United States Patent

Dilling

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[54] GUIDE FOR UNWINDING THREAD FROM A PACKAGE

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[52] **U.S. Cl.** **242/129.72**, 242/157

[51] **Int. Cl.** **B65h 49/00**

[58] **Field of Search** 242/128, 129, 129.62, 129.72, 242/157

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

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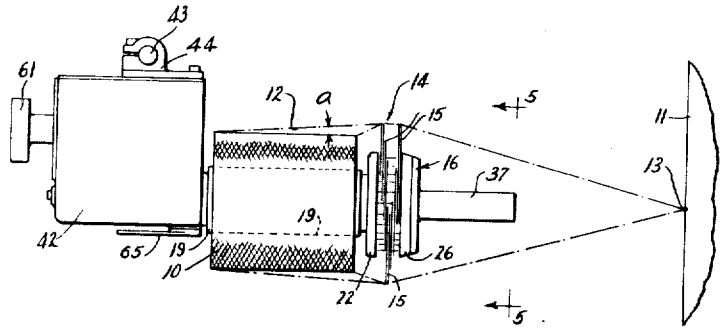
[57] **ABSTRACT**

A generally circular, collapsible guide over which thread is drawn as it is unwound from a package for use in a loom or the like. The guide is collapsed progressively so that its diameter substantially retains a preselected relationship with the decreasing diameter of the package to reduce the possibility of thread sloughing on the package and to reduce various tension problems, especially in the case of cylindrical packages. The guide includes curved fingers which swing in to achieve the collapsing of the guide.

9 Claims, 8 Drawing Figures



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3 Sheets-Sheet 1

Fig. 1.

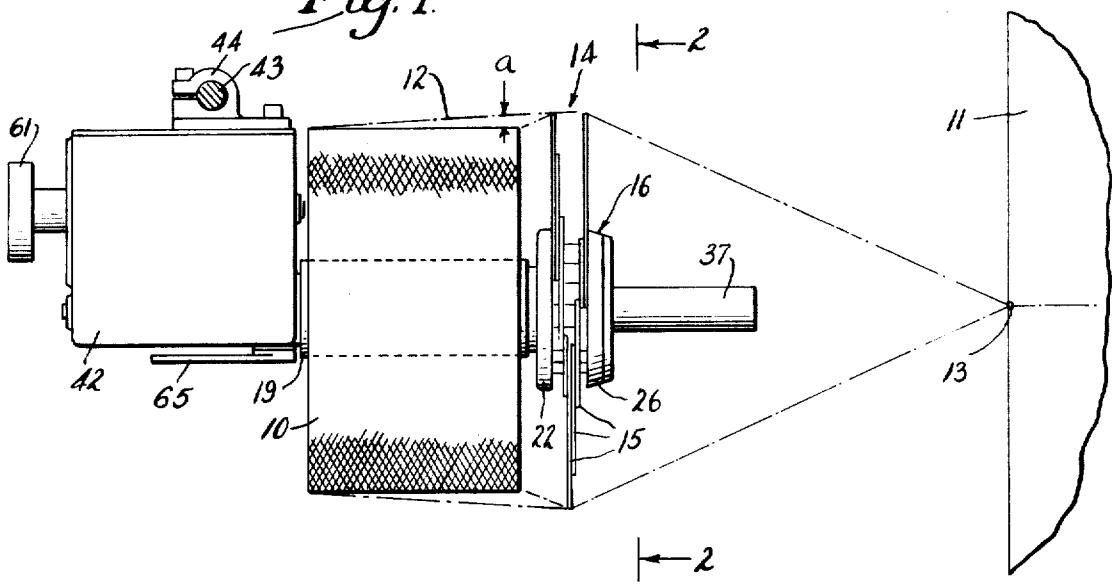

Fig. 2.

