Oct. 23, 1962 R. Y. HAYS 3,059,874

YARN TRAVERSING APPARATUS

Filed March 31, 1961

FIG. 1

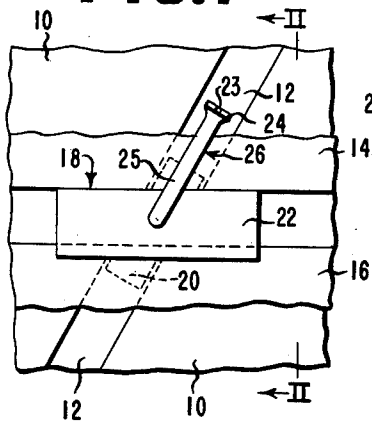


FIG. 2

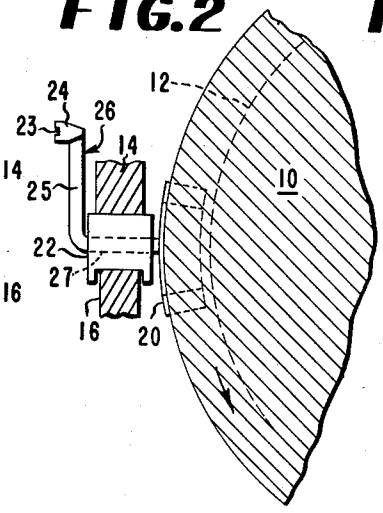


FIG. 3

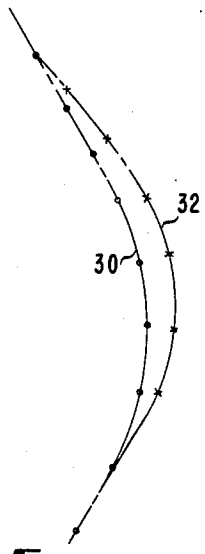


FIG. 4

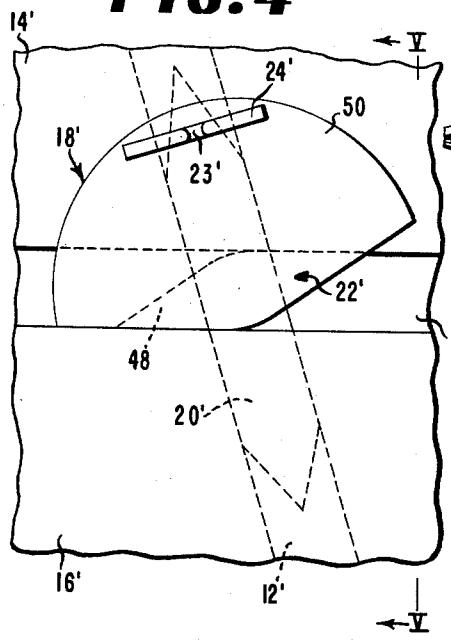
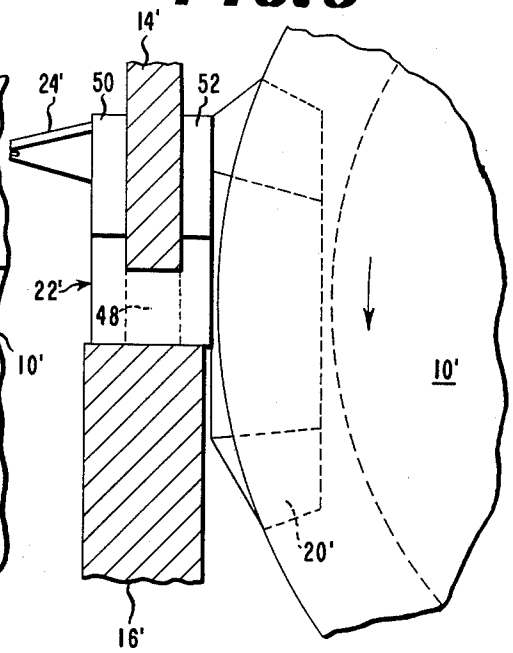


FIG. 5



United States Patent Office 3,059,874 Patented Oct. 23, 1962

3,059,874

YARN TRAVERSING APPARATUS

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Filed Mar. 31, 1961, Ser. No. 99,833
6 Claims. (Cl. 242—158.5)

This invention relates generally to the traverse winding of yarn at high speeds and more particularly to the reciprocating guides and followers employed in a yarn winding apparatus.

