July 22, 1952 M. D. RODGERS 2,603,938

BALLOON CONTROLLING DEVICE

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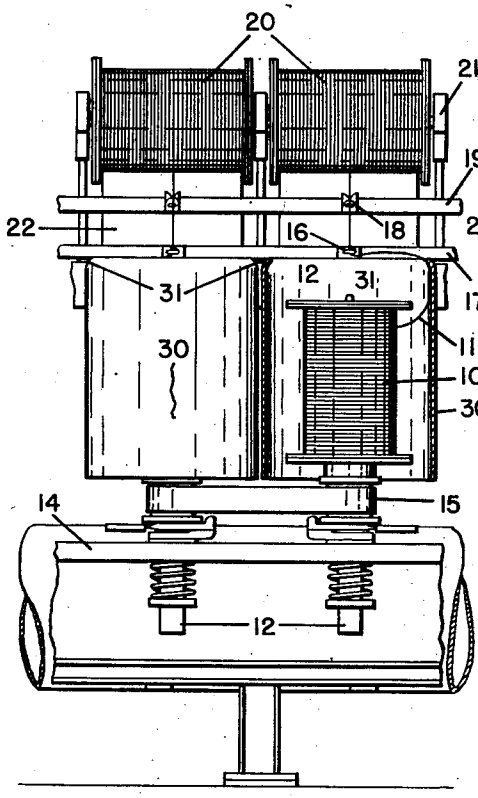


FIG. 1

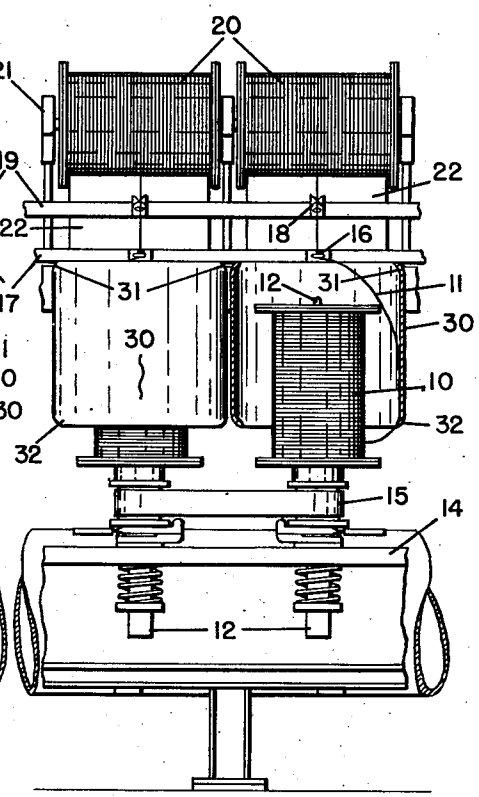


FIG. 2

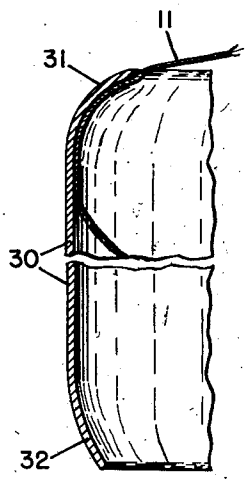


FIG. 3

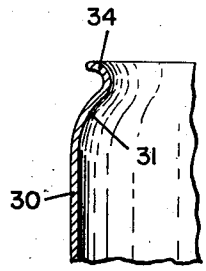


FIG. 4

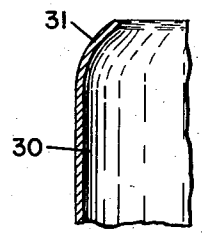


FIG. 5

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BALLOON CONTROLLING DEVICE

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5 Claims. (Cl. 57—59)

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This invention relates to devices for controlling the ballooning effect of yarn, thread, or cord during twisting operations.

