June 22, 1937. H. J. TYNAN 2,084,829

PROCESS OF DRYING, CONDITIONING AND WINDING FROM TEXTILE SKEINS

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Fig. 5.

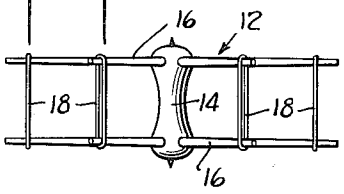


Fig. 1.

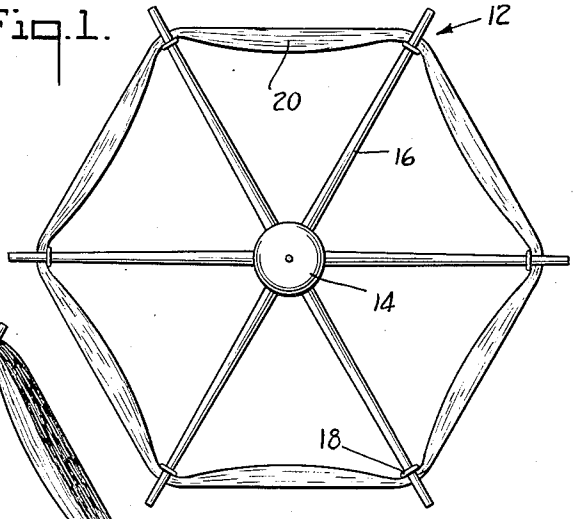
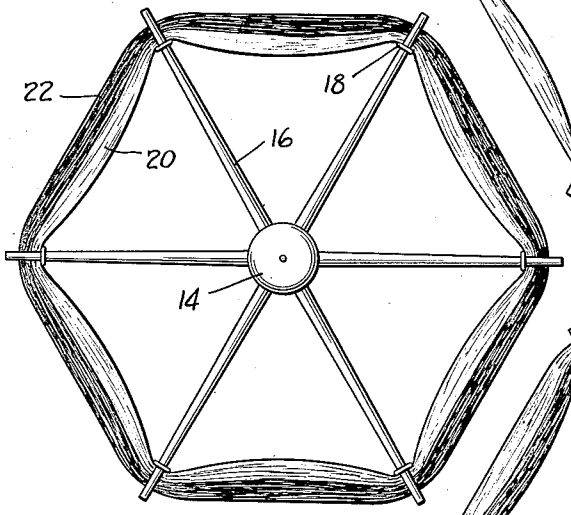


Fig. 2.



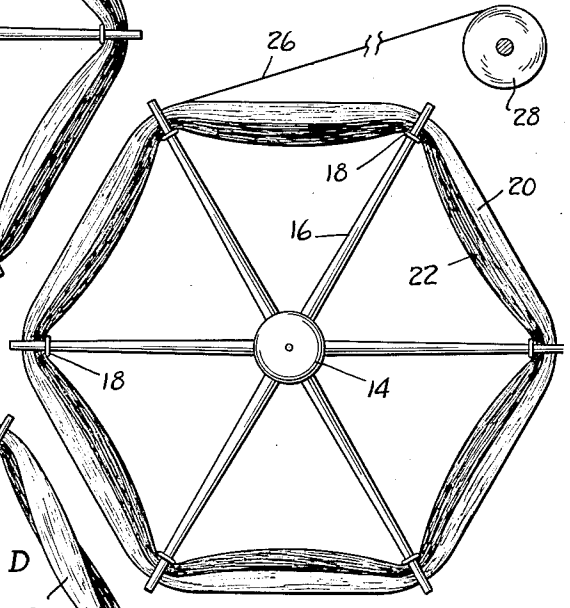


Fig. 3.

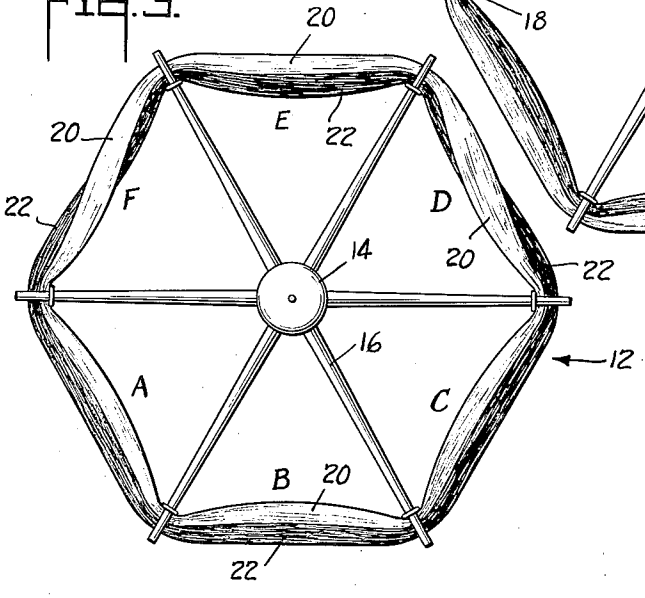


Fig. 4.

