Dec. 19, 1950 J. S. CHAYA ET AL 2,534,339

WARP-WINDING FROM CAKES

Filed April 4, 1944

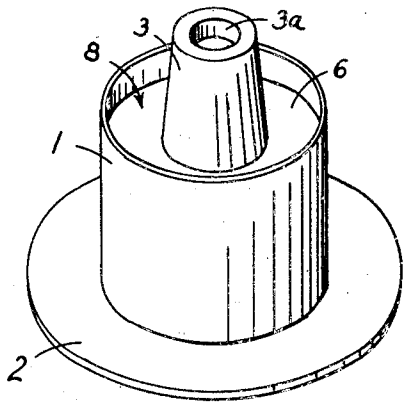


Fig. 1

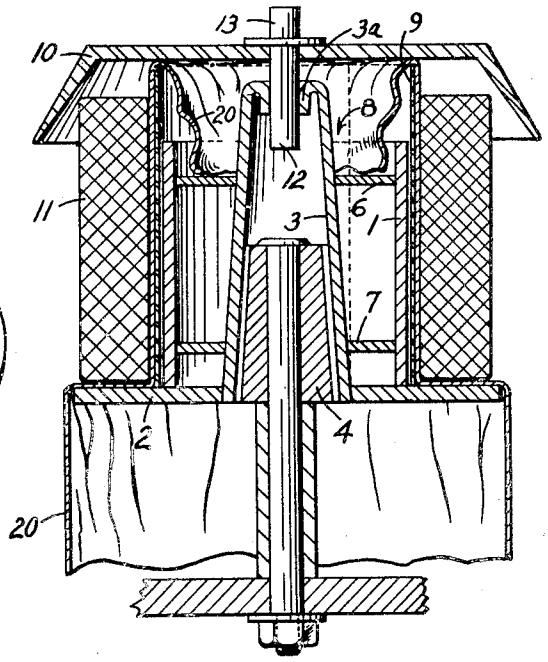
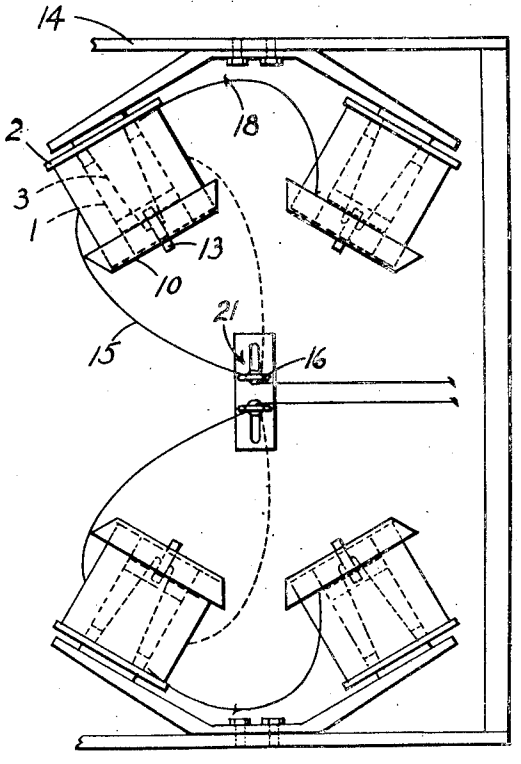
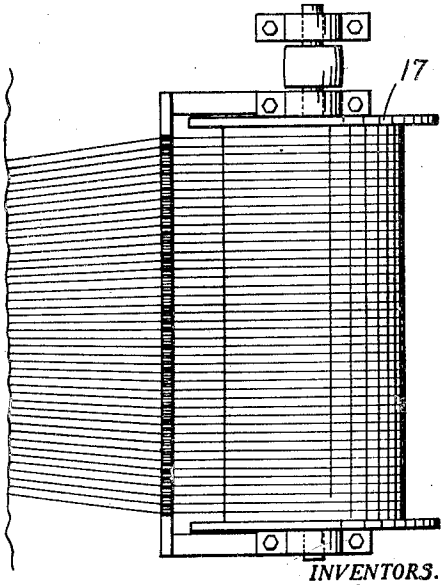