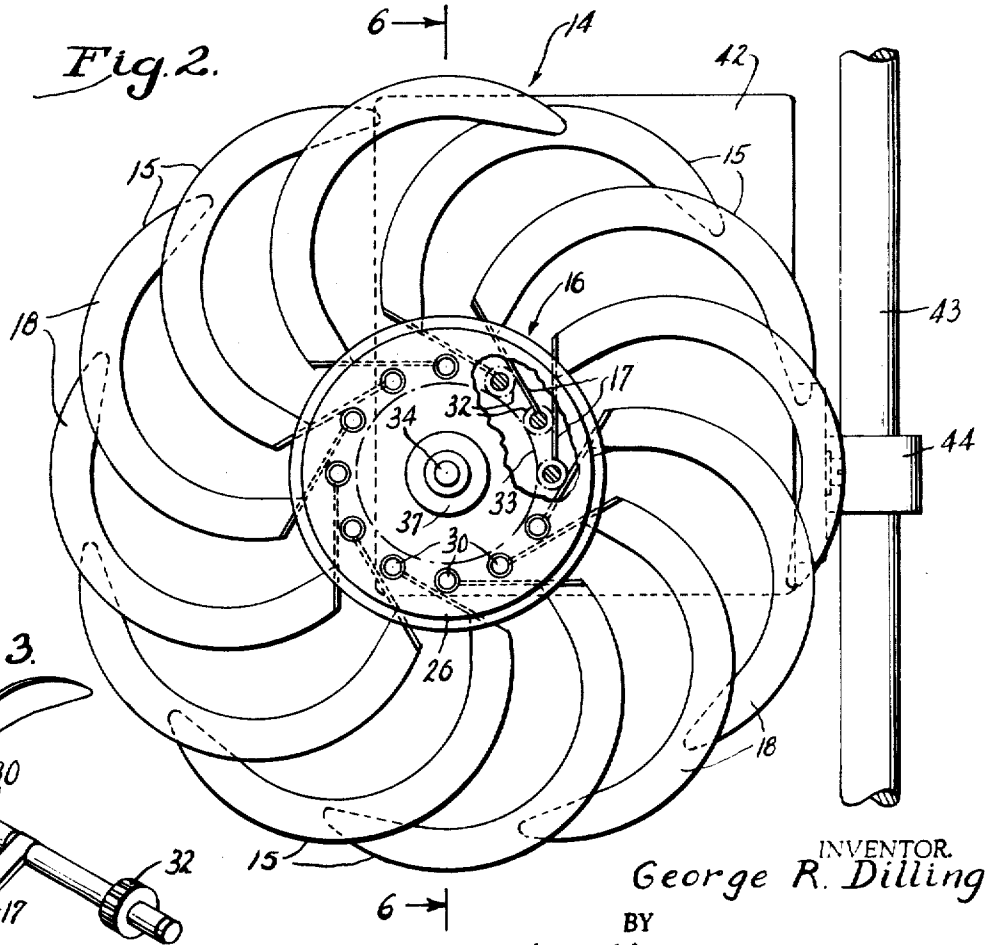

Fig. 3.

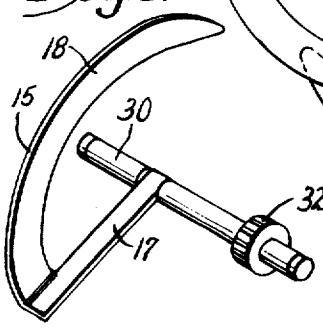

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Fig. 4.

