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Description

This invention relates to winding tensionsensitive thread such as slubbing.

Slubbing is, being twistless or essentially so, very fragile and easily broken under very light tensions. On that account it is difficult to wind into a package.

Patent DE-A 2 507 891 discloses a yarn winding apparatus comprising a bobbin with flanges at each end on which the yarn is to be wound supported on and rotated by a pair of rollers and a yarn brake to wind the yarn running to the bobbin under tension. Such an arrangement is described in connection with winding endless multifilament yarn, which has substantial strength as compared to slubbing.

Conventional slubbing winding techniques employ a surface-driven winding package which runs up a ramp as it grows during the wind. The slubbing is fed to the nip of the package and the driving roller under substantially no tension. The contact pressure at the nip is increased above the weight of the package by the inclined ramp arrangement.

Such a technique is ordinarily capable of winding a soft, fractional kilogram package. Slubbing packages require delicate handling to avoid loops sloughing off or deformation such as would make unwinding more difficult. The relatively small size of the packages means correspondingly high handling costs and frequent package changing operations.

The present invention provides, however, a technique which can produce large, firm, well-wound slubbing packages.

The invention comprises a method for winding a package from tension sensitive thread such as slubbing comprising supporting the package whilst being wound on a pair of parallel rollers which are both driven so as to rotate the package by peripheral contact therewith, in which the said rollers may be driven differentially to effect different roller surface speeds and are arranged so that the thread first encounters the slower moving roller such as to effect controlled tensioning of the thread at its tangent to the package surface. The rollers may have surface speeds differing by up to 10%.

One of the rollers may have a gripping surface, such as a rubber surface, which may be dimpled.

It may be arranged also, however, that the package bears more heavily on one roller than the other and may in fact be held clear of one of the rollers which is however wrapped to a certain angle by the oncoming thread.

Ordinarily, the distribution of the thread axially of the package is effected by a simple traverse mechanism traversing either the package relative to the thread guiding arrangement or the latter relative to the former. A simple harmonic traverse motion is employed, this being adequate for the inherently low quality of winding characteristic of slubbing packages - the improvement to be derived from a constant speed traverse mechanism (such as is commonly used in winding twisted yarns and continuous filament yarns to give a well-shaped package with 'straight' cylindrical or conical sides) would scarcely be noticed in a soft slubbing package.

An additional measure to improve package formation is to control or prevent any tendency for the thread to roll on the roller surface or before the roller/package interface at the edges of the distributed wind. Such control can be effected by increasing the transverse frictional effect of the roller as compared to the circumferential frictional effect, as by profiling the roller surface with circumferential grooves. Another way such control can be applied is by having increased frictional coefficient surfaces on the roller at the location of the edges of the wind, as by having inset rubber rings.

Using techniques according to the invention, moreover, the use not only of a constant speed traverse mechanism and such edge control measures, but also of pattern breaker means therewith makes a significant difference to the quality of the resultant package.

The invention also comprises apparatus for winding a package from tension-sensitive thread such as slubbing comprising driven parallel roller support means for the package which rotate the package by peripheral contact therewith, and in which the rollers of the said roller support means for the package may have different diameters and be rotated at the same rotational speed or alternatively that the said rollers may be driven by differential speed drive means, the rollers of the said support means for the package being arranged so that the thread first encounters the slower moving roller such as to effect controlled tensioning of the thread at its tangent to the package surface.

Embodiments of apparatus and methods for winding tension-sensitive threads according to the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is an end elevation of one winding arrangement,

Figure 2 is a front elevation of the arrangement illustrated in Figure 1,

Figure 3 is an end elevation of another arrangement,

Figure 4 is a plan view of the arrangement illustrated in Figure 3 also showing a traverse mechanism.

Figure 5 is an end elevation of another arrangement,

and Figure 6 is an end elevation of yet another arrangement.

The Figures illustrate winding a package 11 from tension-sensitive thread 12 such as slubbing comprising supporting the package 11 whilst being wound on a pair of parallel rollers 13, 14 which are both driven so as to rotate the package by peripheral contact therewith and to effect controlled tensioning of the thread 12 where it encounters the package surface 16 at 15.

In Figures 1 and 2 the package 11 is shown in full line at the beginning of the wind, in broken line at full size at the end of the wind. The package 11 is guided and stabilized by vertical guide rails 20 for the package centre spindle.

In Figures 1 and 2 the rollers 13, 14 are driven dif-

ferentially to effect such tensioning, having different surface speeds by virtue of the fact of one of them, 14, is of slightly larger diameter than the other, both being driven at the same rotational speed by timing belt means 17 running over sprockets 13a, 14a of the rollers 13, 14 and being driven by an electric motor 16.

