March 6, 1945. A. J. L. MORITZ ET AL 2,370,746

APPARATUS FOR UNWINDING YARN

Filed Jan. 19, 1944 2 Sheets-Sheet 1

Fig. 1.

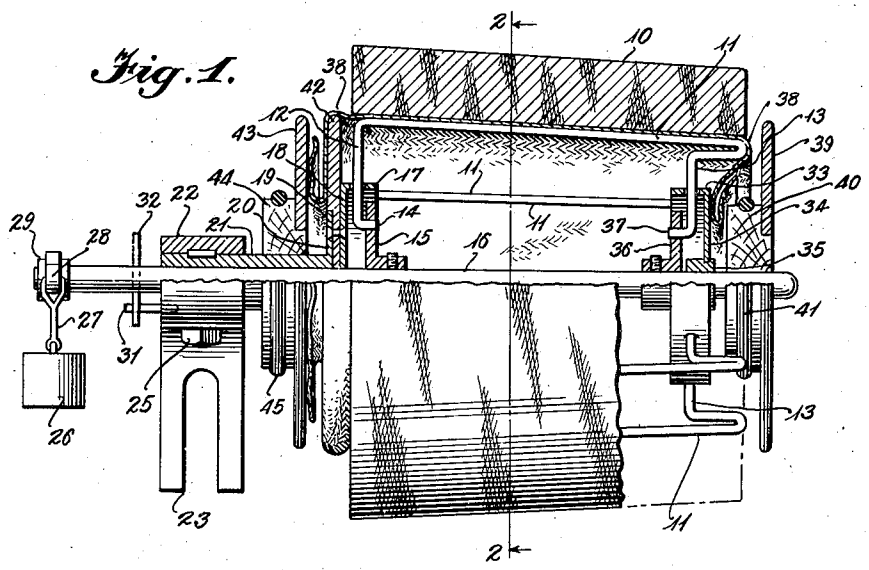


Fig. 2.

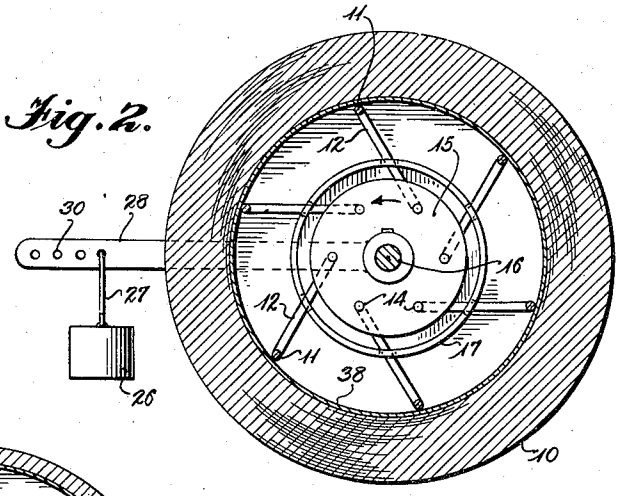
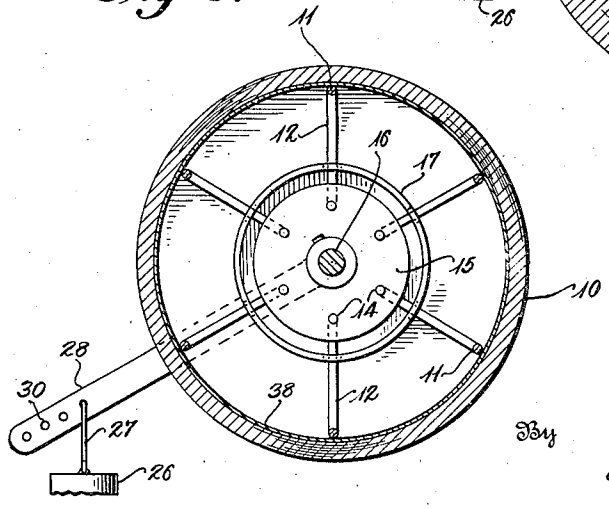


Fig. 3.



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Fig. 4.