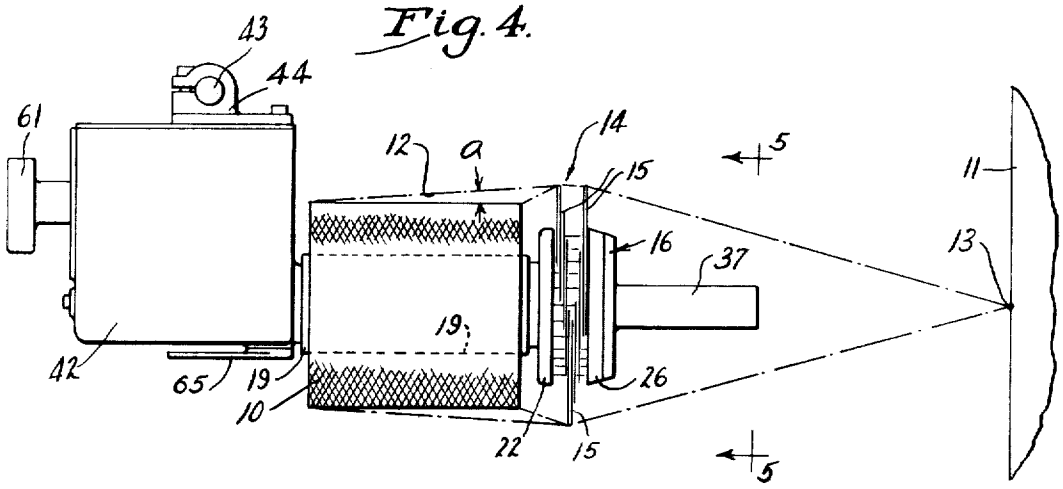
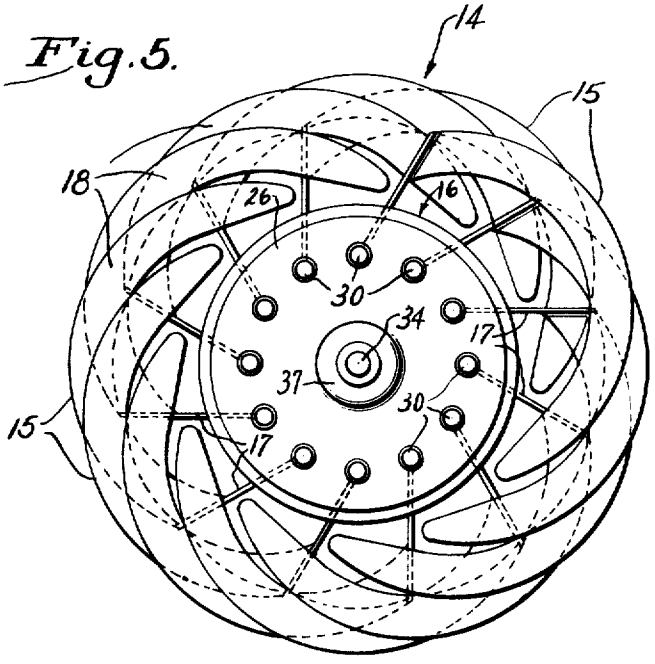


Fig. 5.



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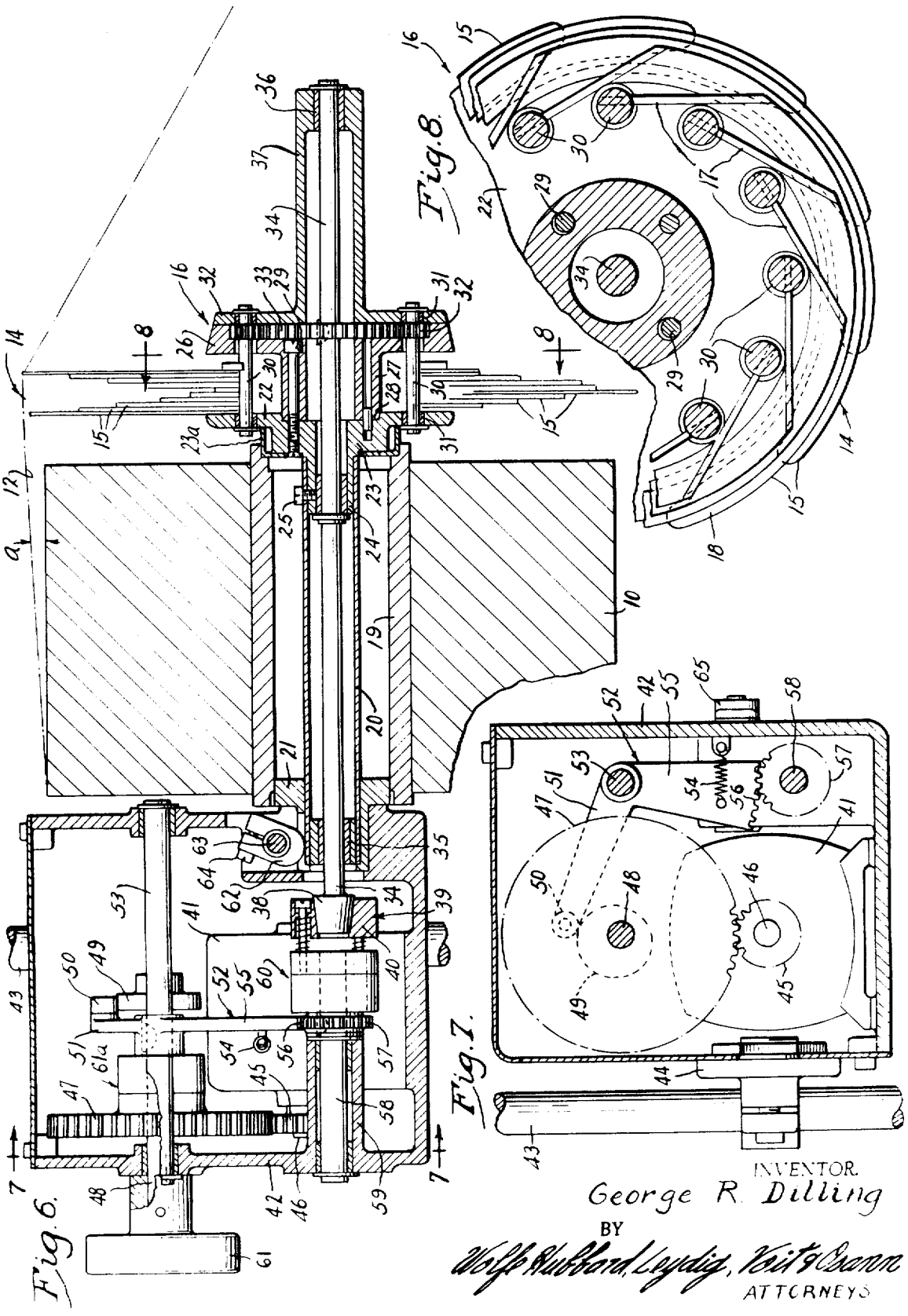

