

United States Patent

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[15] 3,693,338

[45] Sept. 26, 1972

[54] TWIST FRAME APPARATUS

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[22] Filed: Dec. 30, 1970

[21] Appl. No.: 102,576

[52] U.S. Cl.57/75, 57/130, 242/46.2, 242/46.21

[51] Int. Cl.D01h 7/16

[58] Field of Search57/129-135, 75; 242/46.2, 46.21, 46.6

[56] References Cited

UNITED STATES PATENTS

3,077,070 2/1963 Smith et al.....57/130
3,101,911 8/1963 Carroll et al.....242/46.6

3,167,262 1/1965 Adams et al.....242/46.21
3,302,384 2/1967 Smith et al.....57/130
3,403,502 10/1968 Caminada.....57/129
3,497,149 2/1970 L'Allemand.....57/130 X

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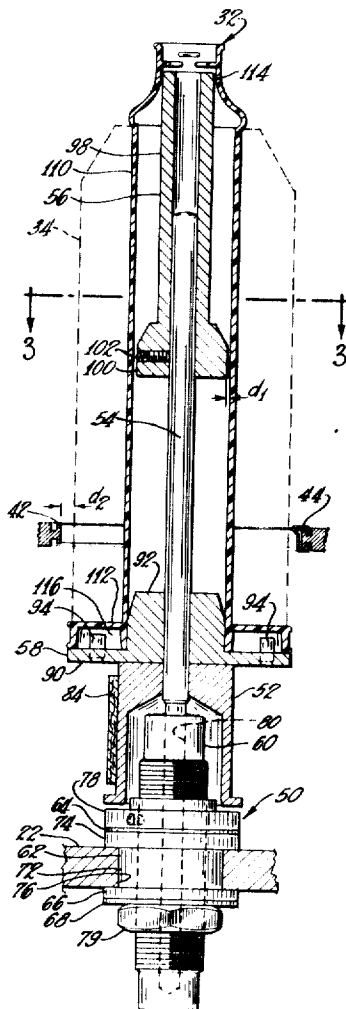
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ABSTRACT

Twist frame apparatus for rotary support and doffing guidance of tubular collectors placed thereon for winding a yarn package; the apparatus including a spindle projecting from a bobbin support for extension within a tubular collector placed thereover and an adapter on the spindle for extension within such tubular collector beyond the zone of collection; the adapter including a laterally extending portion for doffing guidance during removal of such collector from the spindle.