It is well known that substantially cylindrical packages of yarn, thread or the like may be built on a bobbin in a traverse winding apparatus wherein the yarn passes through a reciprocating guide to a rotating package. The guide is attached to a follower which rides in a generally helical groove in the surface of a rotatably driven barrel cam and is constrained by one or more rails to a linear path of travel. An apparatus of this type has been disclosed by Hunter in U.S. Patent No. 2,689,694. Although such an apparatus is entirely suitable for use at the speeds contemplated, it has been found that higher winding speeds lead to the formation of unstable packages having bulged end faces and overthrown ends. These difficulties have been traced to the deposit of surplus yarn at the package ends as a result of the reduction in follower velocity in the reversal sections of the cam profile, i.e., winding speed is frequently limited by the reversal time for the yarn guide. Theoretically the provision of a more angular reversal curve would decrease the effect of this velocity reduction and facilitate an increase in winding speed. As a practical matter, the shoulders still appear and, in addition, the nearly instantaneous change in direction subjects the follower to excessive acceleration loads.

The general objective of the present invention is to improve the formation of packages wound at high speeds.

A further important object of the invention is to provide for an increase in the speed of a yarn guide relative to its associated cam follower as the latter travels through the reversal sections of a helical cam profile.

A corollary object is the provision of a cam follower and yarn guide assembly of such a construction that the reversal speed of the guide is increased without any appreciable increase in the acceleration forces acting on the assembly.

These and other objectives are accomplished by providing an assembly in which a yarn guide is attached to a cam follower in spaced relationship to the turning center of the follower. During each reversal, the guide departs from its normal position relative to the cam profile, i.e., it swings outwardly and travels in a path which is both longer and more angular than the reversal section of the cam profile.

Additional objects and advantages will become apparent in the following specification wherein reference is made by the use of designating numerals to the accompanying drawing in which:

FIGURE 1 is a plan view of a cam follower and yarn guide assembly made in accordance with the teachings of the present invention and shown in association with the cooperating parts of a yarn winding apparatus;

FIG. 2 is a fragmentary, sectional view taken on line II—II of FIG. 1;

FIG. 3 is a diagrammatic sketch of the reversal paths followed by the follower and guide of FIGS. 1, 2;

FIG. 4 illustrates a plan view of a preferred embodiment of the assembly; and

FIG. 5 is a fragmentary sectional view taken on line V—V of FIG. 4.

The yarn winding apparatus chosen for illustration includes as components thereof a rotatably driven barrel cam **10** having in its surface a generally helical, continuous groove **12**, a pair of guide rails **14**, **16** and a cam follower and yarn guide assembly **18**. Assembly **18** is constrained to a linear path of travel by rails **14**, **16** and reciprocating motion is imparted thereto by the camming action of groove **12**.

As shown in FIGS. 1 and 2, assembly **18** includes an elongated follower portion **20**, a rail engaging portion **22**, and a yarn guide **24**. The latter is mounted at the extremity of one leg **25** of an L-shaped member **26**, the other leg **27** of which is fixedly attached to follower **20** above its turning center. Leg **27** also passes through and serves as a rotatable mounting for the rail engaging portion **22** which is also referred to herein as a slide element. Portion **22** has a groove in one side thereof which receives rail **16** and is in flat bearing engagement with rail **14** on its other side. As shown in FIG. 2, follower **20** is of an arcuate configuration which conforms generally to the surface contour of cam **10** within groove **12**.

