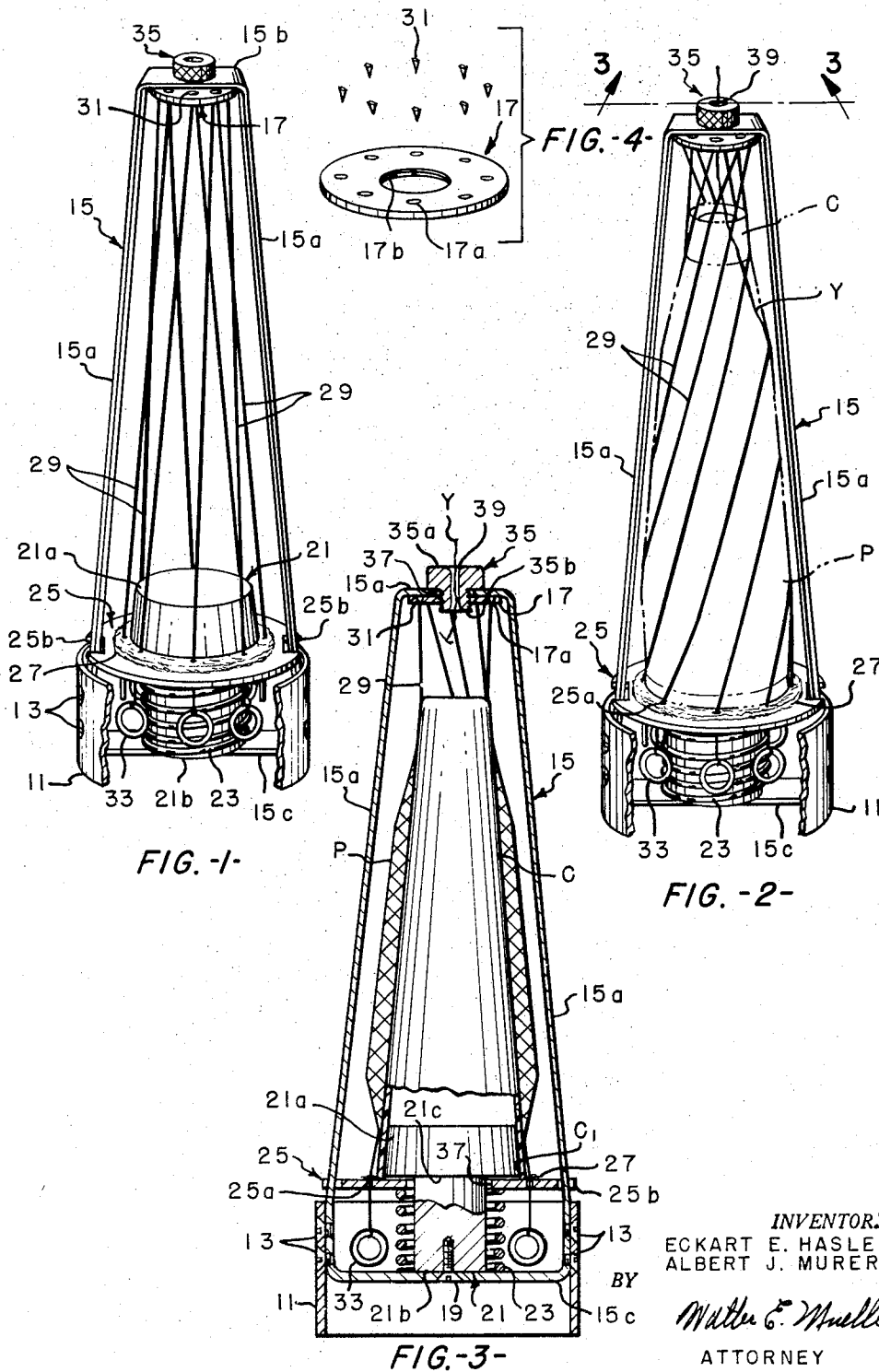


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OVEREND UNWINDING DEVICE

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OVEREND UNWINDING DEVICE

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This invention relates to the unwinding or withdrawing of yarn from wound packages formed on bobbins and the like, and more particularly to an improved apparatus for preventing or reducing the formation of kinks or snarls in yarn in the course of overend unwinding thereof from a bobbin package, especially cone type bobbins having barrel shaped build yarn packages wound thereon, but being also usable with other types of bobbins and yarn packages.

In overend unwinding of yarn from a package formed on a cone or the like a serious problem is presented in the tendency of the yarn to kink upon itself and form what is known as a snarl. This tendency is most pronounced with high twist and high torque yarns. In an attempt to solve this defect various devices have been proposed and constructed, but for various reasons these previous arrangements and attempted solutions have not been entirely satisfactory, one defect being their lack of adaptability to various sizes, shapes, and builds of bobbins and bobbin packages.