Fig. 6.

Fig. 8.

Fig. 7.

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GUIDE FOR UNWINDING THREAD FROM A PACKAGE

BACKGROUND OF THE INVENTION

This invention relates to a guide for thread as it is being unwound from a package for use in a loom or the like.

SUMMARY OF THE INVENTION

The general object of the invention is to provide a novel thread guide which materially reduces the possibility of the thread sloughing on the package and accomplishes this whether a conical package or a cylindrical package is used. As applied especially to cylindrical packages, the guide results in a low, uniform tension on the thread as it is withdrawn from the package and eliminates high tension peaks to reduce the possibility of thread breakage.

A more detailed object is to provide a generally circular but collapsible guide over which the thread passes as it is unwound and to collapse the guide progressively as the diameter of the package decreases so that the difference in the diameters of the guide and the package remains substantially constant, the guide being slightly larger than the package.

Another object is to achieve the foregoing by making the guide of a plurality of radially projecting fingers with curved outer end portions to give the guide its generally circular shape and by swinging the fingers inwardly to collapse the guide.

The invention also resides in the particular construction and arrangement of the fingers and the means for actuating the fingers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of an unwinding mechanism utilizing the novel guide of the present invention.

FIG. 2 is an enlarged sectional view taken along the line 2—2 in FIG. 1.

FIG. 3 is a perspective view of one of the fingers and the associated shaft.

FIG. 4 is a view similar to FIG. 1 but showing the parts in a moved position.

FIG. 5 is an enlarged sectional view taken along the line 5—5 in FIG. 4.

FIG. 6 is a fragmentary sectional view taken along the line 6—6 in FIG. 2.

FIG. 7 is a sectional view taken along the line 7—7 in FIG. 6.

FIG. 8 is a fragmentary sectional view taken along the line 8—8 in FIG. 6 with the guide collapsed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawings for purposes of illustration, the invention is embodied in a mechanism for supporting a package 10 of thread or yarn as it is unwound by some device such as the weft controller 11 of a shuttleless loom. The thread 12 leaves the package, passes through a thread eye 13 which is coaxial with the package, and then is connected to the weft controller in a manner well known in the art.

The present invention contemplates the provision of a novel guide 14 disposed between the package 10 and the eye 13 to guide the thread 12 in such a manner as to reduce the possibility of the thread sloughing on the package and this is achieved whether the package is cylindrical or conical. Thus, there is appreciably less chance for the thread to become snarled or tangled and, at the same time, the package can hold more thread because it may be cylindrical. Also, particularly in the case of a cylindrical package, the guide results in a low, uniform tension on the thread and eliminates high tension peaks thereby reducing the possibility of the thread breaking. To these ends, the guide 14 is generally circular in shape and is collapsible so that its diameter may be progressively reduced as thread is unwound from the package. Initially, the diameter of the guide is larger than the original diameter of the package so that, as shown in FIG. 1, the thread 12 crossing the guide forms a preselected angle *a*, such as 3° to 5°, with the package. This angle, of course, varies somewhat as the thread passes back and forth between the ends of the package. As the thread is unwound, the guide is progressively collapsed so that the angle *a* remains substantially constant as will be seen by a comparison of FIGS. 1 and 4.