Alternatively, the rollers 13, 14 could be the same size, the surface speed differential being derived from differently sized sprockets 13a, 14a.

It is arranged that the faster-moving roller 14 is encountered second by the thread 12. The effect of this is that the slower moving roller 13 imparts a slight drag or draft to the thread 12 which results in a controlled tension, which is to say a tension which is always within the limits of tension to which the thread can be subjected without, in the case of slubbing, for example, breaking or in the case of a very extensible yarn without unduly extending the same.

Even such low tension as slubbing can withstand is found to result in a firm slubbing package. Such firmness can allow the building of a package as proved already to be of at least 1.8 kg and without any tendency to sloughing of turns, especially when built with a constant speed traverse motion. Axial and circumferential pattern breaking will clearly give superior builds.

Typical speed differentials can be up to 10% - 2% and 4% have been used with best effect.

Figures 3 and 4 show an arrangement basically similar to that of Figures 1 and 2 but with the rollers 13, 14 the same size, one, 13, of them, however, being covered with a rubber, especially a dimpled rubber (as for a table tennis bat) sleeve 31.

In Figures 3 and 4 is shown an edge control arrangement comprising increased frictional coefficient bands 33. eg. of rubber set in to the surface of the roller 13 at the edges of the distributed wind. These are for the purpose of controlling the tendency of the thread 12 to roll or slip axially of the roller 13 at the reversal points. The roller 13 could, instead, be profiled with closely spaced shallow circumferential grooves for the purpose of controlling such tendency.

The rollers are driven at the same speed or at different speeds as desired by a motor/differential gearbox arrangement 32 whereby the relative speeds of the rollers 13, 14 can be readily varied.

Figure 4 illustrates also a traversing arrangement comprising a hydraulic ram 41 programmed to give a constant speed stroke moving the winding assembly from side to side to distribute the slubbing axially of the package 11. To prevent build up of radius at the edges of the package, the stroke of the ram 41 is itself shifted slightly from side to side and its speed of traverse is varied slightly during the build for pattern breaking purposes. This is effected by a controller 42 for the ram 41 programmed in accordance with conventional package building techniques.

Of course, it is also possible to hold the package stationary in the axial sense and transverse a thread guide relatively thereto.

Figures 5 and 6 illustrate different arrangements in which the controlled tensioning is effected by

having a differential contact pressure of the package 11 on the two rollers 13 and 14. In the arrangement of Figure 5, the guide rails 20 are displaced slightly from the plane 51 which is equidistant from the axes of the rollers 13 and 14. Thus even though the rollers 13 and 14 are the same size and driven to rotate at the same speed, the package 11 will rest on the roller 14 with a greater pressure than it will on the roller 13 and, depending on the extent of the displacement of the guide rails 20 from the plane 51, may even be slightly clear of roller 13 by as much as the diameter of the thread 12. The differential pressure thus brought about is enough to effect a slight drag or draft on the thread as between the two rollers 13 and 14 to bring about the improved wind. Of course, the two rollers 13 and 14, even with this differential pressure arrangement, may still be of different size and/or be driven at different surface speeds and/or have different frictional coefficient surfaces.

Figure 6 shows an arrangement in which the guides 20 are replaced by a pivoting cradle 61, which can be arranged by appropriate selection of the pivot axis and/or by a suitable linkage to cause the package 11 to lie with differential pressure on the rollers 13 and 14 or not at all on the roller 13, and which may also be used with different sizes, surface speeds and frictional coefficients of the roller surface.

The illustrated arrangements may be operated with different threading paths. For example, the slubbing may be fed in between the two rollers. Different threading methods, different speed differentials, different roller surface configurations will be found to affect the quality of package built. However, using the techniques described and illustrated, firm, dense, well formed packages of slubbing can readily be wound to substantially greater package weights than are possible using conventional equipment.

The winding method and apparatus have been demonstrated with twistless wool slubbing. It is thought best results are obtained when the controlled tensioning is just sufficient to pull crimp out of the fibres but not noticeably to draft the slubbing i.e. to cause the fibres to slide over each other.

The technique will clearly work with other extensible threads such as crimped, e.g. false twist crimped or torque stretch yarn, and elastomeric yarn, in the sense that at least nothing untoward will happen and indeed the precise control of tensioning of the thread where it encounters the package surface will probably give better winding in many cases. Undoubtedly, however, it is of major and totally unexpected benefit to extend the idea to the winding of slubbing, where dramatic improvements in the quality and size of a slubbing package have been established.