Fig. 2

Fig. 3





INVENTORS.
John S. Chaya
William L. Spann
BY Carl A. Castellan
ATTORNEY

Patented Dec. 19, 1950 2,534,339

UNITED STATES PATENT OFFICE

2,534,339

WARP-WINDING FROM CAKES

John S. Chaya, Springfield, and William L. Spann, Boothwyn, Pa., assignors to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application April 4, 1944, Serial No. 529,448

12 Claims. (Cl. 242—130)

1

This invention relates to an improved apparatus for warping filamentary material such as thread, yarn, or the like. More particularly the invention relates to apparatus for directly warping filamentary material collected in a spinning pot in the form of a package having a cylindrical inner periphery, wherein the material is unwound over the ends of a multiplicity of such packages mounted in stationary position on a creel and directly fed to the warp-beam.

In some methods of producing artificial yarn, thread or the like, as for example in accordance with the viscose process, the material is collected in a spinning pot or bucket in the form of an annular package having a cylindrical inner periphery and known as a "cake." It is desirable to warp the material directly from such cakes, in order to avoid undue handling of the thread which presents added opportunity for breaks to occur, thus increasing the possibility that the warped material will possess imperfections such as knots due to pieced ends and also increasing the manufacturing costs as a result of waste, and in order to effect a reduction in the amount of time and labor required in preparing the material for the textile mills.

However, in order to produce a satisfactory warp beam, and avoid varying degrees of stretching along the length of the yarn wound thereon, the thread must be unwound from package form and fed to the warp beam under conditions of substantially constant and uniform tension. Great difficulty has been experienced, heretofore, in unwinding the freshly spun material from the cake obtained from the spinning bucket under such uniform and constant tension conditions, especially when the unwinding operation is effected at high speed. The freshly spun cakes comprise a plurality of layers of thread superimposed on each other, which may be more or less irregularly wound and which, at high speed, have a tendency not to be evenly and cleanly drawn off, the material unwinding from the surface of the package having a tendency to balloon irregularly so that the unwinding loops jam up and become entangled or snarled, thus subjecting the unwinding thread, at some points thereof, to undue tension or drag.

In the common method of warping artificial filamentary material initially obtained in the form of a cake from a spinning pot or bucket, therefore, it is the practice to rewind the material from the cake form on to a plurality of cones, and to then feed the material to the warp-beam from the regularly wound cone-packages mounted on a creel.

2

It has been suggested to rotatably support a plurality of rayon cakes on a specially constructed creel and unwind the material tangentially from the cakes, at right angles to their axes, dependence being placed on the tangential pull of the unwinding material to effect rotation. That method may be useful for certain purposes, but it is entirely unsuitable for practical use in large scale warping where extremely high operating speeds are an essential requirement because, as the cake rotates, the yarn is subjected to a constant jerking action which, at high operating speeds, causes uncontrollable variations of tension, and thus of stretching, in the unwinding thread and leads to frequent breaks therein. Further, the use of such rotated cakes in high speed warping has the disadvange that if operation of the warp beam is interrupted temporarily for any reason, the rotation of the cakes, and unwinding of material therefrom, continues and the loosened or unwound loops of material build up and become tangled, which necessitates discarding a considerable quantity of thread.

Moreover, it is impossible to transfer warp ends from one rotating package to another without twisting and tangling the thread and hence rotating packages are not suitable for use with creels of the magazine type, such as are preferred for large scale warping operations.

One object of the present invention is to provide apparatus for directly warping artificial filamentary material under controlled tension from a multiplicity of rayon cakes obtained by collecting the freshly-spun material in a spinning pot or bucket. Another object of the invention is to facilitate high-speed warping of artificial filamentary material from such rayon cakes without the steps of unwinding the material from the cakes initially obtained and re-winding it on cones, prior to the warping operation. Another object of the invention is to provide a novel holder for supporting a cake of yarn or thread and adapted to fit the cone-holders of standard cone creels without requiring mechanical or other change therein.

Another object is to feed yarns or the like directly to a warp-beam over the ends of a plurality of cakes supported on the novel holders mounted on a standard cone creel.

Another object is to effectively control the tension of the yarn or thread unwinding over the ends of the cakes and traveling to the warp-beam. Another object is to reduce the chances for breaks to occur and thus reduce the number of imperfections in the yarn wound on the warp-beam. Other objects will appear hereinafter.