9 Claims, 5 Drawing Figures



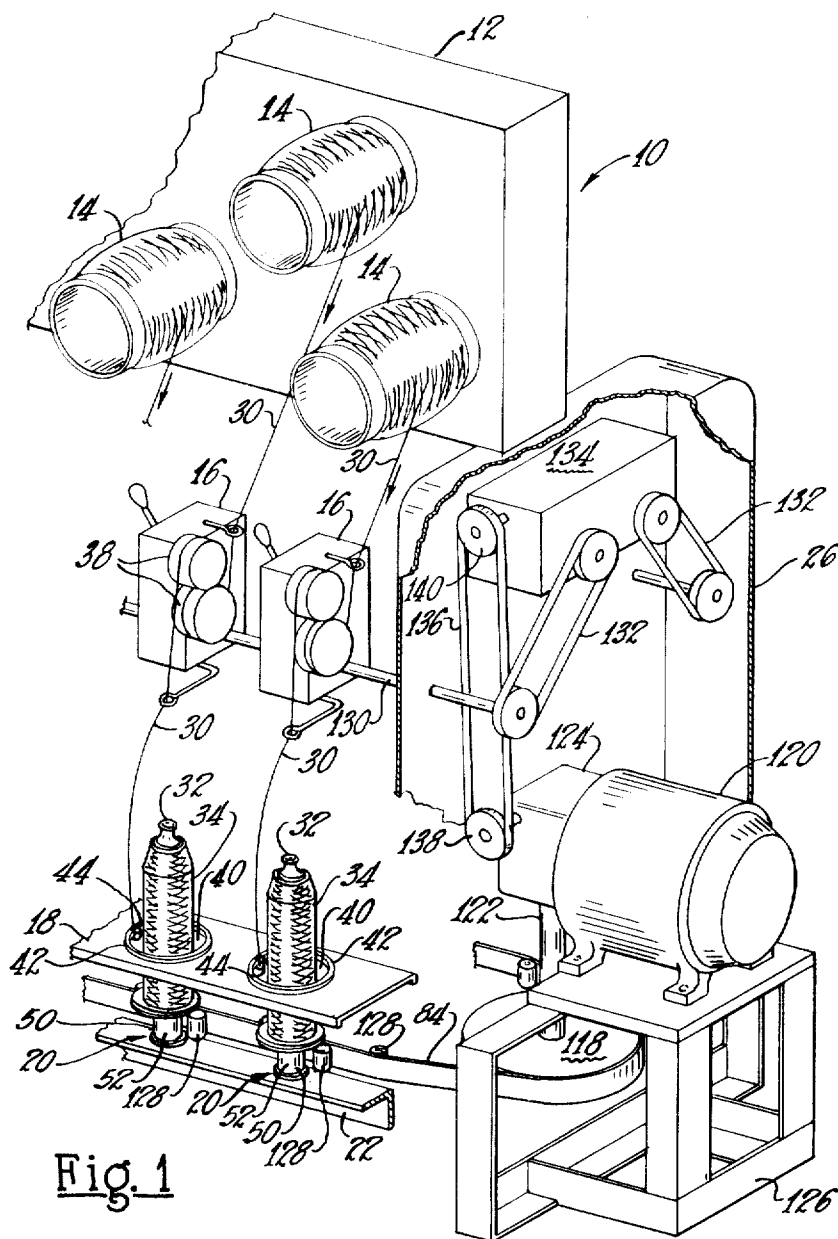
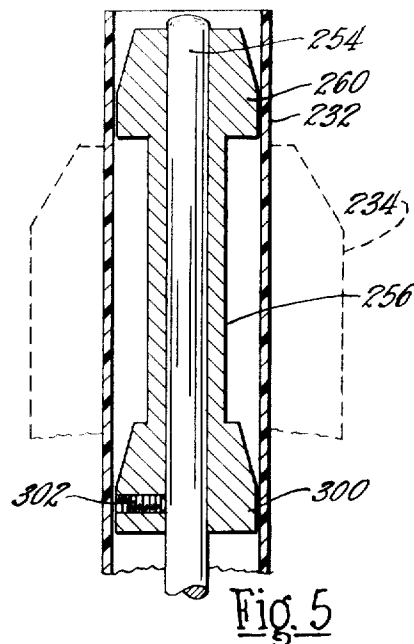
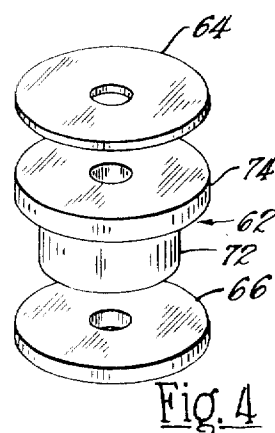
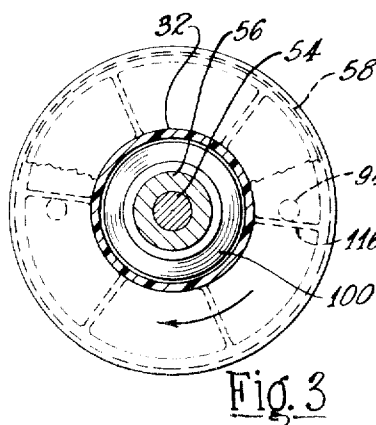
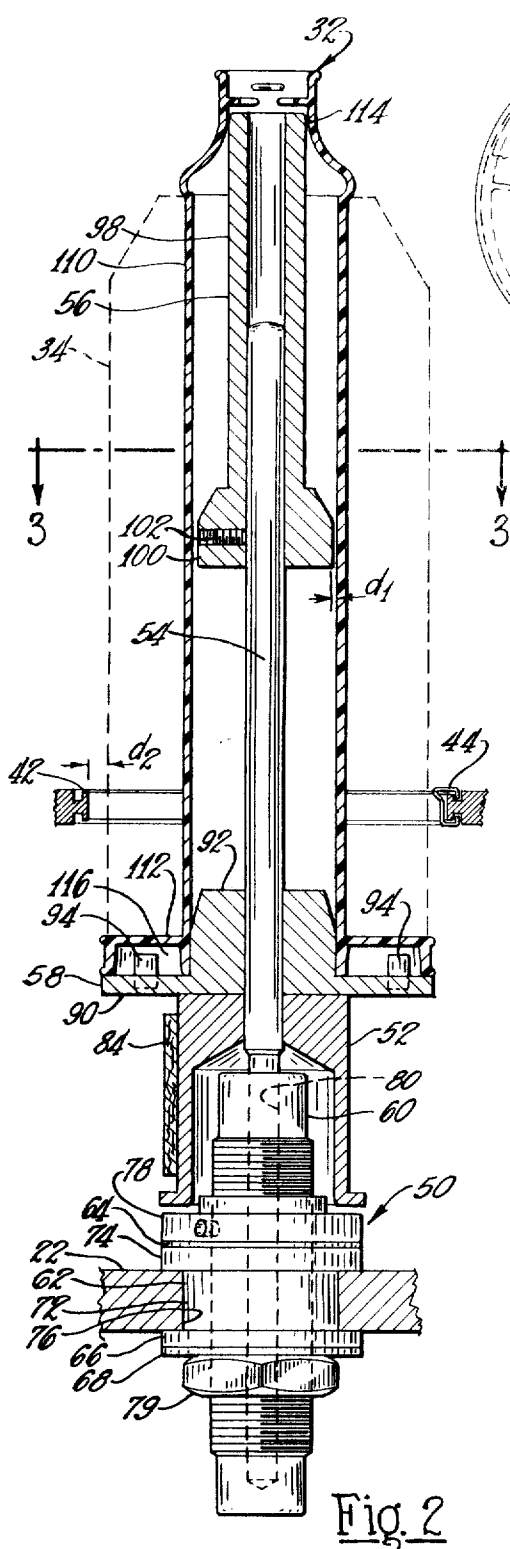