More particularly, the guide 14 is made up of a plurality of fingers 15 which are spaced angularly around and project radially outwardly from a support 16 which is coaxial with the package 10. The inner end portions 17 (FIG. 3) are pivotally connected to the support and the outer end portions 18 are curved, all being curved in the same direction, so that these outer end portions together form the generally circular guide 14 as shown in FIG. 2. By turning the fingers counterclockwise in unison as viewed in FIGS. 2 and 5, the diameter of the guide is increased and it is decreased when the fingers are turned clockwise. The arrangement is such that the beginning diameter is set manually and then the fingers are power driven in the direction to collapse the guide at a rate correlated with the rate at which the thread is unwound from the package 10.

In the present instance, the core 19 (FIG. 6) of the package 10 surrounds a sleeve 20 which is concentric with the core and the rear end of the latter is pressed onto a flange 21 fixed to the sleeve 20. The support 16 is mounted on the forward end of the sleeve 20 and includes a circular disk 22 with an axial flange 23 surrounded by a cup 23*a* which is fitted into the end of the core 19. A boss 24 projecting into the sleeve 20, the boss and the sleeve 20 being held together by a screw 25. Also forming a part of the support is a second circular, two-part disk 26 spaced from the disk 22 by an axial flange 27 which is integral with the disk 26 and is seated in a recess 28 in the disk 22 with screws 29 fastening the two disks together.

Angularly spaced around the support 16 at equal distances are a plurality of shafts 30, one for each finger 15, which are equidistant from the axis of the support and span the disks 22 and 26, the shafts being journaled in the disks by bearings 31. As illustrated in FIGS. 3 and 8, the inner end portion 17 of each finger is straight, projecting radially from its respective shaft 30, and is brazed to the shaft. The curved outer end portion 18 is in a plane at a right angle to the plane of the inner end portion.

To turn the fingers 15 in unison, a gear 32 is keyed to each shaft 30 and meshes with a gear 33 fixed to a shaft 34. The latter is coaxial with and disposed within the inner sleeve 20 and is journaled in bearings 35 in the inner sleeve and a bearing 36 in a tubular extension 37 on the disk 26. 38 rear end of the shaft carries a conical member 38 which is the driven member of a clutch 39. In order to turn the driving member 40 of the clutch, a motor 41, which may be set to turn at a selected constant speed, is disposed within a housing 42 which is mounted on a rail 43 of the loom frame by a bracket 44 (FIG. 1). A pinion 45 (FIGS. 6 and 7) on the output shaft 46 of the motor meshes with a spur gear 47 fast on a shaft 48 which is journaled in the housing 42. A cam 49 is secured to the shaft 48 and is engaged by a follower 50 carried on one arm 51 of a bell crank lever 52 which is fulcrumed in the housing by a shaft 53. A contractile spring 54 acting between the housing and the other arm 55 of the lever 52 yieldably urges the follower into engagement with the cam. The end of the other arm 55 of the lever is formed with teeth 56 which are a sector of a gear and mesh with a spin gear 57 on a shaft 58. The latter is journaled in a sleeve 59 integral with the housing 42 and turns the driving member 40 of the clutch 39 through a slip clutch 60. Thus, the motor 41 turns the fingers 15 through the gears 45 and 47, the cam 49 and follower 50, the gears 56 and 57, the clutches 60 and 39 and the gears 33 and 32, the transmission resulting in a substantial speed reduction. A knob 61 outside the housing 42 is keyed to the shaft 48 so that the fingers may be turned manually to set the guide 14 at its starting diameter. A slip clutch 61*a* on the shaft 48 permits the knob to turn the cam 49 without turning the power drive train.

To permit a package **10** to be set in place, the housing is removably clamped to the sleeve **20**. For the purpose, a wedge **62** (FIG. **6**) is clamped to a shaft **63** by a screw **64**. As shown in FIG. **1**, the shaft projects through the housing **42** and a handle **65** is attached to the outer end of the shaft for manually turning the wedge. When the wedge is out of engagement with the sleeve **20**, the assembly including the package **10**, the sleeve **20**, the support **16**, the guide **14** and the shaft **34** may be removed from the housing, the driven member **38** of the clutch **39** simply slipping out of the driving member **40**. With this assembly removed, the core **19** of the old package may be pulled out of the cup **23***a* and a new package **10** may be set in place by inserting the cup in one end of the core **19** and forcing the other end of the core onto the flange **21**, this reengaging the clutch **39**.