The invention will be readily understood from the following detailed description and the accompanying drawing, in which

Figure 1 is an isometric view of a package holder constructed in accordance with our invention;

Figure 2 is a view, in cross-section, of the holder of our invention having a rayon cake supported thereon; and

Figure 3 is a plan view of two elements of a conventional creel and warp-beam set up, the creel having mounted thereon supported rayon cakes in accordance with our invention.

Broadly, the new package holder which constitutes one feature of our invention, comprises a hollow member having a tapered inner surface adapted to grip a cone-shaped holder, such as the holder of a standard cone creel, and a member surrounding at least a portion of said cone-shaped member and having a cylindrical exterior surface for supporting a supply package in the form of a cake, obtained by collecting filamentary material in a spinning pot or bucket. The holder may also include a member associated with the hollow interiorly tapered member and adapted to control the tension by controlling the ballooning, of thread or yarn unwinding over the end of the package, when the holder is used to support a rayon cake or the like during an over-end unwinding operation.

Referring more particularly to Figure 1, the new package holder may comprise an outer cylindrical shell 1 mounted on a circular apertured base plate 2 and surrounding a hollow inner cone 3 which is fitted into and projects axially from the centrally disposed aperture in base plate 2. Cone 3 is adapted to fit over and grip a standard type of cone holder 4 and is preferably provided at its smaller end with an inturned annular portion 3*a* presenting a cylindrical internal surface or bore extending axially of the cone a substantial distance. Rigid reinforcing members 6 and 7 are fitted between the outside surface of cone 3 and the inside surface of shell 1. An annular recess 8 may be formed between the shell and cone as shown or the member 6 may be flush with the end of the shell 1. The axial length of shell 1 is shown considerably less than the corresponding length of the cone 3. However, the shell may be even shorter than shown or it may be fully as long as the cone or even somewhat longer. When it approaches the length of the cone or is of greater length than the cone, it is preferable that the member 6 be disposed some distance within the end of the shell so that an annular recess is provided about the cone similar to that shown in Figures 1 and 2. It is preferable to use a shell having a length less than that of the cone since such a holder is adaptable for supporting cakes having axial lengths within a wide range of sizes. The tension controlling means comprises a guide 16 spaced axially from the cake and an annular guiding surface which may take the form of an edge or rim of a plate 10 which may be of any form or shape, but must have a diameter at least as great as, and preferably greater than, the outside diameter of the supply package, so that it projects outwardly with respect thereto. As shown, the tension controlling guiding member 10 takes the form of a dished or cupped cover centered with respect to cone 3 having an outer rim projecting backwardly over cake 11. Cover 10 is provided with retaining means 12 which projects into and is held by frictional engagement in the internal

surface of the annular portion 3*a* of cone 3, and serves to retain the cover firmly in place on the holder during an unwinding operation. Cover 10 is also provided with a knob 13 to facilitate removal and replacement thereof on the holder.

As shown in Figure 2, the rayon cake 11 may be supported on the holder by placing the same over shell 1. A flexible cuff 9 which may be of any suitable material such as vulcanized fiber, cellulose or the like, may be inserted between shell 1 and the cake and, due to its ability to contract or expand as required, it automatically adapts the holder to use with otherwise unsupported packages or cakes of any diameter. During warping, the cakes of rayon, which may be wrapped in the usual protective fabric sleeve 20, are placed upon the cake-holders constructed in accordance with the invention and mounted on a conventional creel 14 as shown in Figure 3. The protective fabric is unfolded from the outside of the cake and one end of the fabric is tucked into annular recess 8, while the other end of the fabric is folded around and back of circular base plate 2. The yarn or thread 15 is led off over the end of each cake, guided around and over the edge of member 10 and thence through the guide 16. The guide is adjustable as shown at 21. The strands from a multiplicity of cakes are carried to a warp-beam 17, on which they are wound in the usual manner.