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PROCESS OF DRYING, CONDITIONING, AND WINDING FROM TEXTILE SKEINS

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Application February 12, 1937, Serial No. 125,358

6 Claims. (Cl. 34—24)

The invention relates to a process of the drying and moisture-conditioning of textile skeins, and winding the thread therefrom.

In textile manufacture it is often necessary to soak skeins in an aqueous solution in order that the thread composing the skeins may be brought to a state more favorable for winding and for subsequent manufacturing operations. The next necessary steps are to remove the water from the skeins and to dry them, nevertheless retaining in the thread as much as possible of those ingredients of the solution which will favorably affect winding and other processes. First there is a partial removal of the water, with some unavoidable loss of other ingredients composing the aqueous solution; and to effect this partial removal centrifugal hydro-extractors are the means most commonly used. The skeins when taken from the extractor are still wet and, in preparation for the winding of the thread upon spools or other take-up packages, must next be made dry by a method which will not further substantially lessen the content in the thread of other ingredients derived from the aqueous solution to which reference has been made. The terms "dry" and "dryness" as used herein and in my claims do not exclude the presence of such moisture as is commercially recognized as normal in threads called "dry", or such moisture as experience has shown to be desirable to effectuate the most perfect winding.

When thread is to be wound from a skein to form a wound package for use or processing—as for example, wound upon a spool or bobbin—it is usually required that the skein be dry, within the above meaning of the word. This is in order to avoid distortion of the thread which would occur, either under the tension of winding or afterward in the wound package, were the thread drawn from a skein wet at the outset of the winding operation but progressively becoming dryer as the winding proceeded. Dryness, as above qualified, is necessary throughout the winding operation if an approximately uniform condition is to be maintained in all of the threads being wound from great numbers of skeins. Without approximate uniformity as to moisture content during the winding operation, defects are very apt to appear in the yarns or fabrics into which the wound threads subsequently enter. Although it is physically impossible to maintain absolute uniformity of moisture content in each yard of thread being wound, such uniformity is at least the constant aim.

Heretofore it has been customary to put the wet skeins from the hydro-extractor through a special and extended drying treatment—either by hanging them on lines or poles to dry through many hours, which is termed "natural" drying, or by placing them similarly on poles in heated drying apparatus, or by using similar apparatus which first eliminates all moisture and then restores a limited moisture content in an effort to create a good skein condition for the winding operation. The last mentioned apparatus is regarded by many as the best because its final result is a good simulation of "natural" drying. After drying by one of the methods mentioned, the skeins are routed through the plant to the winding machines which carry the open-work rotatable members called swifts, on which the skeins are placed for the drawing off of thread by the winding bobbin, spool, or the like driven apparatus for forming a wound package of thread.

The threads are ordinarily not under tension during the drying operations mentioned, but merely hang from the lines or poles. It is thus possible for the threads of the skein to become objectionably crinkled during drying. While this crinkling of the thread may often be harmless, it is at least not favorable to perfect results in subsequent operations as, for instance, when several threads are twisted together to form a yarn. Further objections to the existing methods to which reference has been made are (1) that they require much time, space and labor; (2) that moving air currents used in special drying apparatus are apt to disturb the good order of the threads in the skein; and that such apparatus is cumbersome, costly in itself and for installation, and expensive to operate; and (3) that many fragile threads are inevitably broken during the extensive handling involved, especially in the routing of the dry fluffy skeins from the place where they have been dried to the machines where the winding is to occur.

The principal object of the present invention is to avoid difficulties and costs such as are above referred to, by utilizing the rotation of dry skeins, in winding thread therefrom, to rotate and thereby dry the moist skeins. This is preferably accomplished by disposing an inner moist skein about the swift or other open-work rotatable device, customarily used for rotatably supporting skeins during the operation of winding therefrom, beneath an outer dry skein which covers the exterior circumference of the moist skein upon the swift, and rotating the swift by the pull produced by drawing the thread from the outer

dry skein for winding, as upon a driven bobbin, spool, or the like.

