This invention relates generally to the packaging of textile and industrial yarns and particularly to improvements in yarn windup devices of the type in which a guide is reciprocated between spaced rails by a rototarily driven barrel cam in order to traverse yarn across a yarn package support as a package is wound.

For moderate winding speeds, such traverse guides are constructed with sufficient ruggedness to reduce the necessity of replacement except, possibly, at times of general overhaul. At higher winding speeds, specially designed traverse guides of the type disclosed by Altice and Waldin in U.S. Patent No. 3,086,722 can be used to good advantage. At very high rates of oscillation, these plastic guides wear or sometimes shatter and must be replaced. To implement removal and insertion of a worn guide, movable rail arrangements (U.S. Patent No. 3,074,286) are generally satisfactory. However, under some conditions, foreign material such as dirt, broken portions of guide buttons and lint collect on the rail spacers. This, along with possible operator error in the realignment of a movable rail, can result in malfunctions.

The general objective of the present invention is to provide for the loading and unloading of traverse guides without the need for disassembly and realignment of rails or other parts. It is a corollary object to provide for the removal or insertion of a traverse guide without the necessity for using tools of any kind.

The above objects are accomplished in a windup which includes a rototarily driven barrel cam having a helical groove in its surface for reception of the follower on a traverse guide and a pair of spaced rails adapted to receive and constrain the guide to a linear path of travel. The improvement involves provision of an auxiliary groove which opens into the helical cam groove in the approach to a cam reversal to facilitate loading of the follower. In addition, one of the rails has a cut-out at a point beyond the normal path of travel of the guide to facilitate initial placement between the rails.

Additional objectives and advantages will be apparent from the following specification wherein reference is made to the accompanying drawings in which:

FIGURE 1 is a schematic end view of a windup into which the improvements of the present invention have been incorporated;

FIG. 2 is a plan view of the barrel cam shown schematically in FIG. 1;

FIG. 3 is an enlarged top view of the combination cam follower and traverse guide; and

FIGS. 4 and 5 are side and end views, respectively, of the cam assembly shown in FIG. 1.

In the windup of FIG. 1, frame 10 is the mounting for a cam assembly 12 which includes a rototarily driven barrel cam having a shaft 16. A combination cam follower and yarn traverse guide 18 is in operative engagement with cam 14. Adjacent assembly 12, there is a drive roll 20 suitably mounted on bearings and driven by a motor (not shown). Drive roll 20 is initially in rolling engagement with a yarn support tube 22 mounted on a spring biased chuck 24 which automatically moves away from the drive roll as a package of yarn 26 accumulates. In operation, yarn is received continuously from a source (not shown), passes through a fixed guide 28 located above the windup, through traverse guide 18 and around drive roll 20 to the package support 22.

In FIG. 2, cam 14 has been shown as a generally cylindrical piece of metal, the ends of which are of reduced diameter to form shaft extensions 16, 16'. Machined in the surface of cam 14 is a groove 30 which is generally rectangular in cross section and helical in shape. The illustrated groove comprises left and right sections which are contiguous at their respective ends so as to form a continuous open groove. Depending on the diameter of the cam, the lengths of stroking and the speed of traverse and other considerations, the cam groove may be made in the form of two partial helical sections or may be constructed with the helix angles such that the right and left sections cross at one or more locations. A single crossover has been shown herein.

Additionally, cam 14 has been provided with an auxiliary or loading groove 32 which tapers inwardly toward and opens into the helical groove 30. Groove 32 has a radial depth substantially equal to that of groove 30 and intersects the latter in the approach to a cam reversal. In other words, loading groove 32 is located outside the path of groove 30 in a straight (constant helix angle) length 34 which is followed by guide 18 in its approach to reversal curve 35. Since the guide normally travels at a substantially constant speed in length 34 and since its follower portion is then engaged by the inside edge of groove 30, the provision of auxiliary groove 32 has no adverse effect on normal operation of the windup.

As indicated above, the traverse guides of Altice and Waldin are particularly suitable for use in windups of the type disclosed herein. The guide chosen for purposes of illustration in FIG. 3 is a unitary structure having cam-, rail- and yarn-engaging portions 36, 38, 40. Rail-engaging portion 38 is intermediate portions 36, 40 and is provided with longitudinal V-shaped grooves which engage the rails shown in FIGS. 4, 5. Cam-engaging portion 36 is cylindrical and adapted for positioning in groove 30; as such, it is also referred to herein as a follower or button. Portion 40 projects outwardly in the opposite direction from the button and has a central guide slot 41 through which traversing yarn advances to package support 22.