Accordingly, it is a major object of this invention to provide an improved apparatus for withdrawing yarn from a package formed on a bobbin, particularly a cone or the like, and which is adjustable for ready adaptation to various sizes and shapes of packages.

It is another feature according to the invention that an improved apparatus for overend unwinding of yarn from bobbins or the like is provided, wherein the possibility of yarn entrapment at the base end of the bobbin is substantially eliminated or materially reduced.

Still another feature is the provision of an overend unwinding device employing a cage for restricting yarn as it is unwound from a package, and wherein the cage is rendered readily adjustable by adjustment of the helical or skew angle of inclination of the element or elements forming the cage, and particularly by the relative angular displacement about the axis of the bobbin of the supporting and/or guiding members carrying the upper and lower end portions of the element or elements forming the cage.

Still other objects, features and attendant advantages will become apparent to those skilled in the art from a reading of the following detailed description of a preferred embodiment constructed according to the invention, taken in conjunction with the accompanying drawings wherein

Figure 1 is an orthographic view, partially broken away for clarity, illustrating a preferred embodiment according to the invention.

Figure 2 is a view similar to that in Figure 1 illustrating the embodiment with a yarn package in place and with the angle of inclination of the cage element adjusted to best enclose the yarn package.

Figure 3 is a section view taken along line 3—3 of Figure 2.

Figure 4 is an exploded view of the arrangement for connecting the strand elements forming the cage to the cage adjustment disc of the embodiment.

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Referring now to the figures of the drawing, an open cylindrical base 11 has secured thereto as by screws 13 an upstanding open cage support frame 15 having a pair of upstanding leg sections 15a and interconnecting upper and lower transverse web sections 15b and 15c. The upper transverse web section 15b of the support frame 15 has supported therefrom an angularly movable cage adjustment disc or plate 17, more particularly described hereinafter. Suitably secured as by a screw 19 to the lower transverse web section 15c is a cone support block 21 having a frusto-conical upper section 21a and a reduced diameter cylindrical lower section 21b. Surrounding the cylindrical section 21b is a compression spring 23 which at its lower end engages the support frame lower web section 15c and at its upper end serves to engage and resiliently bias upwardly an apertured support plate 25 slidably mounted on and surrounding the cylindrical section 21b of the block. In the absence of a bobbin being disposed on the block 21, upward movement of the plate 25 is restricted by a limit stop in the form of a shoulder 21c formed between the frusto-conical section 21a and the cylindrical section 21b of the cone support block.

In the placement of a cone shaped bobbin C on the frusto-conical section 21a of the support block the lower flared end C₁ of the bobbin extends beneath the shoulder 21c and engages under compression the resiliently biased plate 25, thereby materially reducing the possibility of yarn entrapment beneath the bobbin C during unwinding of yarn Y therefrom. The plate 25 has an annulus of fur 27 or the like suitably secured as by cement or the like to its upper face for surrounding and partially engaging the lower flared end of a cone C (as shown in Figures 2 and 3) in order further to prevent entrapment of yarn beneath the cone during unwinding.

The lower plate 25 has formed therein a plurality of small circular apertures 25a and the upper cage adjustment plate 17 has a corresponding number of small apertures 17a formed therein. Extending between corresponding apertures 17a and 25a are a series of thin filaments 29 of nylon or the like, which are secured at their upper ends to the upper plate as by wedges 31 as shown, or by cement or other suitable connection, and which hang loosely through the apertures 25a formed in the lower plate 25. The filaments 29 are weighted as by a plurality of light rings 33 formed of metal or the like of suitable weight and which tend to pull the filaments toward a straight line path, which path is distorted to conform to the shape of the package P on the cone C inserted on the frusto-conical portion of block as shown in Figures 2 and 3. The apertures 25a are formed closely adjacent to the base of the frusto-conical section 21a of the block 21 in order to insure such that the cage filaments 29 may most readily conform to the contour of the yarn package adjacent the base end of the bobbin C.

The lower plate 25 is fixed against angular movement about the axis of the cone, as by oppositely disposed recesses or notches 25b formed in its periphery and which engage the respective legs 15a of the upstanding support frame, thus permitting vertical or axial movement of the plate but preventing angular movement of the plate about the axis of the cage formed by filaments 29. The upper plate 17 is angularly adjustable about the axis of the cage and may be adjustably set in a selected angular position as by the employment of an adjustment securing screw 35 which serves as both a coupling support and adjustment securing means for the cage adjustment plate 17. Screw 35 has an enlarged head 35a resting on the upper surface of the upper transverse web support section 15b, and a threaded section 35b which extends loosely through an oversized aperture 37 formed in the web section 15b. The adjustment plate 17 has a complementary threaded

central aperture 17b complementary to screw 35 and is thereby threadably adjustably connected to and supported by the screw 35. An axial yarn guide aperture 39 is formed through the center of adjustment screw 35, the yarn Y from the package P within the filament cage being withdrawn through the axial aperture.

