

March 20, 1945.

W. J. ELVIN ET AL

2,371,684

REEL STRUCTURE

Filed June 20, 1942

Fig. 1.

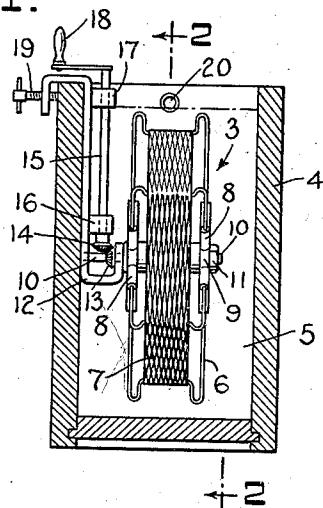
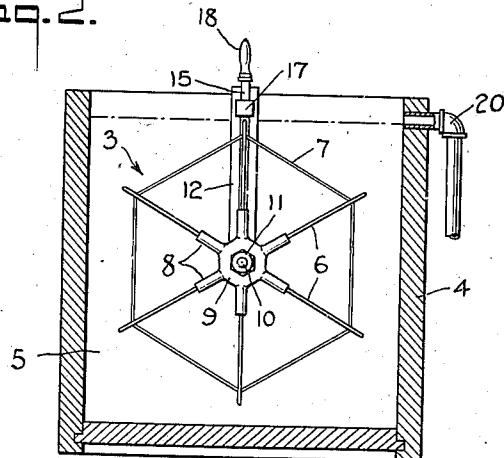


Fig. 2.



INVENTORS  
WILLIAM J. ELVIN  
JOHN B. STEIDING  
BY

*W. J. Elvin & J. B. Steiding*  
ATTORNEYS

## UNITED STATES PATENT OFFICE

2,371,684

## REEL STRUCTURE

William J. Elvin, Frostburg, and John B. Steidling,  
Midland, Md., assignors to Celanese Corporation of America, a corporation of Delaware

Application June 20, 1942, Serial No. 447,861

1 Claim. (Cl. 242—110)

This invention relates to the treatment of yarn and relates more particularly to the treatment of yarns having a basis of cellulose acetate or other organic ester of cellulose.

Yarns of regenerated cellulose of high tenacity have been prepared by the saponification of stretched yarns having a basis of an organic ester of cellulose. The yarns are stretched during some stage of their manufacture and the stretching may be facilitated by means of solvents, latent solvents or swelling agents for the cellulose ester. During stretching, the yarns may be increased in length to the extent of 200, 300, 500, or even 1000 or 2000% of their original length. The yarns acquire a relatively high tenacity on being stretched, which tenacity is retained and in many instances enhanced by saponification and consequent regeneration of the cellulose. The resulting high tenacity yarns find extensive employment in applications wherein yarns of an unusual degree of strength are desired. In saponifying the stretched yarns having a basis of an organic ester of cellulose, various methods may be employed. The saponification of the yarn may be carried out in a continuous manner or batch processes may be employed. While many methods of saponification have produced reasonably satisfactory high tenacity regenerated cellulose yarns, it has frequently been observed that the yarns may be incompletely saponified in certain portions. Furthermore, the prior methods have required much handling of the yarn and necessitated a somewhat extended processing cycle.

It is therefore an important object of our invention to provide apparatus adapted for the saponification of stretched yarns having a basis of an organic ester of cellulose so as to enable a completely regenerated cellulose yarn of uniformly high tenacity and of improved characteristics to be produced.

Another object of our invention is to provide an improved apparatus for effecting saponification of the cellulose ester yarn with a minimum of handling and in a rapid and efficient manner.

Other objects of our invention will appear from the following detailed description and the accompanying drawing.

In the drawing:

Fig. 1 is an end view of a device on which yarn may be wound, said device being submerged in a trough adapted to contain a saponifying liquid, and

Fig. 2 is a side elevation of said device in said trough, taken along the line 2—2 of Fig. 1.

Like reference numerals refer to like parts throughout the several views of the drawing.

Referring now to the drawing, there is shown a reel, generally indicated by reference numeral 3, set in a trough 4, the latter containing a suitable saponifying liquid bath indicated by reference numeral 5. The reel 3 comprises a plurality of flexible arms 6 adapted to support thereon a quantity of yarn 7, which is to be treated, the construction and arrangement of said arms being such as to yield under yarn shrinkage and to enable said yarn to undergo said shrinkage without any substantial increase in tension in the yarn. The arms 6 are mounted in radially disposed spokes 8 which are integral with a hub 9 which is mounted in fixed position on a shaft 10 as by a key or other suitable means and is held thereon by a nut 11. The shaft 10 is journaled in bracket 12 the bottom portion of which is shaped to form a supporting bearing. The entire reel together with the shaft 10 may be freely rotated at any desired speed.

The rotational movement of the reel 3 is obtained through a beveled gear 13 keyed to the shaft 10 which engages a beveled gear 14 fixed to a shaft 15. The shaft 15 is mounted in bearings 16 and 17 integral with bracket 12 and may be rotated by suitable means. This may be done manually, as by a handle 18, or preferably mechanically, as for example by suitable gearing, or by a belt and pulley arrangement, as is well understood in the art. The bracket 12 together with the reel is clamped on trough 4 by a screw 19 threaded through the upper part of said bracket and turned so as to engage the side of said trough. The liquid level in trough 4 is maintained constant by an overflow pipe 20.

In carrying out the saponification of the organic ester of cellulose yarns employing the novel apparatus of our invention, the yarn, such as for example, a yarn having a basis of cellulose acetate, is wound on the reel 3 in any convenient manner. A suitable traverse may be employed in winding the yarn to produce a good uniform spread, substantially as shown in Fig. 1, or less of a traverse may be utilized so that a more compact structure is obtained. When the yarn is wound as desired, the reel is immersed in the saponifying bath. The reel is rotated during the course of the saponification and in this way the saponifying liquid is circulated constantly as saponification of the yarn proceeds. The shrinkage of the yarn during saponification takes place without any substantial increase in tension due to the fact that the supporting arms 6 on the reel

3 yield to compensate for the decrease in yarn length upon saponification. As a result, the saponification takes place uniformly and the yarn is not subjected to excessive tension during saponification. When saponification is completed, the saponifying liquid may be discharged through a suitable discharge valve (not shown) and replaced with wash water which serves to remove the remaining saponifying liquid. If desired, the reel may be unclamped and placed in a separate washing bath.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

A reel structure for use in yarn treating troughs, comprising a bracket adapted to be clamped on 20 to said trough, a bearing member integral with

10 said bracket and being of a length which is less than the depth of the trough in which it is to be employed, said bearing member having a U-shaped portion, a shaft journaled in said U-shaped portion, a beveled gear fixed to said shaft within said U-shaped portion, means for rotating said shaft, said means including a shaft carried by said bracket, a beveled gear carried by said second shaft and cooperating with said first-mentioned gear, and a reel mounted on said first-mentioned shaft, said reel comprising a hub and a plurality of yarn supporting members radially carried by said hub, said yarn supporting members being flexible and adapted to yield under an 15 increase in yarn tension during treatment thereof, thus reducing the effective diameter of said reel and avoiding excessive tension on the yarn being treated.

WILLIAM J. ELVIN.  
JOHN B. STEIDING.