Claims

1. A method for winding a package (11) from tension sensitive thread (12) such as slubbing comprising supporting the package (11) whilst being wound

on a pair of parallel rollers (13, 14) which are both driven so as to rotate the package (11) by peripheral contact therewith, and characterised in that the said rollers (13, 14) are driven differentially to effect different roller surface speeds and are arranged so that the thread (12) first encounters the slower moving roller (13) such as to effect controlled tensioning of the thread (12) at its tangent (15) to the package surface (16).

2. A method for winding a package according to claim 1, in which the rollers (13, 14) have surface speeds differing by up to 10%.

3. Apparatus for winding a package (11) from tension-sensitive thread (12) such as slubbing comprising driven parallel roller support means for the package (11) which rotate the package (11) by peripheral contact therewith, and characterised in that the rollers (13, 14) of the said roller support means for the package have different diameters and are rotated at the same rotational speed or alternatively that the said rollers (13, 14) are driven by differential speed drive means, the rollers of the said support means for the package being arranged so that the thread (12) first encounters the slower moving roller (13) such as to effect controlled tensioning of the thread (12) at its tangent (15) to the package surface (16).

4. Apparatus according to claim 3, in which at least one of the rollers (13, 14) has a gripping surface.

5. Apparatus according to claim 4, in which the said gripping surface is of rubber.

6. Apparatus according to claim 5, in which the said rubber surface is dimpled (31).

7. Apparatus according to claim 3, comprising traverse means for distributing the thread (12) axially on the package (11).

8. Apparatus according to claim 7, said traverse means comprising pattern breaker means.

Patentansprüche

1. Verfahren zum Wickeln eines Wickels (11) aus einem spannungsempfindlichen Faden (12), wie z. B. Vordergespinst, wobei der Wickel (11) beim Wickeln von einem Paar paralleler Rollen (13, 14) gestützt wird, die beide so angetrieben werden, daß sie den Wickel (11) durch Umfangsberührung desselben in Drehung versetzen, dadurch gekennzeichnet, daß die Rollen (13, 14) unterschiedlich angetrieben werden, um unterschiedliche Rollenoberflächengeschwindigkeiten zu ergeben, und so angeordnet sind, daß der Faden (12) zuerst auf die sich langsamer bewegende Rolle (13) auftrifft, um so eine gesteuerte Spannung des Fadens (12) in seiner Tangente (15) an die Wickeloberfläche (16) zu bewirken.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Rollen (13, 14) um bis zu 10% voneinander abweichende Oberflächengeschwindigkeiten aufweisen.

3. Vorrichtung zum Wickeln eines Wickels (11) aus einem spannungsempfindlichen Faden (12), wie z.B. Vordergespinst, mit angetriebenen parallelen Rollen aufweisenden Stützmitteln für den Wickel

(11), die den Wickel (11) durch Umfangsberührung desselben in Drehung versetzen, dadurch gekennzeichnet, daß die Rollen (13, 14) dieser Stützmittel für den Wickel unterschiedlichen Durchmesser aufweisen sowie mit derselben Drehgeschwindigkeit gedreht werden oder alternativ diese Rollen (13, 14) durch unterschiedliche Geschwindigkeiten liefernde Antriebsmittel angetrieben werden und daß die Rollen dieser Stützmittel für den Wickel so angeordnet sind, daß der Faden (12) zuerst auf die sich langsamer bewegende Rolle (13) auftrifft, um so eine gesteuerte Spannung des Fadens (12) in seiner Tangente (15) an die Wickeloberfläche (16) zu bewirken.

4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß wenigstens eine der Rollen (13, 14) eine Greifoberfläche aufweist.

5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Greifoberfläche aus Gummi besteht.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Greifoberfläche mit Grübchen (31) versehen ist.

7. Vorrichtung nach Anspruch 3, gekennzeichnet durch Traversiermittel zum axialen Verteilen des Fadens (12) auf dem Wickel (11).

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Traversiermittel aus Musterunterbrechungsmitteln bestehen.

Revendications

1. Procédé d'enroulement d'une bobine (11) d'un fil (12) sensible à la tension, tel qu'un boudin, comprenant le support de la bobine (11) pendant qu'elle subit un enroulement, sur deux rouleaux parallèles (13, 14) qui sont tous deux entraînés afin qu'ils fassent tourner la bobine (11) par contact périphérique avec celle-ci, caractérisé en ce que les rouleaux (13, 14) sont entraînés différemment afin qu'ils donnent des vitesses différentes de surface de rouleau et ils sont disposés afin que le fil (12) rencontre d'abord le rouleau (13) qui se déplace le plus lentement afin que le fil (12) soit mis à une tension réglée à sa tangente (15) à la surface (16) de la bobine.