As the yarn or thread is unwound and led over the end of the cake, it tends to balloon out between the cake and guide 16. A certain amount of such ballooning is permissible and even desirable, since it prevents undue tension or pull on the yarn unwinding from the surface of the cake and traveling to the warp-beam. However, ballooning is often irregular, due to irregularities in the windings comprising the cake, and, further, such irregularity is apt to become excessive as the diameter of the cake decreases during the unwinding of the yarn from the surface thereof, or as the result of other variations in the unwinding conditions. Such irregular ballooning must be avoided during warping of the thread in order to ensure constant and uniform tension of the unwinding yarn, and to prevent the yarn from becoming entangled and thus broken or otherwise damaged. Member 10 which preferably has a diameter greater than the outside diameter of the rayon cake, and which may be of any shape but preferably projects back over the feeding end of the cake, especially in the case of cakes consisting of heavy yarns, serves as a thread guiding and tension controlling means and minimizes any tendency to irregular or excessive ballooning of the unwinding yarn so that run-out drag is substantially non-existent and the tension on the thread or yarn is maintained substantially uniform throughout the entire unwinding and warping operation.

The invention offers a distinct improvement in the usual methods of preparing yarn or the like produced according to the viscose process for use as the warp of a woven material in subsequent textile operations, since it permits high speed warping directly from the cake initially obtained by after-treating and drying in cake form the freshly spun material collected in a spinning pot, and avoids entirely the necessity for coning the material prior to warping the same.

The package holder of our invention may be adapted for use with creels of any type in which the unwinding packages are stationary and may

be used in any desired position such as horizontal or vertical and in either of such positions the yarn or thread may be unwound over either the top or bottom end of the package. The method of warping and the novel package holder of our invention are particularly suitable for use in connection with creels of the magazine type where the yarn may be fed continuously in succession over the ends of stationary rayon cakes, the inside end of the feeding yarn or thread of one cake being attached to the outside end of the yarn of a reserve cake as shown at 18 in Figure 3. As shown there the cake-holders are supported in a plurality of pairs, the axes of each cake in a pair being disposed so that they converge, and the guide 16 which cooperates therewith is disposed so that it is adjustable along the bisectrix of the angle between the two converging axes of the pair.

The over-end unwinding from non-rotating packages permits high operating speeds without undue tension in the yarn and the yarn may be unwound over the ends of the cakes and continuously fed to the warp-beam at lineal speeds of 300 to 350 yards per minute or more under controlled tension and ballooning conditions and with a minimum of breaks. Due to elimination of the step of intermediately transferring the yarn to a cone-shaped package, when it is obtained in the form of a cake from a spinning pot or bucket, the amount of handling to which the yarn is subjected is substantially reduced and as a consequence the warped yarn is of better quality and has fewer knots due to pieced ends, for any given length thereof, than has ordinarily been the case.

The apparatus of our invention may be used in the warping of natural or artificial filamentary material, such as yarn or thread consisting of cotton, hemp, etc., or consisting of regenerated cellulose obtained from viscose, cuprammonium or nitrocellulose; cellulose esters such as cellulose acetate, cellulose butyrate, and mixed cellulose esters such as cellulose acetate-butyrate; cellulose ethers such as ethyl and benzyl cellulose; fibroin, casein, and other protein threads, linear polymers such as nylon; etc.

Although the package holder is shown and described herein more particularly in combination with a thread-guiding and tension controlling means, and as used for supporting a rayon cake or the like during a direct cake to warp-beam unwinding operation, and is of special advantage for that purpose, it is not limited to such use but may be used in coning, copping, doubling, reeling, or any other textile operation where it is desired to support a package in the form of a cake, in any position from vertical to horizontal, and with or without the thread tension and balloon controlling means.

Changes and modifications may be made in the device specifically illustrated in the drawing. For example, the thread-guiding and tension controlling member 10 may be of any form or shape provided its diameter is as great as or greater than the outer diameter of the supply package of filamentary material. Obviously, also, it may be associated with the holder and maintained in place thereon during the unwinding and warping operation, in any convenient manner. All such changes and modifications are within the scope of the above-described invention which is not to be limited except as set forth in the appended claims.

We claim:

1. A package holder for annular wound packages of filamentary material and suitable for use in warping from cakes, said holder comprising a base having an opening therethrough, a hollow member projecting from the opening and having an internal surface tapering inwardly from the base, a member having a generally cylindrical outer surface projecting from the base and surrounding at least a portion of the hollow member adjacent to the base, the inner surface of the second member being removed from the outer surface of the first member to provide an annular recess between the surfaces adjacent the end thereof away from the base, and reinforcing means arranged within and constituting the bottom wall of the recess rigidly connecting the hollow member and the member surrounding the hollow member together.