In twisting it is customary to feed the yarn, thread, or cord through a suitable twisting guide positioned above a rotating yarn package to a laying guide and thence onto a collecting package. The twisting operation is usually carried out at relatively high speeds with the result that the yarn is subjected to centrifugal action causing it to "balloon." This "ballooning" action is not too objectionable if the maximum diameter remains relatively small; however, if the diameter is of substantial size the space required by any one supply package becomes excessive and the twisting apparatus becomes uneconomical. Also it is desirable to conduct the twisting operations with a minimum of stoppage because of knots and other imperfections in the yarn which during ballooning tend to cause breakage by ensnarlment of the yarn, entanglement in the twisting guide positioned above the rotating package, or entanglement with some other part of the twisting apparatus. It is important therefore to control the balloon diameter and to restrict the balloon within a predetermined space during twisting. Means such as spaced rings or balloon girdles of various types are normally utilized for control of yarn balloons.

It has been observed that when a package from which the yarn is removed and twisted is relatively full the maximum ballooning diameter is greater than when the package is substantially empty. During such intervals of maximum ballooning the yarn has a tendency to rise above the supply package to sometimes become entangled with the twisting guide immediately above the package unless its upper portion is restrained so that the yarn is maintained clear of the guide. Minor imperfections in the supply package may momentarily halt the delivery of the yarn, thread or cord from the supply package. When the momentary retardation is overcome, the sudden release imparts a shock wave to the balloon which may jump out of a balloon restricting means and ensnarl the twisting guide, etc. Knots in the yarn also tend to develop an eccentricity in the balloon which sometimes cause breakage while going through the guide. By adequately controlling the vertical travel and extent of the twisting balloon the yarn balloon can be kept a sufficient distance from the twisting guide, and also the twist can be better restrained from creeping back to the package whereon it may become twisted in with the turns still on the package.

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The apparatus of this invention advantageously provides for a device that controls the ballooning of yarn, thread, or cord in a twisting operation at increased speeds. The device is of simple construction which permits the design of a compact twisting machine. It advantageously controls the balloon throughout the full unwinding period of a rotating package and minimizes breakage of the twisted material to improve its quality, and the twist is made more uniform. These results are attained without imposing any undue frictional resistance on the material being twisted.

The device comprises a balloon restricting cylinder substantially fully encompassing a twisting package. The cylinder ends are advantageously turned in at a radius to substantially dampen and restrict the balloon from moving out of the cylinder and align its travel to a twisting guide above to thus prevent an entanglement of the twisted yarn with the guide, and improving the twisting of yarn of various qualities. Where there is not enough vertical spacing to permit a cylinder to substantially fully enclose a twisting package the cylinder may be shortened and its base also turned inwardly at a radius which will control the balloon and keep it from emerging outside the cylinder. The cylinder ends may be further advantageously outwardly curved to protect the inner curved surface of the cylinder from damage which if imperfect may have the tendency to damage the yarn upon contact. Generally the cylinder is of such a width so as to permit a ready insertion of a twisting spool on a spindle, as well as its removal.

This invention will be more fully described by reference to the accompanying drawing which shows the application of a balloon controlling cylinder in a twisting operation. In the drawing,

Figure 1 is an elevation of a portion of an uptwisting apparatus embodying the balloon controlling device;

Figure 2 is a further elevation of a portion of a twisting apparatus representing a modified construction of a balloon controlling device; and

Figures 3, 4, and 5 are further details of the balloon dampening ends of the device.

Referring to the drawing a supply package 10 containing yarn, thread, or cord 11 is rotated on a spindle 12 that is supported on a transversely positioned member 14. The yarn package 10 is rotated by means of a belt 15 running about the whorl of the spindle 12. The yarn 11 is withdrawn from the package 10 through a twisting guide 16 positioned above the spindle 12 and sup-

ported on the transverse member 17, thence through a laying guide 18 mounted on a transverse bar 19 and onto a surface rotated collecting package 20. The collecting package 20 is horizontally positioned in supports 21 while being rotated by surface contact with a driving roller 22.