2. Procédé d'enroulement d'une bobine selon la revendication 1, dans lequel les rouleaux (13, 14) ont des vitesses de surface qui diffèrent d'une quantité pouvant atteindre 10%.

3. Appareil d'enroulement d'une bobine (11) d'un fil (12) sensible à la tension, tel qu'un boudin, comprenant un dispositif de support de la bobine (11) ayant des rouleaux parallèles menés qui font tourner la bobine (11) par contact périphérique avec celle-ci, caractérisé en ce que les rouleaux (13, 14) du dispositif de support de la bobine ont des diamètres différents et sont entraînés à la même vitesse de rotation, ou, dans une variante, les rouleaux (13, 14) sont entraînés par des dispositifs d'entraînement à des vitesses différentes, les rouleaux du dispositif de support de la bobine étant disposés afin que le fil (12) rencontre d'abord le rouleau (13) qui se déplace le plus lentement de manière que le fil (12) subisse une tension réglée à sa tangente (15) à la surface de la bobine (16).

4. Appareil selon la revendication 3, dans lequel l'un au moins des rouleaux (13, 14) a une surface d'accrochage.

5. Appareil selon la revendication 4, dans lequel la surface d'accrochage est formée de caoutchouc.

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6. Appareil selon la revendication 5, dans lequel la surface de caoutchouc à des fossettes (31).

7. Appareil selon la revendication 3, comprenant un dispositif de déplacement destiné à répartir le fil (12) axialement sur la bobine (11).

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8. Appareil selon la revendication 7, dans lequel le dispositif de déplacement comporte un dispositif brouilleur de zone.

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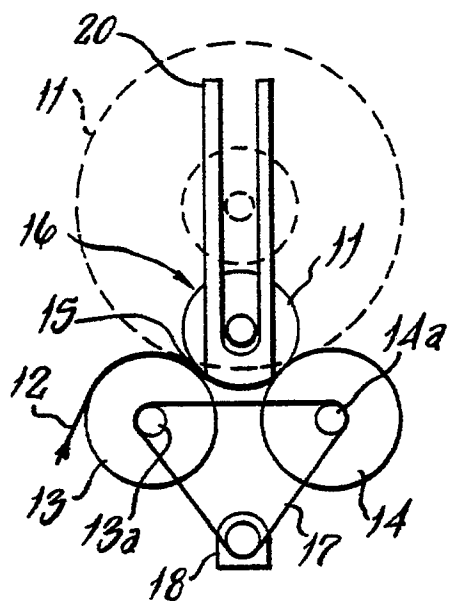