2. A package holder for annular wound packages of filamentary material and suitable for use in warping from cakes, said holder comprising a base having an opening therethrough, a hollow member projecting from the opening and having an internal surface tapering inwardly from the portion in proximity to the base, a member having a generally cylindrical outer surface projecting from the base and surrounding said hollow member but having an axial length less than said hollow member to provide a space between the outer surface of the hollow member and the inner surface of the member surrounding the hollow member adjacent the end thereof away from the base, and reinforcing means arranged within the space between said members for rigidly connecting them together.

3. A package holder for annular wound packages of filamentary material and suitable for use in warping from cakes, said holder comprising a base having an opening therethrough, a hollow member projecting from the opening and having an internal surface tapering inwardly from the portion in proximity to the base, a member having a generally cylindrical outer surface projecting from the base and surrounding said hollow member but having an axial length less than said hollow member, and reinforcing means arranged within the space between the first and second members for rigidly connecting them together, said reinforcing means being arranged at a point removed from the upper periphery of said second member and defining the lower limit of an annular recess formed between the first and second members.

4. A package holder suitable for use in warping from cakes comprising a hollow member having a generally tapered inner surface, a member surrounding at least a portion of said hollow member and having a generally cylindrical outer surface for supporting a package of filamentary material, and a member positioned adjacent the smaller end of said hollow member and having centrally disposed means for engagement therewith, said member extending outwardly and transversely of said holder and presenting a generally annular thread-guiding surface for guiding and controlling the tension of filamentary material unwinding over the end of a supply package thereof supported on said holder.

5. A package holder suitable for use in warping from cakes comprising a base having a centrally disposed opening therethrough, a hollow member having a generally tapered inner surface positioned in said opening and projecting axially therefrom, a member surrounding at least a por-

tion of said hollow member and having a generally cylindrical outer surface for supporting a package of filamentary material, and a member positioned adjacent the smaller end of said hollow member and having centrally disposed means for engagement therewith, said member presenting a generally annular thread-guiding surface extending outwardly and transversely of said holder for guiding and controlling the tension of filamentary material unwinding over the end of a supply package thereof supported on said cylindrical surface.

6. A package holder suitable for use in warping from cakes comprising a base having a centrally disposed opening therethrough, a hollow member having a generally tapered inner surface and provided at its smaller end with an annular inturned portion presenting an inner generally cylindrical surface extending axially of said hollow member a substantial distance, said hollow member being positioned in said opening and projecting axially therefrom, a member surrounding at least a portion of said hollow member and having a generally cylindrical outer surface for supporting a package of filamentary material, and a member positioned adjacent the smaller end of said hollow member and having centrally disposed means for engagement therewith, said member presenting a generally annular thread-guiding surface extending outwardly and transversely of said holder for guiding filamentary material unwinding over the end of a supply package thereof supported on said holder away from the surface of the package under substantially constant tension.

7. Apparatus for use in warping from cakes comprising means for unwinding filamentary material over the end of a supply package thereof, comprising a hollow member having a generally tapered inner surface, a member surrounding at least a portion of said hollow member and having a generally cylindrical outer surface, a supply package of filamentary material supported on said cylindrical surface, and a member positioned adjacent the smaller end of said hollow member and having centrally disposed means for engagement therewith, said member presenting a generally annular thread-guiding surface extending outwardly and transversely of said supply package for guiding the filamentary material away from the supply package under substantially constant tension during unwinding thereof from the surface of said package.

8. Apparatus for use in warping from cakes comprising means for unwinding filamentary material over the end of a supply package thereof, comprising a base having an aperture therein, a hollow member having a generally tapered inner surface positioned in said aperture and projecting axially therefrom, a member surrounding at least a portion of said hollow member and having a generally cylindrical outer surface, a supply package of filamentary material supported on said cylindrical surface, and a member positioned adjacent the smaller end of said hollow member and having centrally disposed means for engagement therewith, said member presenting a generally annular thread-guiding surface extending outwardly and transversely of said supply package, for guiding the filamentary material away from the supply package under substantially constant tension, during unwinding thereof from the surface of said package.

