 24. This is sufficient to prevent the rapidly rotating yarn balloon being hindered in any way by the slit 33.

It is self-evident that this limiting mantle, without any change to the object of the invention, may also consist of several rings arranged one over the other. It is also not necessary that the limiting mantle should be fixed to the spindle itself. The mantle, or separate rings of it, could also be fixed to the machine stand. The mantle may have one or several longitudinal slits. In order to make the limiting mantle more stable, the slit may for instance even be bridged over at separate places, without thereby greatly hindering the threading of the yarn. It would for instance be easily conceivable for the mantle to be somewhat widened at its upper end, and for the top edge to be kept solid, i.e. without any slit. The threading in of the yarn could then be easily effected with the help of a small needle or the like. For twisting extremely coarse yarns, it is preferable that the mantle should not be too narrow. It is thereby possible simply to make it of larger diameter in its cylindrical shape, in order to fix it to the magnet holder plate 36 by means of screws 34 and flanges 35 (see Fig. 3). It would however also be conceivable to leave its lower portion as shown in Fig. 1, and then to widen it conically upwards in accordance with requirements. Figs. 4 and 5 show an embodiment which is specially suitable for fine yarns and long tubes.

The construction of the spindle is the same as that illustrated in Figs. 1 and 2, the spindle being carried on a swivelable arm 3, which in its turn is swivelably carried on a pin 37. The said pin is fixed by means of nut 38 to the machine frame 39. On the pin 37, the two hinges 42 and 43 are held by means of set rings 40 and 41, the hinges being firmly clamped by screw 44 with respect to each other and at the same time on the pin 37. The two flange-shaped hinges 42 and 43 in their turn carry the two parts 45 and 46 of the limiting mantle. These parts are separated from each other lengthwise, as shown in Fig. 5, and are the smallest possible distance away from the run-over member 17, and have a taper shape narrowing upwards. Nevertheless, in order to be able to raise the spindle easily out of the lower part, for instance to oil it, the two halves of the limiting mantle may be moved apart after screws 44 or some other suitable clamping means have been loosened.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A strand twisting apparatus comprising, in combination, a double twisting uptwister spindle having a non-rotating member with an axial hollow shaft, and a rotary driven member, said spindle being constructed to support a bobbin and to feed a strand from said bobbin while defining a first inner balloon axially through said shaft from an inlet end to an outlet end thereof and radially outwardly from said outlet end to said rotary driven member to define a second outer balloon, and means for controlling said outer balloon and protecting the non-rotating member comprising a stationary balloon limiting mantle having a longitudinal slit formed therein, said slit being formed in said mantle and having circumferentially spaced, directly-opposed wall portions provided by said mantle.

2. A strand twisting apparatus as defined in claim 1, wherein said stationary balloon limiting mantle with a longitudinal slit has a length sufficient that the outer balloon does not touch the uppermost edge of said mantle nor swell out at the under part of said mantle.

3. A strand twisting apparatus as defined in claim 1, wherein said spindle has stationary magnets to coact with the non-rotating member to hold it from rotation, said magnets being disposed exteriorly of said mantle to act through the mantle upon the non-rotating member.

References Cited in the file of this patent

UNITED STATES PATENTS

535,029	Sullivan	Mar. 5, 1895
539,561	Whitaker	May 21, 1895
2,127,921	Kent	Aug. 23, 1938
2,603,938	Rodgers	July 22, 1952
2,660,856	Kingsbury	Dec. 1, 1953
2,731,786	Klein	Jan. 24, 1956

FOREIGN PATENTS

34,002	Netherlands	Nov. 15, 1934
346,003	France	Nov. 8, 1904
872,986	France	Mar. 2, 1942
513,086	Belgium	July 24, 1952