The upper plate 17 may be rotated, within the limits dictated by the length of the filaments 29 and the size of the yarn package P, to any desired angular position and the screw 35 may then be tightened to secure the plate 17 in this position, at which position the filaments forming the cage or bobbin-encompassing enclosure will be selectively inclined both toward the axis of the package and skew to the package axis, the desired position being dependent upon the particular size and shape of the cone and package. It is an important feature according to the invention that this adjustment may be readily made by angular movement of one of the cage end members 17, 25, in the instant example the angularly adjustable member being the upper plate 17, and that the filaments 29 each take an inclined position in the same angular direction about the axis to thereby effectively form a constricting helix about the periphery of a yarn package P from which the yarn is withdrawn. The filaments 29 thus form a package constricting enclosure or cage for contacting yarn package P from substantially the bottom end to the upper end of the package, the upper and lower constriction of the package by the filaments being particularly aided by virtue of the skew angle of inclination and the consequent helical path of the filaments between the cage end members 17 and 25.

In utilizing the illustrative embodiment according to the invention, a bobbin, particularly a cone C, having a yarn package P formed thereon, particularly a package of the type having a bottle build thereon as shown in Figures 2 and 3, is inserted within the cage by passing it between two adjacent filaments 29, and is then press fitted onto the frusto-conical section 21a of the cone support block, the lower end C₁ of the cone C being engaged by the resilient upwardly biased support plate and the inner fringe of the fur annulus. The provision for resiliently biased upward sliding movement of the lower plate together with the annulus of fur on its upper surface, insures engagement of the cone C and the effective facing surface of the cage base member in the form of plate 25 and substantially eliminates the possibility of entrapment of the yarn between the plate and the base of the cone during unwinding. The yarn Y is unwound from the package P and withdrawn through the axial guide aperture 39 formed in the adjustment screw 35. It will be seen that unwinding is most advantageously effected when the angle of inclination of the filaments 29 forming the constricting cage about the package P is opposite or transverse to the angle of inclination of the yarn Y as it is withdrawn from the package P.

While a single preferred embodiment of the invention has been disclosed it will be readily apparent to those skilled in the art that many modifications and improvements may be made without departing from the scope and spirit of the invention. It is therefore to be understood that the invention is not to be limited to the presently described illustrative embodiment, but only by the scope of the appended claims.

That which is claimed is:

1. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing enclosure for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said enclosure being formed of a plurality of filaments skew inclined to the axial center line of said enclosure in a common angular direction, a support for and operatively connected to said filaments at one end of said enclosure, said support being coaxial with and selectively angularly movable about the axial center line

of said enclosure to selectively adjust the skew angle of inclination of said filaments with respect to the enclosure axial center line.

2. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing enclosure for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said enclosure being formed of a plurality of filaments skew inclined to the axial center line of said enclosure in a common angular direction, a support for and operatively connected to said filaments at one end of said enclosure, said support being selectively angularly movable about the axial center line of said enclosure to selectively adjust the skew angle of inclination of said filaments with respect to the enclosure axial center line, a bobbin-end-engaging plate disposed at the opposite end of said enclosure and having a plurality of small apertures therein, said filaments extending freely through said apertures, tensioning means secured to said filaments at a point beyond said apertures and stressing said filaments each toward a straight line path, and spring means resiliently biasing said plate toward said angularly adjustable filament support.

3. A device according to claim 2 further comprising an annulus of fur secured to the bobbin engaging face of said bobbin-engaging movable plate.

4. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing enclosure for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said enclosure being formed of a plurality of filaments skew inclined to the axial center line of said enclosure in a common angular direction, a pair of filament engaging members axially spaced at opposite ends of said enclosure, each of said filament engaging members having means thereon fixing the positions of said filaments adjacent thereto, said filament engaging members being coaxial with and mounted for selective relative angular motion about the longitudinal axis of said enclosure to vary the skew angle of filaments with respect to said axis.

5. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing cage for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said cage comprising a plurality of spaced apart filaments, a pair of filament engaging members axially spaced at opposite ends of said cage, each of said filament engaging members having means thereon fixing the circumferential positions of said filaments adjacent to said filament engaging members, said filament engaging members being mounted for selectively relative angular motion about the longitudinal axis of said cage to vary the skew angle of said filaments with respect to said axis, and an internal guide eye for guiding yarn for withdrawal from within said cage.

6. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing cage for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said cage comprising a plurality of spaced apart filaments, a pair of filament engaging members axially spaced at opposite ends of said cage, each of said filament engaging members having means thereon fixing the circumferential positions of said filaments adjacent to said filament engaging members, said filament engaging members being mounted for selectively relative angular motion about the longitudinal axis of said cage to vary the skew angle of said filaments with respect to said axis, and guide means for guiding yarn for withdrawal from within said cage, one of said filament engaging cage end members being mounted for

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selective angular movement about said axis, said other filament engaging cage end member being substantially fixed against rotation about said axis.

7. A device according to claim 6 wherein said other filament engaging member is movably mounted for movement toward and away from said one filament engaging member, said device further comprising means resiliently biasing said other filament engaging member toward said one filament engaging member.

8. A device according to claim 7 wherein said other filament engaging member has fur disposed on its surface facing toward said one filament engaging member.

9. A device according to claim 8 wherein said fur is an annulus of fur adapted to surround the base of a bobbin mounted in said cage.

10. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing cage for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said cage comprising a plurality of spaced apart filaments, a pair of filament engaging members axially spaced at opposite ends of said cage, each of said filament engaging members having means thereon fixing the circumferential positions of said filaments adjacent to said filament engaging members, said filament engaging members being mounted for selectively relative angular motion about the longitudinal axis of said cage to vary the skew angle of said filaments with respect to said axis, and guide means for guiding yarn for withdrawal from within said cage, one of said filament engaging members being movably mounted for axial movement toward and away from the other of said filament engaging members, said device further comprising means resiliently biasing said one filament engaging member toward said other filament engaging member.

11. A device according to claim 5 wherein said guide means is disposed centrally of one said filament engaging cage and members.

12. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing cage for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said cage comprising a plurality of spaced apart filaments, a pair of filament engaging members axially spaced at opposite ends of said cage, each of said filament engaging members having means thereon fixing the circumferential positions of said filaments adjacent to said filament engaging members, said filament engaging members being mounted for selectively relative angular motion about the longitudinal axis of said cage to vary the skew angle of said filaments with respect to said axis, and guide means for guiding yarn for withdrawal from within said cage, said one filament engaging cage member being angularly adjustably movable about said axis, said device further comprising adjustable securing means adapted to secure said one member in a selected angular position.

13. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing cage for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said cage comprising a plurality of spaced apart filaments, a pair of filament engaging members axially spaced at opposite ends of said cage, each of said filament engaging mem-

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bers having means thereon fixing the circumferential positions of said filaments adjacent to said filament engaging members, said filament engaging members being mounted for selectively relative angular motion about the longitudinal axis of said cage to vary the skew angle of said filaments with respect to said axis, and guide means for guiding yarn for withdrawal from within said cage, said one filament engaging cage member being angularly adjustably movable about said axis, said device further comprising adjustable securing means adapted to secure said one member in a selected angular position, said adjustable securing means being a threaded member disposed on said axis and threadedly engaging said one member, said guide means being the peripheral wall of an aperture formed in said threaded member.

14. A device for unwinding or withdrawing yarn from a bobbin, comprising a yarn package encompassing cage for engaging the package periphery and for exercising a constrictive pressure thereon throughout the decrease in the package diameter as the yarn is withdrawn, said cage comprising a plurality of spaced apart filaments, a pair of filament engaging members axially spaced at opposite ends of said cage, each of said filament engaging members having means thereon fixing the circumferential positions of said filaments adjacent to said filament engaging members, said filament engaging members being mounted for selectively relative angular motion about the longitudinal axis of said cage to vary the skew angle of said filaments with respect to said axis, and guide means for guiding yarn for withdrawal from within said cage, and a bobbin mounting and supporting means disposed within said cage and adapted to support a bobbin and yarn package within said cage.

15. A device according to claim 14 wherein one of said filament engaging members is movably mounted for axial movement toward and away from the other of said filament engaging members, said device further comprising means resiliently biasing said one filament engaging member toward said other filament engaging member, said bobbin mounting and supporting means being disposed adjacent said one filament engaging member.

16. A device according to claim 15 wherein said bobbin mounting means as a frusto-conical bobbin engaging section and a reduced diameter cylindrical section, said frusto-conical section being disposed within said cage and having its smaller end directed toward said other filament engaging member, said one filament engaging member having a central aperture therein and fitted in axial sliding relation about said cylindrical section.

17. A device according to claim 16 further comprising a spring resiliently biasing said one filament engaging member toward said other filament engaging member.

18. A device according to claim 17 further comprising a plurality of spaced apart small apertures formed in said one filament engaging member and loosely receiving said filaments therethrough, and tensioning means operatively connected to said filaments outside said cage and adapted to tension said filaments.

19. A device according to claim 18 wherein said tensioning means comprises a plurality of individual weights each connected to a respective one of said filaments.

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