9. Apparatus for use in warping from cakes comprising means for unwinding filamentary material over the end of a supply package thereof comprising a base having an opening therethrough, a hollow member having a generally tapered inner surface and provided at its smaller end with an inturned portion presenting a generally cylindrical inner surface extending axially of said hollow member a substantial distance, said hollow member being positioned in said opening and projecting axially therefrom, a member surrounding at least a portion of said hollow member and having a generally cylindrical outer surface, a supply package of filamentary material supported on said cylindrical surface, a member positioned adjacent the smaller end of said hollow member and having centrally disposed means for engagement therewith, said member presenting a generally annular thread-guiding surface extending outwardly and transversely of said supply package for guiding the filamentary material away from the supply package under substantially constant tension conditions during unwinding thereof from the surface of said package.

10. A package holder suitable for use in warping from cakes comprising a hollow member having a generally tapered inner surface adapted to support the holder on the conical supporting element of a conventional cone creel, said tapered surface terminating in an aperture at the larger end thereof for admitting said conical element, a member fixedly secured to and surrounding said hollow member and having a generally cylindrical outer surface for supporting a package of filamentary material, an annular recess between the outer surface of the hollow member and the inner surface of the member surrounding the hollow member, said recess being adjacent to and extending to the end of the hollow member having the smallest inside diameter, and a centrally apertured circular base plate secured to the other end of said hollow member and having an outer annular portion projecting outwardly from the cylindrical outer surface of the member which surrounds the hollow member, said annular portion lying in a plane at right angles to said cylindrical outer surface.

11. A package holder suitable for use in warping from cakes comprising a hollow member having a generally tapered inner surface adapted to support the holder on the conical supporting element of a conventional cone creel, said tapered surface terminating in an aperture at the larger end thereof for admitting said conical element, a rigid shell surrounding at least a portion of said hollow member and having a seamless or unbroken cylindrical outer surface for supporting a package of filamentary material, a concentric member detachably connected with said holder, at one end thereof, and extending radially outwardly and transversely thereof and presenting a generally annular thread-guiding surface and controlling the tension of filamentary material unwinding over the end of a supply package thereof supported on said holder, and a centrally apertured circular base plate secured to the other end of said holder and having an outer annular portion projecting radially from the cylindrical outer surface of the member which surrounds the hollow member, said annular portion lying in a plane at right angles to said cylindrical outer surface.

12. A hollow package holder suitable for use in warping from cakes and comprising a generally tapered inner surface adapted to support the holder on the conical supporting element of a conventional cone creel, said tapered surface

terminating in an aperture at the larger end thereof for admitting said conical element, a seamless or unbroken cylindrical outer surface for supporting a package of filamentary material, a concentric member detachably connected with said holder at one end thereof and extending radially outwardly and transversely thereof and presenting a generally annular thread-guiding surface for guiding and controlling the tension of filamentary material unwinding over the end of a supply package thereof supported on said holder, and a centrally apertured circular base plate secured to the other end of the holder and having an outer annular portion projecting radially outwardly from the cylindrical outer surface, said annular portion lying in a plane at right angles to said cylindrical outer surface.

JOHN S. CHAYA.
WILLIAM L. SPANN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
629,018	Streeter	July 18, 1899
782,535	Ashworth	Feb. 14, 1905
1,834,961	Moore et al.	Dec. 8, 1931
2,017,008	Loncteaux et al.	Oct. 8, 1935
2,179,574	Cullin	Nov. 14, 1939
2,249,777	Naumann et al.	July 22, 1941
2,283,079	Mc Dermott	May 12, 1942
2,302,700	Lambach	Nov. 24, 1942
2,331,611	Kennedy et al.	Oct. 12, 1943
2,361,320	Rosendale	Oct. 24, 1944

FOREIGN PATENTS

Number	Country	Date
36,426	France	Feb. 18, 1930
319,013	France	July 10, 1902
448,436	Germany	Aug. 19, 1927
521,259	Germany	Mar. 19, 1931
654,766	France	Dec. 7, 1928
720,799	France	Dec. 12, 1931