In operation, with a new package **10** in place and the wedge **62** in clamping engagement with the sleeve **20**, the knob **61** is turned to swing the fingers **15** out until the diameter of the guide **14** produces the preselected angle *a* between the thread **12** and the package as shown in FIGS. **1** and **2**. As the weft controller **11** is activated, the motor **41** is started. The weft controller draws the thread **12** off the package and across the guide and, during the unwinding, the thread travels around the guide in a clockwise direction as viewed in FIG. **2**. At the same time, the motor turns the gears **32** to swing the fingers **15** progressively inwardly so that, as shown in FIGS. **4** and **5**, the diameter of the guide decreases as the diameter of the package decreases. The cam **49** is shaped to gradually increase the speed at which the fingers turn to compensate for the increasing rate at which the diameter of the package is reduced and thus the angle *a* remains substantially constant.

With the arrangement described above, the guide **14** may be set so that the thread **12** and the package **10** form an angle which is least likely to result in thread sloughing on the package. Further, the progressive collapsing of the guide maintains this angle substantially constant throughout the unwinding operation. An additional advantage is that the possibility of sloughing is reduced even if a cylindrical package is used and this permits the use of packages containing appreciably more thread and thus the package has to be replaced less frequently. Moreover, as applied especially to cylindrical packages, the guide maintains a low, uniform tension on the thread and materially reduces the possibility of thread breakage.

I claim as my invention:

1. Mechanism for use in unwinding thread from a package of a predetermined diameter, said mechanism comprising, means adapted to receive and hold said package, a generally circular, collapsible guide member concentric with said package adjacent one end thereof and adapted to have the thread drawn across it as the thread is unwound from the package, the initial diameter of said guide being greater than the diameter of said package whereby the thread crossing the guide forms a preselected angle with the package, and means for progressively reducing the diameter of said guide as thread is unwound from the package to maintain a substantially constant angle between the thread and the package.

2. Mechanism as defined in claim **1** in which said guide includes radially extending fingers with their inner ends pivotally mounted on a support and their outer ends curved in the same direction and said means progressively turns said fingers inwardly.

3. Mechanism as defined in claim **1** including means for setting said guide manually at the starting diameter.

4. Mechanism for use in unwinding thread from a package of a predetermined diameter, said mechanism comprising, means adapted to receive and hold said package, a support disposed adjacent one end of said package and concentric therewith, a plurality of fingers projecting radially outwardly from said support with their inner ends pivotally connected to the support, the outer end portions of said fingers being curved whereby the fingers together form a generally circular guide which collapses in diameter as the fingers turn in one direction and expands as the fingers turn in the other direction, the initial position of the fingers forming a guide of a diameter larger than the diameter of the package whereby the thread crossing the guide forms a preselected angle with the package, and means for progressively turning said fingers in unison to collapse said guide progressively as thread is unwound from the package and maintain a substantially constant angle between the thread and the package.

5. Mechanism as defined in claim **4** including means for manually turning said fingers to set said guide at the starting diameter.

6. Mechanism for use in unwinding thread from a package of a predetermined diameter, said mechanism comprising, means adapted to receive and hold said package, a support disposed adjacent one end of said package and concentric therewith and having a plurality of shafts angularly spaced equal distances around the axis of the support, a plurality of fingers, one projecting radially outwardly from each of said shafts with its inner end pivotally connected to the support on the associated shaft, the outer end portions of said fingers being curved whereby the fingers together form a generally circular guide which collapses in diameter as the fingers turn in one direction and expands as the fingers turn in the other direction, the initial position of the fingers forming a guide of a diameter larger than the diameter of the package whereby the thread crossing the guide forms a preselected angle with the package, and second means for progressively turning said fingers in unison to collapse said guide progressively as thread is unwound from the package and maintain a substantially constant angle between the thread and the package.

7. Mechanism as defined in claim **6** including means for manually turning said fingers to set said guide at the starting diameter.

8. Mechanism as defined in claim **6** wherein said fingers are fast on said shafts and said second means includes a second shaft disposed within and concentric with said spindle, a plurality of driven gears, one fast on each of said finger shafts, a gear fast on said second shaft and meshing with the gears on said finger shafts, and a power actuator for turning said second shaft.

9. Mechanism as defined in claim **8** wherein said second means further includes cam means operable to increase the rate at which the fingers turn as the package is unwound.

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