Referring to FIGS. 4 and 5, it is seen that shaft extensions 16, 16' are supported by bearings 42 in sectional end plates 44, 46. Upper and lower longitudinal beams 48, 50 extend between and are attached to end plates 44, 46 with suitable fasteners (not shown). The beams also serve as partial covers for cam 14 and, more importantly, as rigid supports for a guide of rails 52, 54 having spaced longitudinal edges between which the rail-engaging portion 38 of guide 18 is slidable after its insertion through a cut-out or rabbet 56 in upper rail 52. As illustrated, rabbet 56 is located beyond the normal traverse stroke of guide 18, i.e., axially beyond the left, reversal curve 35 in groove 30 (FIG. 2).

After rails 52, 54 have been aligned with the rotational axis of cam 14 and rigidly attached, the portion 38 of a new guide 18 is passed through rabbet 56 and positioned between the rails. Cam 14 is rotated manually until loading groove 32 is in registry with the button 36 which can then be positioned in groove 30. Driven rotation of cam 14, as indicated by arrows in FIGS. 2 and 4, reciprocates guide 18 in a linear path of travel between rails 52, 54, through a stroke dependent on the distance between the reversal curves in groove 30. With groove 32 located as specified, the manner in which it opens into groove 30 presents no difficulty during normal operation of the windup.

To unload a damaged guide 18 from the assembly, the cam is stopped and then rotated manually in the reverse
direction while button 36 is ramped out of cam groove 30 by way of loading groove 32. The button may then be manually moved along rails 52, 54 to cut-out 56 and removed from the assembly.

In another embodiment, in which the barrel cam extends beyond the rail cut-out, guide 18 may be loaded directly into the loading groove and cam rotation in the correct direction will then position the guide in its proper traverse path. In either case, during insertion or withdrawal of the button, excessive stress is never required to be placed on the spaced rails. Thus, rail alignment is never disturbed. Furthermore, with the placement of the loading groove such that the entrance to the cam groove is at a location where the cam is truly helical and, therefore, the follower is not being decelerated, there will be no tendency for the cam follower to be ejected during normal operation.

Additional embodiments or modifications will be apparent to those skilled in the art without departure from the inventive concept which accordingly is intended to be limited only by the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A yarn windup comprising: a rotatably driven package support; a rotatably driven barrel cam having a continuous generally helical groove in its surface and a fixed pair of rails having spaced longitudinal edges disposed in parallelism with the rotational axis of said cam, said rails and said groove respectively being adapted to receive rail- and cam-engaging portions of a traverse guide through which yarn advances to said support, one of said rails being rabbeted at a point beyond the normal traverse stroke to facilitate reception of said rail-engaging portion, said helical groove including reversal curves, there being an auxiliary groove opening into said helical groove in the approach to a reversal curve and extending toward said point whereby to facilitate introduction of said cam-engaging portion to said helical groove.

2. A yarn windup including a rotatably driven package support, a rotatably driven barrel cam having a helical groove in its surface for reception of the follower on a traverse guide through which yarn advances to said support and a pair of spaced rails adapted to receive and constrain the guide to a linear path of travel between reversal curves in said helical groove, the improvement of which comprises provision of a loading groove opening into said helical groove in the approach to a reversal curve, one of said rails being rabbeted at a point outside said path of travel to facilitate positioning of said guide between the rails, said loading groove extending toward said point to facilitate passage of said follower to the helical groove.

3. A yarn windup comprising: a rotatably driven package support; a rotatably driven barrel cam having a helical groove in its surface, said groove including reversal curves; a fixedly mounted pair of rails having spaced longitudinal edges disposed in parallelism with the rotational axis of said cam; and a traverse guide through which yarn advances to said support, said guide including a follower portion in said helical groove, a yarn-guiding portion and a rail-engaging portion between said edges, said cam being provided with an auxiliary groove opening into said helical groove to facilitate sliding movement of the guide to a point spaced therefrom, one of said fixed rails having a cut-out at said point to facilitate removal of the guide.

4. The windup of claim 3 wherein said auxiliary groove is located in the approach to a reversal curve and extends therefrom toward said point, the latter being beyond the normal traverse stroke of said guide.

5. A yarn windup comprising: a rotatably driven package support; a rotatably driven barrel cam having a continuous, generally helical groove in its surface, said groove including reversal curves; a fixedly mounted pair of rails having spaced longitudinal edges disposed in parallelism with said cam; and a traverse guide through which yarn advances to said support, said traverse guide including a follower portion in said helical groove, an integral grooved portion slidably mounted between said edges and a yarn guide projecting outwardly from said grooved portion, said cam being provided with an auxiliary groove outside of and opening into said helical groove in the approach to a reversal curve whereby to facilitate removal of said follower portion from the helical groove and replacement of said guide.

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