The rapid rotation of the yarn supply package 10 tends to throw the yarn 11 in an outward direction causing it to balloon which, if unconfined, would tend to become entangled with adjacent equipment to become broken. There is provided about the package 10 a vertically positioned cylinder 30 substantially encompassing the yarn package and being adapted to control the yarn balloon diameter to a diameter not greater than the cylinder. The cylinder is advantageously adjustably mounted and fixed on the twisting frame of the apparatus and the supply packages 10 are positioned within the cylinder and removed therefrom. The diameter of the cylinder is larger than that of its open ends. The balloon, because of the construction of the cylinder, is restrained in the shape that it would normally assume. As shown the cylinder 30 has curved ends 31, 32 which dampen the vertical ballooning effects so as to prevent the balloon from emergence, possible entanglement with the twisting guide 16, or becoming entangled with the lower part of an adjacent twisting spool.

The balloon controlling cylinder 30 is advantageously curved inwardly at its ends at a radius designed to keep the balloon from creeping out as well as to restrain and dampen it to clear the twisting guide. The twisting guide 16 is desirably positioned relative to the curved portion 31 of the cylinder a distance so as not to draw the balloon out of the cylinder. As further shown in Figures 3, 4 and 5 the curved upper end 31 is turned in at a radius that will gradually deflect the balloon when it reaches that portion of the cylinder. The curved portion deflects and flattens the upward portion of a yarn balloon in a dampening, restraining and compressing manner so that the portion of the balloon entering the twisting guide 16 is curved and the guide provided with sufficient clearance to prevent any yarn entanglement. The curved portion 31 also tends to depress the balloon on a full yarn supply, and is particularly advantageous with malformed packages. The base portion of the balloon restraining cylinder also may be somewhat similarly curved inwardly to prevent the balloon from creeping out of the bottom of the cylinder. The curvature 32 at the base need not be similar to that of the curved portion 31 since the ballooning effect is not as severe at the base of the balloon as it is at the top.

It is of course important that the dampening surface of the curved portions 31 and 32 be smooth to avoid injury to the twisted yarn. Where there may be a tendency to damage the balloon dampening curved surface by the insertion of yarn supplies there may be provided, by again outwardly curving the upper portion of the cylinder, a safeguard 34 that will protect the curved portion 31. It has been further observed that yarn containing knots passes through the twisting guide more freely when a balloon is vertically dampened. Also there is a tendency for a better control of the twist in the yarn as well as improved control of the twist and its tendency to creep back to the surface of the spool to sometimes become twisted in with the remaining yarn on the spool.

I claim:

1. In combination, a rotating yarn supply, a twisting guide positioned above said yarn supply, a yarn collecting package for said supply, a balloon controlling cylinder spaced about said yarn supply, said cylinder having an open end diameter greater than said yarn supply and less then the cylinder itself, said cylinder adapted to control the ballooning of said yarn to a predetermined space.

2. A balloon controlling device comprising a vertically positioned cylinder adapted to receive and encompass a twisting package, and said cylinder having its upper end curved inwardly, the opening across the curved portion being larger than the diameter of a twisting package.

3. A balloon controlling device comprising a vertically positioned cylinder adapted to receive and encompass a twisting package, said cylinder being longer than a twisting package, and one end of said cylinder being curved inwardly leaving an opening having a diameter across the curved portion larger than the diameter of a twisting package.

4. A balloon controlling device comprising a vertically positioned cylinder adapted to receive and encompass a twisting package, one end only of said cylinder extending beyond a twisting package, and both said ends of said cylinder being inwardly curved leaving openings having diameters across the curved portions larger than the diameter of a twisting package.

5. A balloon controlling device comprising a vertically positioned cylinder adapted to receive and encompass a twisting package, and one end of said cylinder being curved inwardly then outwardly leaving an opening having a diameter across the curved portion larger than the diameter of a twisting package.

MARCUS D. RODGERS.

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