In operation, assembly **18** is reciprocated by the camming action of groove **12** and in this manner yarn passing through the slot **23** in guide **24** is traversed back and forth across a rotatably driven package (not shown) which is part of the traverse winding apparatus. When the assembly **18** is in a linear section of cam groove **12**, each portion thereof follows a linear path of travel, i.e., there is no relative movement between the various portions of assembly **18**. In the end or reversal sections of groove **12**, follower **20** pivots about an axis which is substantially perpendicular to the rotational axis of cam **10**. Leg **27** is also on this axis. As follower **20** pivots and thereby reverses its direction of travel, its turning center follows the cam profile which has been designated with the numeral **30** in FIG. 3. Simultaneously, guide **24** swings outwardly from profile **30** and follows a path **32**. This path **32** includes an additional increment of travel which is achieved by spacing guide **24** in leading or trailing relationship to the turning center of follower **20**. Thus, a simple means for accelerating the yarn guide as it enters or leaves a reversal section has been provided. With this improvement, the speed of yarn windups may be increased without subjecting the assembly to excessive acceleration loads since the guide reversal is accomplished in a time interval which is less than the time required for reversal of the follower **20**. This reduction in guide reversal time reduces the shoulders which usually appear on the package and thus leads to a more stable, uniform package outline.

The preferred embodiment of the assembly which has been illustrated in FIGS. 4 and 5 includes a follower portion **20'**, a rail engaging portion **22'**, and a yarn guide **24'**. Rail engaging portion **22'** includes an integral diamond shaped stud **48**, the adjacent faces of which are alternately in engagement with one of the guide rails **14'**, **16'**. It also includes an integral pair of semi-circular plate elements **50**, **52** which overlap and receive rail **14'** therebetween. The pivot axes of portions **20'**, **22'** are coincident. Guide **24'** is attached to plate **50** and has a yarn receiving slot **23'** which is spaced longitudinally from the turning center or pivot axis of follower **20'** and is also situated above the follower centerline. Thus, when the assembly **18'** is in a linear section of the cam groove, slot **23'** is above the groove centerline. As the assembly passes through a reversal, its turning center remains above the profile **30** but slot **23'** swings outwardly in a path **32** as shown in FIG. 3.

It is apparent that many changes and modifications may be made in the disclosed cam follower and yarn guide assembly without departing from the spirit of the

invention which is therefore 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. In a yarn winding apparatus including a barrel cam provided with a helical groove in its surface and at least one guide rail, a cam follower and yarn guide assembly comprising: an elongated follower in said groove, said follower being adapted to pivot about an axis substantially perpendicular to the rotational axis of the cam when in the reversal sections of said groove; a yarn guide fixedly and immovably attached to said follower for pivotal movement therewith about said axis and having a yarn-engaging portion in longitudinally spaced relationship to said axis; and rail engaging means on said assembly for constraining the latter to a linear path of travel.

2. In a yarn winding apparatus including a rotatably driven barrel cam provided with a helical groove in its surface and spaced guide rails, a cam follower and yarn guide assembly comprising: an elongated follower in said groove, said follower being adapted to pivot about an axis substantially perpendicular to the rotational axis of the cam when in the reversal sections of said groove; an integral stud projecting outwardly from said follower along said axis, said stud being situated between said rails and adapted to pivot about said axis with the follower; an integral plate member extending from said stud toward one end of the follower and in overlapping relationship to one of said rails; and a yarn guide located on said plate member in spaced relationship to said axis.

3. The apparatus of claim 2 wherein said stud is diamond shaped in cross-section and has opposed parallel faces adapted for simultaneous engagement with said rails.

4. The apparatus of claim 3 wherein is provided a second integral plate member extending from said stud, both said plate members being in slidable engagement with said one rail.

5. In a yarn winding apparatus including spaced guide rails and a rotatably driven barrel cam provided with a helical groove in its surface, a cam follower and yarn guide assembly comprising: an elongated follower in said groove, said follower being adapted to pivot about an axis substantially perpendicular to the rotational axis of the cam when in reversal sections of said groove; an L-shaped member having a first leg fixedly and immovably attached to said follower for pivotal movement therewith about said axis and projecting outwardly on said axis and a second leg extending toward one end of the follower in overlapping relationship to one of said rails; a yarn guide located on said second leg in spaced relationship to said axis; and a slide element situated between said rails, said element being rotatably mounted on the first leg of said member.

6. The apparatus of claim 5 wherein said slide element is rectangular in cross-section and has a centrally disposed bore within which said first leg is freely rotatable.

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