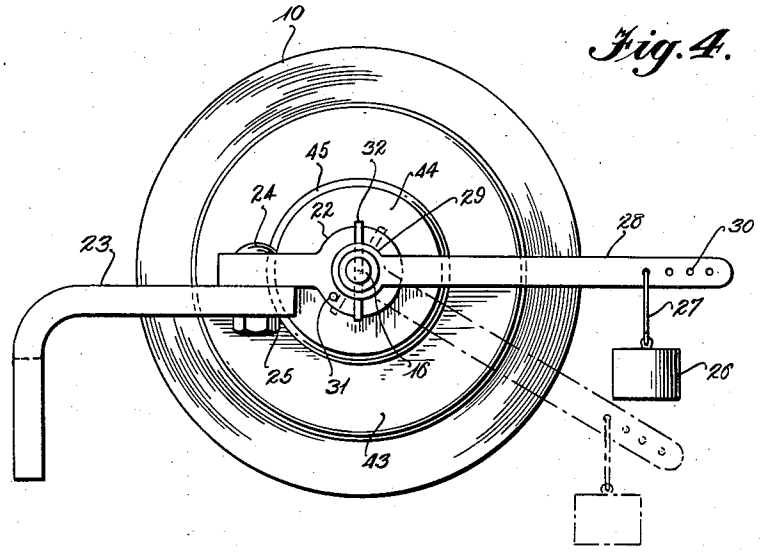


Fig. 5.

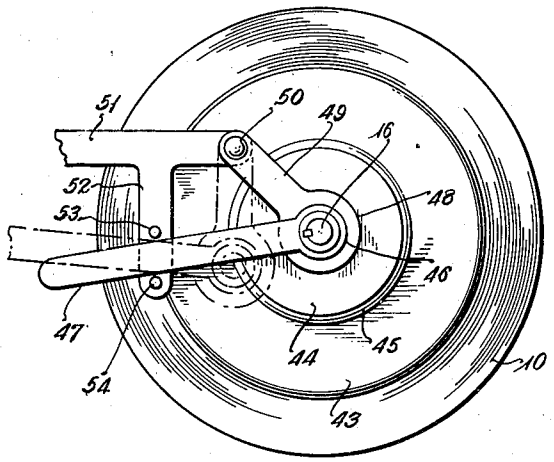
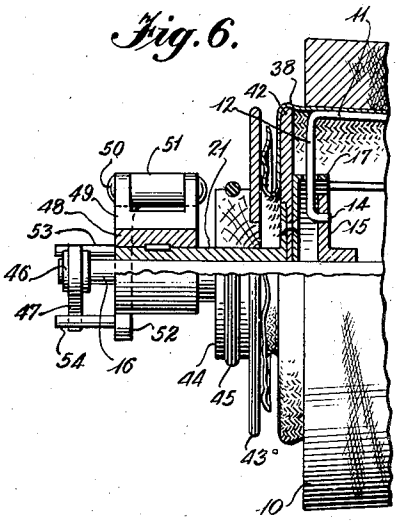


Fig. 6.



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APPARATUS FOR UNWINDING YARN

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9 Claims. (Cl. 242—129)

The present invention relates to unwinding thread and the like from yarn packages, and more particularly to a method and apparatus for continuously removing rayon from pot spun packages which initially have no interior supports or rewound bobbin spun packages.

It is now common practice in the rayon industry to aftertreat freshly spun rayon in the original pacakge form and subsequently rewind the same. In the case of pot spun rayon, the package has no initial interior support and it is with this type of package that the present invention is primarily concerned. However, in some cases where other types of packages are produced such as bobbin spun packages, they may be partially aftertreated and later rewound on a holder that is removable. The present invention may also be applicable to these types of packages.

The interior layers of these unsupported or hollow packages become loosened and often slough off during the unwinding operation. This is due primarily to the absence of the support previously furnished by the outer layers and to the fact that the packages have been dried without internal supports, thereby resulting in a certain amount of suppleness and crinkle in the inner layers. If no precautions are taken, such loosening incurs tangling, which impedes the unwinding of the said interior layers of the package. Accordingly, various forms of inserts have been employed which have corrected this difficulty to some extent, but in cases where the proper tension is imposed on the interior convolutions of the packages, a rather complicated support is employed which has to be controlled manually during the unwinding operation. Examples of such supports are disclosed in U. S. Patents Nos. 2,245,937 and 2,285,826. In both of these cases it will be seen that a spring controlled device is set in operation by means of a foot treadle which is locked in position manually during the unwinding.

It is, therefore, the object of the present invention to provide a device for unwinding thread such as rayon from a package which has had no interior support during some steps of manufacturing, while automatically maintaining the interior layers of the package taut during the complete unwinding operation.

The invention further contemplates the application of continuous outward pressure to the interior convolutions of the packages while the unwinding step is being effected.

Another object of this invention is the provision of a simple thread package supporting device which acts to support the package during the unwinding operation while maintaining the inner layers under pressure, either through the intermediary of an outside gravitational force, or by means of the weight of the package per se.