Fig. 1

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TWIST FRAME APPARATUS

BACKGROUND OF THE INVENTION

Vibrations present during winding of textile packages often limit the size of such packages, speed of collection and length of collectors usable on apparatus for winding packages. The situation is especially harsh for textile twisters where production demands press apparatus towards winding larger packages at high production speeds.

At high rotating speeds vibration from wobbling bobbins tend to be an even more exasperating problem in arrangements using bobbin adapters. Heretofore prior bobbin adapters have contributed to bobbin wobble during yarn collection on bobbins rotating at high speeds. The adapters themselves tend to be off-center; consequently bobbin wobble introduced by these adapters supplemented vibration from the bobbins themselves.

Although efforts continued, vibrations from lateral motion of rotating bobbins have stood as a resolute barrier to improved textile twisting and plying operations.

SUMMARY OF THE INVENTION

An object of the invention is improved winding apparatus, especially textile twist frame apparatus using rotatable collectors for packaging linear filamentary material.

Another object of the invention is an improved spindle adapter for rotary support and for doffing guidance of hollow bobbins used on textile twisters.

Yet another object of the invention is twist frame apparatus that reduces bobbin wobble, and consequent vibration, during collection of a package on the bobbin.

These and other objects are attained using twist frame apparatus including means for mounting and for rotating a tubular collector for winding a package of filamentary material, a spindle shaft that projects from the member for axially extending within such tubular collector on the mounting means and an adapter on the spindle shaft for extending within the tubular collector beyond the collection zone of the collector to establish a close fit relationship with the interior surface of the tubular collector beyond the collection zone. The adapter usually includes a laterally projecting region that reduces any tendencies for lateral movement as a collector is being removed from the spindle shaft.

The above and other objects and advantages will become more apparent as the invention is described in greater detail with respect to the following drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in perspective of a portion of a textile twister that uses apparatus for rotary support and doffing guidance to bobbins according to the principles of the invention.

FIG. 2 is an enlarged vertical section view of a portion of apparatus of FIG. 1 more clearly illustrating a bobbin mounted for support and guidance according to the principles of the invention.

FIG. 3 is a view taken generally along the line 3—3 of FIG. 2.

FIG. 4 is a somewhat exploded view of a vibration isolating mount used with the apparatus shown in FIG. 2.

FIG. 5 is another bobbin adapter arrangement according to the principles of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

While apparatus embodying the principles of the invention is particularly adaptable for use with a spindle and hollow bobbin arrangement on textile twisting apparatus, people may use the apparatus with other types of arrangements using rotatable collectors for winding linear filamentary materials such as strands, yarns, cords, etc.