FIG. 1

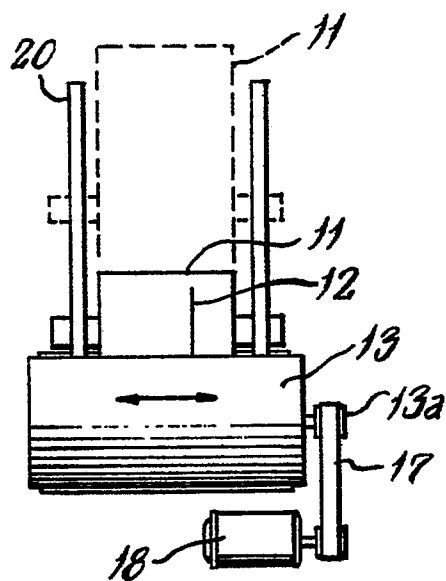


FIG. 2

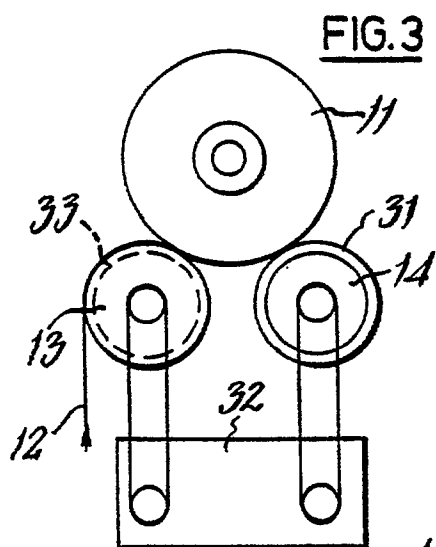


FIG. 3

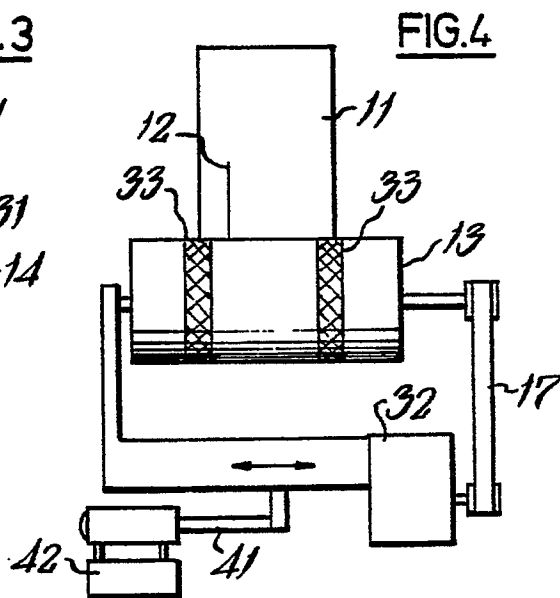


FIG. 4

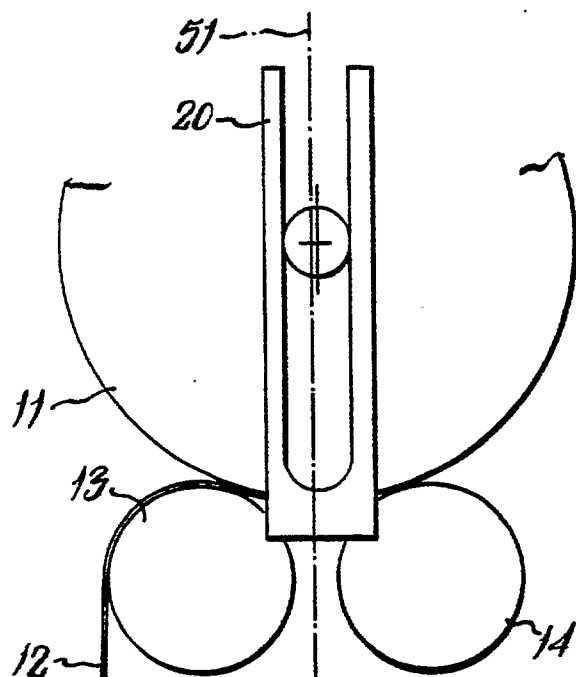


FIG. 5

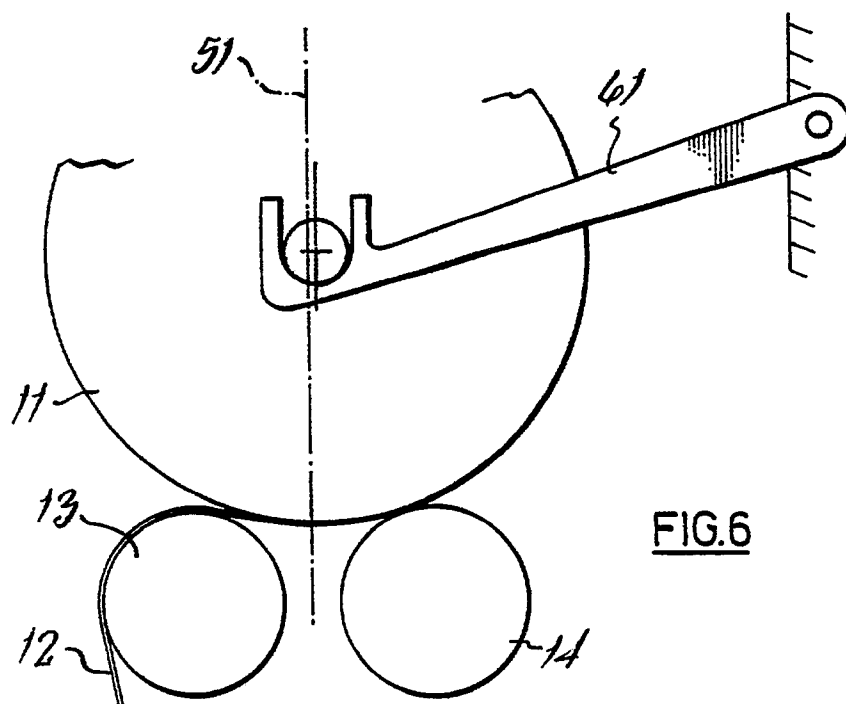


FIG. 6