Other objects and advantages of this invention will be apparent from the following detailed description of two embodiments thereof when considered in conjunction with the annexed drawings, wherein

Figure 1 is a view partially in vertical section, and partially in side elevation illustrating thread package supporting apparatus constructed according to the present invention, the package being broken away at the lower righthand corner of the figure to illustrate, in elevation, the supporting means;

Figure 2 is a view in section taken on line 2—2 of Figure 1;

Figure 3 is a view in section taken from the position of Figure 2, but illustrating the position assumed by the thread package support when the thread package has been substantially unwound;

Figure 4 is a view in end elevation of the apparatus of Figure 1 illustrating in broken lines the position to which the weight biasing means moves during an unwinding operation;

Figure 5 is a view in end elevation similar to Figure 4, but concerned with a modification of the invention in which the weight is eliminated, and

Figure 6 is a view partially in vertical section and partially in elevation of the modified form of apparatus of Figure 5.

Referring now in greater detail to the drawings, and more particularly to Figures 1 to 4 inclusive thereof, the numeral 10 designates a wound package of thread which is interiorly supported at a plurality of circumferentially spaced points by axially extending rods 11. Rods 11 are held in position by integral depending shanks 12 and 13 bent downwardly adjacent the ends of each rod and extending inwardly toward the axis of package 10. Each shank 12 terminates in an intgeral projection 14 which is inserted for free rotation but anchored in an aperture in a disk 15, said disk being mounted upon and keyed to a shaft 16 disposed concentrically within package 10. Upon reference to Figure 2 it will be seen that the apertures in disk 15 are equally spaced in a circular path concentric to shaft 16.

Intermediate projection 14 and rod 11, each depending shank 12 is passed through an opening in an annular fulcrum member 17, the openings

being equally spaced about the annular member, one being provided for each depending shank 12. Annular fulcrum member 17 is a flange extending outwardly from a circular plate 18, which is attached by rivets 19 to the flange 20 of a sleeve 21 which overlies and is in bearing engagement with shaft 16. Upon reference to Figure 1 it will be seen that sleeve 21 acts as a bearing for shaft 16, the latter being rotatable within the former. A support 22 surrounds the left hand end of sleeve 21 as it is viewed in Figure 1, said support being held in position by a bracket 23 to which it is connected by a bolt 24 and a nut 25. Support 22 is held stationary by the foregoing construction and is keyed to sleeve 21, so that the latter is held stationary as well as parts 20, 18 and 17 connected thereto. Shaft 16, however, is rotatable, and when it turns disk 15 will turn with it. Thus, if disk 15 is biased in a counterclockwise direction, as it is viewed in Figure 2, bearing in mind that annular fulcrum member 17 is stationary, it will be seen that depending shanks 12 will be moved from the position of Figure 2 to substantially the radial position of Figure 3. Inasmuch as the openings in member 17 are fixed with respect to the axis of the package, this movement is accompanied by an increase in the effective distance between rods 11 and the axis of the package. Interior expansion of the package results.

In one form of the invention, the rotation of disk 15 discussed in the preceding paragraph is brought about by a weight 26 which is attached by a hanger 27 to the end of a lever 28 having a hub 29 keyed to shaft 16. So that the effective force at the hub may be varied, the right-hand end of lever 28, as it is viewed in Figure 4, is provided with a number of holes 30, in which hanger 27 may be placed.

It is now evident that when the package is in the Figure 2 position, weight 26 is biasing shaft 16 in a counterclockwise direction, tending to urge disk 15 to the Figure 3 position. As the package is unwound and the compressive effect of the outer layers thereof upon the inner layers is relieved, the biasing effect of weight 26 results in gradual rotation of disk 15 to maintain the interior convolutions of the package under tension so as to avoid tangling during an unwinding operation such as that involved in the preparation of warp beams, in which a number of packages are simultaneously unwound while supported on a creel.

Inasmuch as movement of lever 28 beyond the Figure 3 position would result in reduction in the effective distance between rods 11 and shaft 16, it is necessary to provide a stop to inhibit counterclockwise rotation of shaft 16 at the Figure 3 position. To this end a pin 31 projects outwardly from support 22 in a position to be engaged by a diametrically disposed pin 32 passed through shaft 16. As can best be seen in Figure 4, engagement of pin 32 against pin 31 will stop the rotation of shaft 16 brought about by weight 26.