FIG. 1 illustrates one side of a conventional textile twister or twist frame 10 for processing linear filamentary material into wound packages. The twister 10 includes a creel structure 12 for holding supply packages 14, feed roll units 16 below the creel 12, a ring rail 18 and bobbin mounting assemblies 20 on a bolster rail 22. The twister 10 further includes drive apparatus within two spaced apart housings 26; one housing 26 is at each end of the textile twister 10. FIG. 1 shows only one end of the drive arrangement. The drive apparatus is for driving the apparatus of assemblies 20 and units 16.

The creel structure 12 rotatably holds the supply packages 14. As shown, the packages 14 are packages of glass strand 30; however, supply packages can be other filamentary material, either twister or untwisted. For example, the apparatus can wind yarn of glass or of other natural or synthetic material.

The twister 10 processes the glass strands 30 to deliver twisted glass strand or yarn individually to rotating hollow bobbins 32 each held on a bobbin mounting arrangement 20. The rotating bobbins collect the glass yarn into packages 34.

Below the creel 12 are the feed roll units 16 that advance the glass strands 30 from the supply packages 14 for yarn take-up by the bobbins 32. As shown, the feed roll units 16 are between the creel 12 and bobbin mounting arrangement 20. The feed roll units 16 each include a pair of cooperating driven rolls 38 that advance individual strands 30.

The bobbin mounting assemblies 20 rotatably hold the hollow bobbins 32 on the bolster rail 22. The mounting assemblies 20 hold the bobbins 32 vertically below the feed roll units 16. As shown there is one mounting arrangement 20 for each feed roll unit 16.

The ring rail 18 includes circular openings 40 and circular tracks or rings 42 that each hold a traveler or flyer 44. The rings 42 define the circular openings 40. Each of the flyers 44 moves freely about its ring 42. The glass strands 30 pass through the flyers 44 along their path for collection on the bobbins 32 as packages 34.

The twister 10 reciprocates the ring rail 18 vertically lengthwise of the bobbins 32 on the bobbin mounting assemblies 20.

The ring rail 18 and bobbin mounting assemblies 20 are positioned to align the bobbins 32 centrally of their respective circular opening 40. Hence, the rings 42 encircle the bobbins 32. The ring rail, and consequently the rings 42, reciprocates lengthwise of the bobbins 32 during collection of yarn onto the bobbins 32. The stroke of the reciprocating ring rail 18 is normally less than the length of the bobbins 32.

FIGS. 2 and 3 more clearly show one of the bobbin mounting assemblies 20. In the embodiment shown the assembly 20 includes a mount 50, a whorl 42, a blade or spindle 54, an adapter 56 and a bobbin mounting member or plate 58.

The mount 50 includes a generally cylindrical brace 60 that is removably fixed vertically on the bolster rail 22 by a vibration isolating arrangement.

The vibration isolating arrangement can be more clearly seen in FIG. 4 and includes an insert 62, an upper washer 64 and lower washers 66 and 68. The insert 62 is a flanged unit normally made of a plastic, e.g., polypropylene. The insert 62 includes a cylindrical portion 72 and a flange portion 74 at one end of the cylindrical portion 72; the insert includes an opening therethrough adapted for inclusion of the brace 60. The upper washer 64 and lower washer 66 are of resilient material. They are normally made of neoprene. The lower washer 66 is normally thicker than the upper washer 64. The lower washer 68 is usually made of metal.

The cylindrical portion 72 of the insert 62 fits snugly into an opening 76 through the bolster rail 22. The flange portion of the insert 62 is at the upper surface of the rail 22. The washers 66 and 68 are at the lower surface of the rail 22. The upper washer 64 is on the upper surface of the flange 74. Nuts 78 and 79 on threads of the brace 60 are turned from opposite sides of the bolster rail 22 towards each other against the washers to hold the mounting 50 removably fixed on the bolster rail 22.

The brace 60 includes a bore 80 that rotatably holds the blade or spindle 54.

As shown in FIG. 2, the spindle 54, whorl 52 and mounting plate 58 are united to form a rotating unit. The spindle 54 extends upwardly from the bore 80 of the brace 60. The whorl 52 includes a recess 82 into which the upper portion of the brace 80 extends. The bobbin mounting plate 58 is adjacent the whorl 52 on the spindle 54.