The action upon depending members 13 at the right-hand end of Figure 1 has not been described in detail in connection with the foregoing for the reason that it is similar in all respects to the action upon depending members 12. Note that annular fulcrum member 33 has openings therein to receive depending members 13, and that said fulcrum member is held in position by a disk 34 mounted for free rotation about shaft 16 in a hub 35. A disk 36 similar to disk 15 is keyed to shaft 16 and is provided with a plurality of holes for the reception and anchoring of projections 37 from depending shanks 13. The effect of rotation of disk 36 on depending shanks 13 is exactly the same as the effect of rotation of disk 15 on shanks 12.

In the event the package 10 has been previously covered with a fabric sock in order to facilitate aftertreating operations, then the sock must be sufficiently unfolded to be out of the way during unwinding of the package. This is effected as shown in Figure 1, namely, by folding the ends of sock 38 back over the ends of the package and depositing each end of the sock into the space provided at the respective ends of the package supporting apparatus. This space is created at the right hand end of Figure 1 by extending rods 11 beyond the point at which shank 13 depends. To close the space and enclose the end of sock 38, a fiber cap 39 is provided and maintained in position by means of a split wood block 40 attached thereto and carrying a rubber ring 41. At the left hand end of Figure 1, the sock 38 is enclosed in the space between cap 42 and a fiber cap 43 maintained in position by means of a split wood block 44 attached thereto and carrying a rubber ring 45. The cap 42 is mounted between plate 18 and flange 20 by means of rivets 19 which hold the cap in fixed relation therewith.

Now referring to Figures 5 and 6, the construction is quite similar to that illustrated in Figures 1 to 4 inclusive, except that instead of a counterweight such as 26, the movement of rods 11 away from the center of the package is effected by the weight of the package itself. In this case shaft 16 is keyed to the hub 46 of a lever 47 while sleeve 21 is keyed to a sleeve 48 at one end of a link 49, the other end of which is pivotally attached at 50 to a supporting arm 51. Depending from supporting arm 51 is a member 52 carrying stop pins 53 and 54 which lie in the path of possible movement of lever 47 and serve to prevent any substantial rotary movement of shaft 16.

In this instance the entire weight of the assembly is carried by sleeve 21 so that the tendency of link 49 is to depend vertically from pivot point 50. In view of the fact that sleeve 48, which constitutes the end of link 49, is keyed to sleeve 21, it is evident that the angular relationship between sleeve 48 and sleeve 21 will not change in response to any bodily movement of link 49 about its point of pivot 50. This being the case, annular fulcrum member 17, which is keyed with sleeve 21, will stay in the same relative position with respect to link 49. On the other hand, shaft 16, which has keyed thereto disk 15, will only be rotated relative to the remainder of the assembly, due to the fact that lever 47, which is keyed to shaft 16, cannot, because of stops 53 and 54, move bodily with link 49. Since this bodily movement is prevented, the angular position of lever 47 relative to link 49 must change as the latter moves toward its depending position illustrated in broken lines in Figure 5. The relative rotation of member 17 with respect to shaft 16 causes disk 15 to assume a position such as that illustrated in Figure 3 when link 49 depends vertically from supporting arm 51.

In use, the form of the invention illustrated in Figures 5 and 6 involves only placing the package in position with link 49 defining with supporting arm 51 an angle equal to or greater than that involved in the full line illustration of Figure 5. When the package is released the assembly will fall to the full line position of Figure 5, and will thereafter gradually move to the

broken line position of that figure as the compression on the inner convolutions of thread is released, permitting expansion of supporting elements 11, in turn permitting rotation of fulcrum member 17. Thus, at all times during the unwinding operation, supporting elements 11 will be biased by their respective levers against the inner convolutions of the package, tending to radially expand it. This keeps said inner convolutions distended and free of tangles during the entire unwinding operation.

Although in the specification and the accompanying drawings there is shown and described two embodiments of this invention, and although various alternatives are suggested, these are not intended to be exhaustive or limiting of the invention, but, on the contrary are given for the purpose of illustrating it and instructing others in the principles thereof as well as the best practical manner of utilizing the invention in order that others may be enabled to modify it and apply it in numerous forms each as may be best suited to conditions and requirements in any particular instance. The invention is to be limited only to the extent of the annexed claims.

What is claimed is:

1. A device for supporting hollow thread packages in a non-rotatable manner and tensioning the interior convolutions thereof during unwinding which comprises radially extensible means for engaging the inner convolutions of thread and means controlled from the weight of the package for extending the said extensible means whereby the inner convolutions are distended throughout the unwinding operation.

2. A device for supporting hollow thread packages in a non-rotatable manner and tensioning the interior convolutions thereof during unwinding which comprises radially extensible means for engaging the inner convolutions of thread, rotatable shaft means for extending the said extensible means and a weight means for rotating said shaft means whereby the inner convolutions are distended throughout the unwinding operation.