A belt 84 engages the whorl 52. As the belt is driven, it rotates the whorl 52, bobbin mounting plate 58 and spindle 54 together at the same rpm.

A hollow bobbin 32 placed over the spindle 54 rests on the plate 58; the plate 58 includes a circular base 90 and a hub 92. The upper surface of the plate 58 includes connecting means in the form of drive lugs that extend to engage the base of the bobbins 32. The engaging lugs 94 rotate the bobbin with the plate 58.

The adapter 56 is secured on the spindle 54 for extending within the hollow bobbin 32 beyond the yarn collection zone. The adapter establishes a close-fit relationship with the interior surface of the bobbin wall portion beyond the yarn collection zone. The close-fit relationship of the adapter 56 provides lateral support to the bobbin 32 during rotation.

As shown in FIGS. 2 and 3, the adapter 56 is shown to include a tubular body 98 and an annular guide 100; such guide establishes a laterally projecting portion on the body 98 within the bobbin 32 for reducing any tendencies toward lateral movement that would cause a package 34 to hit against the ring 42 as the bobbin 32 is being removed from the spindle shaft 54.

The adapter 56 reaches beyond the yarn collection zone, i.e., beyond the package 34, to a region within

the bobbin 32 that is essentially free from the effect of compressive package forces on the bobbin. Yarn tends to wrap tightly on bobbins; the result is bobbins with modified cross sectional size along their length.

The adapter 56 as shown is held on the spindle 54 by a set screw 102.

As shown, the annular guide 100 is integral with the tubular portion 98; however, it is possible to make the guide a separate unit that can be movably mounted to permit various locations along the length of the tubular portion 98 within the yarn collection zone.

As more easily seen in FIG. 2, the hollow bobbin 32 includes a tubular shank 110 and a flange 112. The flanged end of the bobbin 32 rests on the bobbin mounting member 58. The other and free end of the bobbin has a fairly short end region 114 with a smaller diameter than the interior diameter along the remaining portion of the tubular shank 110. The end region 114 is spaced from the flange 112 beyond the yarn collection region or package 34. The bobbin 32 is normally made of a plastic.

The under side of the flange 112 has fins or veins 116 that the lugs 94 engage to rotate the bobbin 32 as the plate or member 58 rotates.

The bobbin support and bobbin guide effect of the adapters 56 can be more clearly understood from FIGS. 2 and 3. In the arrangement of these figures, the spindle 54 projects from the bobbin mounting plate 58 axially within the tubular shank 110; the spindle 54 projects for a distance less than the full length of the shank 110. The adapter 56 is secured over the spindle 54 and provides an extension of the spindle. The tubular portion 98 extends away from the bobbin support plate 58 to terminate within the reduced diameter end region 114 beyond the package 34.

The end of the adapter 56 in the reduced diameter region 112 is in close-fit relation with the interior surface of the bobbin wall portion. It has been found that a clearance between the adapter 56 and tubular shank of from 0.003 to 0.004 inch gives an adequate close-fit relation for most collecting conditions. The clearance takes into account any eccentricities that may be present in either the bobbin 32 or the adapter 56.

As the bobbin 32 rotates during yarn collection, the upper end of an adapter 56 is present in rotary supporting relationship within the upper end 114 of the bobbin to reduce lateral bobbin movement. Hence the upper end of the bobbin adapter 56 discourages bobbin wobbling during yarn collection.

The annular guide 100 provides a laterally extending portion on the tubular body 98 between the ends of the tubular shank 110 within the zone of collection on the bobbin 32; the guide 100 is spaced from the interior wall portion of the tubular shank 110 during collection of the package 34 on the bobbins 32. However, during doffing from the spindle 54 the guide 100 reduces tendencies towards lateral movement of the bobbins 32 from the spindle 54 to keep a completed package (package 34) out of contact with the ring 42. To reduce such tendencies, the distance d_1 between the interior surface of the tubular shank 110 and the annular guide 100 is less than the distance d_2 between the lengthwise external surface of the package 34 and the ring 42.

The function of the guide 100 is increasingly important for bobbins holding packages, especially larger packages, that have their lengthwise surfaces close to the twister ring 42. If there is no lateral guide, such as the guide 100, damage to the wound package can easily occur as an operator removes or doffs bobbins from their spindles.

A preferred location for the guide 100 is in mid-length region of the tubular shank 110.

Referring again more specifically to FIG. 1, it can be seen that the belt 84, which drives the whorls 52, extends lengthwise of the twister 10 and is itself driven by a drive pulley 118. An electrical motor 120 drives the pulley 118. A shaft 122, which holds the drive pulley 118, is driven through transmission gearing of conventional construction connected to the electrical motor 120 and contained within a housing 124. A supplemental frame 126 supports the motor 120.

Adjustable idler rolls 128 are adjacent to each whorl 52 for guiding the moving belt 84 towards or away from each whorl. Hence the idler roll 128 can selectively establish a drive relationship between the whorls 52 and the belt 84. Adjustment of the idlers 128 can move the belt out of driving relationship with the whorls 52 to interrupt rotation of the bobbins held on the mounting assemblies 50.

A driven shaft 130 drives the feed rolls 38 of the unit 16. A belt 132 that is driven by power transmission mechanisms contained within a housing 134 rotates the shaft 130. The power transmission mechanism in housing 134 is driven by a belt 136 and pulleys 138 and 140 connecting the power transmission mechanism contained in the housing 124 with the power transmission mechanism in housing 134.

FIG. 5 shows another bobbin adapter for use on the textile twister 10 shown in FIG. 1. The arrangement of FIG. 5 shows a tubular bobbin or collector 232 with a package 234 wound thereon. A spindle shaft 254 projects from a member for support of the tubular collector 232; the shaft 254 projects axially within the tubular collector 232.

An adapter 256 is on the spindle 254 and extends within the tubular collector beyond the yarn collection zone, i.e., the package 234. The adapter includes two laterally extending portions; one portion is a bobbin support portion 260 and the other is a bobbin guide portion 300. The bobbin support portion 260 is beyond the package 234 and establishes a close-fit relationship between the interior wall portion of the tubular collector 232 at the region beyond the package 234. The guide portion 300 is analogous to the guide portion 100 shown in FIG. 2; the guide portion 300 reduces tendencies towards lateral movement of the collector 232 as such collector is being removed from the spindle 254 as in the case of the guide portion 100.

A set screw 302 holds the adapter 256 on the spindle 254.

We claim:

1. Twist frame apparatus for rotary support and doffing guidance of tubular collectors placed thereon for winding filamentary material into a package along a portion of the length of such collectors comprising:

means for mounting and for rotating a tubular collector;

a spindle shaft aligned to extend axially within such tubular collector mounted on said means; and

an adapter secured to the spindle shaft of a dimension sufficient for extension within such tubular collector beyond the zone of collection, the adapter being of shape and size to conform in close-fit relationship with the interior surface portion of such tubular collector in the region beyond the collection zone for rotary support thereof, the adapter including a laterally projecting portion for disposition within the collection zone of such collector such laterally extending portion being of such shape and size to be in spaced apart guiding relationship with the interior surface of the bobbin to guide the tubular collector axially of the spindle shaft during doffing from the spindle shaft thereby during doffing to reduce tendencies toward lateral movement of bobbin packages into engagement with surrounding portions of the twist frame.

2. Twist frame apparatus for rotary support and doffing guidance of tubular collectors placed thereon for collection of filamentary material into a package along a portion of the length of such collectors comprising:

a rotatable member for mounting a tubular collector at one end;

a rotatable spindle shaft projecting from the member aligned to extend axially within such tubular collector mounted on the member;

a spindle adapter secured to the spindle shaft of a dimension sufficient for extension within such tubular collector beyond the zone of collection, the adapter being of shape and size to conform in close-fit relationship with the interior surface portion of such tubular collector in the region beyond the collection zone for rotary support thereof, the adapter including a laterally projecting portion for position within the tubular collector along the yarn collection zone of such collector in spaced apart guiding relationship with the interior surface of the bobbin to guide the tubular collector axially of the spindle shaft during doffing from the spindle shaft thereby during doffing to reduce tendencies toward lateral movement of bobbin packages into engagement with surrounding portions of the twist frame;

connecting means for driving engagement between the rotatable member and a tubular collector mounted thereon; and

means for rotating the spindle shaft and member together.