3. A device for supporting and tensioning the interior convolutions of a hollow thread package during unwinding which comprises, longitudinally extending means for contacting the inner convolutions of thread, means for moving the longitudinally extending means outwardly comprising a fulcrum means, an anchor means, levers passing through said fulcrum means and connecting said longitudinally extending means to said anchor means and means for effecting relative rotary movement between said fulcrum means and said anchor means whereby the longitudinally extending means are moved outwardly to distend the inner convolutions of the thread package during unwinding.

4. A device for supporting and tensioning the interior convolutions of a hollow thread package during unwinding which comprises, longitudinally extending means for contacting the inner convolutions of thread, means for moving the longitudinally extending means outwardly comprising a fulcrum means, an anchor means, levers passing through said fulcrum means and connecting said longitudinally extending means to said anchor means, a shaft, said anchor means being keyed to said shaft, and said fulcrum means being rotatable with respect to said shaft and weight means acting to rotate said shaft to increase the effective radial length of said levers, whereby the longitudinally extending means are moved outwardly to distend the inner convolutions of the thread package during unwinding.

5. A device for supporting and tensioning the interior convolutions of a hollow thread package during unwinding which comprises, longitudinally extending means for contacting the inner convolutions of thread, means for moving the longitudinally extending means outwardly comprising a fulcrum means, an anchor means, levers passing through said fulcrum means and connecting said longitudinally extending means to said anchor means, a shaft, said anchor means being keyed to said shaft, and said fulcrum means being rotatable with respect to said shaft and means responsive to the weight of the package and the foregoing parts for effective relative movement between said fulcrum means and said anchor means to increase the effective radial length of said levers, whereby the longitudinally extending means are moved outwardly to distend the inner convolutions of the thread package during unwinding.

6. A device for supporting and tensioning the interior convolutions of a hollow thread package during unwinding which comprises, circumferentially and axially spaced longitudinally extending elements adapted to contact the interior of the thread body, levers converging inwardly from said elements in a radial plane, fulcrum means, anchor plate means, said levers being mounted for free pivotal movement in each of said means about axes normal to the radial plane in which they lie, said two means being concentrically disposed different radial distances inwardly from said elements, means supporting said fulcrum means in stationary position, a shaft, said anchor plate means being keyed to said shaft, and weight means biasing said shaft for rotation to increase the effective radial length of said levers, whereby the elements may be expanded to distend the inner convolutions of the thread package during unwinding.

7. A device for supporting and tensioning the interior convolutions of a hollow thread package during unwinding which comprises, circumferentially and axially spaced longitudinally extending elements adapted to contact the interior of and support the thread body, levers converging inwardly from said elements in a radial plane, fulcrum means, anchor plate means, said levers being mounted for free pivotal movement in each of said means about axes normal to the radial plane in which they lie, said two means being concentrically disposed different radial distances inwardly from said elements and means responsive to the weight of the package and foregoing parts for biasing said anchor plate means relative to said fulcrum means to increase the effective radial length of said levers, whereby the elements may be expanded to distend the inner convolutions of the thread package during unwinding.

8. A device for supporting and tensioning during unwinding the interior convolutions of a hollow thread package having a fabric sock covering which comprises, circumferentially and axially spaced longitudinally extending elements adapted to contact the interior of the thread body, levers converging inwardly from each end of said elements in a radial plane, fulcrum means, anchor plate means, said levers being mounted for free pivotal movement in each of said means about axes normal to the radial plane in which they lie, said two means being concentrically disposed different radial distances inwardly from said elements, means supporting said fulcrum means in

stationary position, a shaft, means provided at each end of said shaft for receiving the respective ends of said sock, said anchor plate means being keyed to said shaft, and weight means biasing said shaft for rotation to increase the effective radial length of said levers, whereby the elements may be expanded to distend the inner convolutions of the thread package during unwinding.

9. A device for supporting and tensioning during unwinding the interior convolutions of a hollow thread package having a fabric sock covering which comprises, circumferentially and axially spaced longitudinally extending elements adapted to contact the interior of and support the thread body, levers converging inwardly from each end of said elements in a radial plane, fulcrum means, anchor plate means, said levers being mounted for free pivotal movement in each of said means about axes normal to the radial plane in which they lie, said two means being concentrically disposed different radial distances inwardly from said elements, means provided at each end of said device for receiving the respective ends of said sock, and means responsive to the weight of the package and foregoing parts for biasing said anchor plate means relative to said fulcrum means to increase the effective radial length of said levers, whereby the elements may be expanded to distend the inner convolutions of the thread package during unwinding.

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