3. Twist frame apparatus for rotary support and doffing guidance of a hollow bobbin having at least one flanged end placed thereon for collection of yarn into a package comprising:

a member for mounting a hollow bobbin at its flanged end and for rotating such bobbin;

a spindle shaft projecting from the member for extending axially into a hollow bobbin a distance less than the full length of the bobbin;

an adapter secured over the spindle shaft and providing an extension of the spindle shaft to establish a close-fit relationship with the interior of the free end region of such hollow bobbin beyond the zone of collection of the yarn for support of the bobbin during rotation, the adapter including a laterally projecting portion within the bobbin along the collection zone in spaced apart relation with the in-

terior surface of the bobbin to guide the bobbin axially of the spindle shaft during doffing to reduce tendencies toward lateral movement of bobbin packages into engagement with surrounding portions of the twist frame; and

means for rotating the member and spindle together.

4. Twist frame apparatus for collecting yarn into a package on a hollow bobbin with at least one flanged end comprising:

a rotatable member for mounting a hollow bobbin at its flanged end and for rotating the bobbin;

a ring;

a traveler movable on the ring and through which yarn travels to such bobbin during collection of a package thereon;

a blade projecting from the support member for axial extension within a bobbin on the member, the blade extending in a direction generally aligned centrally of the ring and generally normal to the plane of the ring, the bobbin on the member extending through the opening of the ring, the blade being rotatable with the support member;

a longitudinal adapter secured to the blade to extend within a hollow bobbin on the member beyond the yarn collection region of such bobbin, the adapter being of such size and shape to establish a close-fit relationship with the interior of the bobbin beyond the yarn collection zone, the adapter further including a laterally extending bobbin guide portion for disposition within the bobbin along the length of the yarn collection zone of the bobbin, the guide portion being of such size and shape to be in spaced apart relationship with the interior wall of the bobbin, the lateral distance between the interior wall of the bobbin in the yarn collection zone and the guide portion being less than the lateral distance between the ring and the external surface of a completed package wound on the bobbin thereby during doffing reducing tendencies toward lateral movement of the bobbin package into engagement with the ring during doffing from the blade;

means for rotating the support and blade together; and

means for effecting a reciprocating movement of the ring lengthwise of the hollow bobbin on the member during yarn collection with a stroke shorter than the length of the bobbin.

5. Twist frame apparatus for rotary support and doffing guidance of a hollow bobbin comprising a tubular shank flanged at least one end comprising:

a rotatable plate for mounting a bobbin at a flanged end, the plate including means for driving engagement with the flanged end of the bobbin mounted thereon;

a ring;

a traveler movable on the ring, yarn advancing through the traveler to such bobbin during package collection thereon;

a spindle projecting from the plate to extend axially within the tubular shank of a bobbin mounted on the plate, the spindle extending in a direction generally aligned centrally of the ring and generally normal to the plane of the ring, the spindle being rotatable with the plate;

means for reciprocating the ring lengthwise of the spindle between the ends of such bobbin mounted on the plate with a stroke shorter than the length of the tubular shank of the bobbin;

a longitudinal adapter secured on the spindle with its longitudinal axis generally coextensive with the spindle, the adapter extending away from the plate within the tubular shank of such bobbin mounted on the plate beyond the zone of yarn collection, the adapter within the tubular shank beyond the zone of yarn collection, the adapter within the tubular shank beyond the yarn collection region having a shape and size establishing close-fit relation with the interior of such tubular shank to provide lateral support for such bobbin during rotation, the adapter including a laterally extending guide portion for disposition with the bobbin in the yarn collection zone, the guide portion and the interior surface of the shank in the collection zone being spaced apart a lateral distance less than the lateral distance between the ring and the lengthwise surface of a completed yarn package wound on the bobbin thereby during doffing to reduce tendencies toward lateral movement of bobbin packages into engagement with the ring; and

means for rotating the plate and spindle together.

6. Apparatus of claim 5 in which the laterally extending portion is located at the mid-length of the tubular shank.

7. Apparatus of claim 5 in which the adapter is generally cylindrical and the laterally extending portion is annular.

8. Apparatus of claim 7 in which the spindle extends a distance less than the full length of a bobbin placed thereover.

9. Apparatus of claim 7 in which the guide portion is movable along the length of the adapter.

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