A further object is to make use of the moist inner skein as a source of moisture for the moisture conditioning of the dry outer skein, so that this dry skein is moderately humidified during the withdrawal of the thread from it, and substantially until all of the thread composing such outer skein has been transferred to the receiving or take-up package.

A further object of my invention is to provide a novel method of disposing and handling skeins upon a swift and winding thread therefrom to a receiving package, which method includes within itself needed humidification of the dry skein being wound and the simultaneous drying, without special apparatus or cost, of the moist skein on the same swift that is destined to be next drawn from in the building up of the receiving package or packages.

A further purpose of my invention is to provide a novel process of winding thread from skeins to driven take-up packages and producing wound packages of thread, in which process each individual skein being wound is locally humidified by the centrifugal delivery to it of moisture from a moist skein beneath it on the same rotating swift, the moist skein simultaneously and by the same rotation being gradually dried so that it is in condition for winding when all of the thread composing the outer skein has been wound upon the take-up package.

A further purpose of my invention is to provide a cyclical process of drying, moisture-conditioning and winding skeins, wherein a moist skein is mounted on a swift over a dry skein, the two skeins are manually reversed, as a single unit, all around the swift so that the dry skein becomes the outer skein, and the drawing of thread from the now outer, dry skein is utilized to rotate the swift and skeins and thus effect the drying of the now inner, moist skein, and when all of the thread has been drawn from the outer, dry skein and the single skein remaining on the swift has become dry, a new moist skein is imposed upon the said remaining skein and the foregoing steps repeated, so that each skein is dried when in innermost position on the swift and humidified and its thread wound off when in outermost position as described.

Figs. 1–4 are side views of a skein or skeins upon swifts. Dry skeins are indicated by light lines and wet skeins by heavier lines.

Fig. 1 shows a swift with a dry skein thereon.

Fig. 2 shows a swift with an inner, dry skein and an outer, wet skein thereon.

Fig. 3 indicates how the skeins are reversed.

Fig. 4 shows the skein relation after reversal, with inner, wet skein and outer, dry skein, and the thread of the latter connected to a bobbin for winding, and

Fig. 5 is a top view on a reduced scale of the form of swift shown herein.

Reference character 12 designates an open-work swift of known form designed to turn freely in the usual supports, 14 the hub, 16 the radial arms, of which there are six pairs, and 18 the cross members, commonly flexible or adjustable, which join each of the radial arms 16 shown in Figs. 1–4 to a corresponding radial arm parallel with it and projecting from the opposite end of the hub 14, as indicated in Fig. 5. The skeins when mounted on the swift 12 rest upon cross members 18, each of which cross members joins together a pair of parallel radial arms 16.

As shown in Fig. 1, a dry skein 20 ready for winding is disposed directly about the cross members 18 of swift 12 between extensions of the arms 16. Light lines are used to indicate that the skein 20 is dry.

As shown in Fig. 2 a wet skein 22 is imposed upon the entire circumference of dry skein 20. The lines of skein 22 are relatively dark to indicate that this skein is wet, but the two skeins 20 and 22 are otherwise substantially alike.

As indicated in Fig. 3 the relative positions of the skeins 20 and 22 on the cross members 18 of the swift 12 are being reversed by turning the said skeins over together, as a single unit. Between the six pairs of radial arms of the swift 12 as shown, there are six sectors A, B, C, D, E, F. In the sectors A, B, C the skeins are as in Fig. 2, with the wet skein 22 in the outer position and the dry skein 20 in the inner position. In sector D, and again in sector F, the pair of skeins is shown as it appears while being manually turned over or reversed for the purpose of bringing the dry skein to the outer or winding position. In sector E, the turning over or reversal of the pair of skeins has been completed, so that the dry skein 20 now occupies the outer position, and the wet skein 22 the inner position, on the swift. The operation of thus reversing the skeins is accomplished by hand, the operator taking hold of the two skeins together, preferably at both sides of each cross member 18, turning them through 180°, and repeating this performance all the way around the swift. The manual reversal of a pair of skeins on a swift consumes only a few seconds of time.

Fig. 4 shows the relation of the skeins 20 and 22 after the manual reversal has been completed, with wet skein 22 innermost and disposed in contact with the cross members 18 of swift 12, and the dry skein 20 imposed upon the entire outer circumference of wet skein 22. From this outer, dry skein 20, Fig. 4, the constituent thread 26 thereof is wound upon a suitable winding device, a spool or bobbin 28 being indicated for this purpose, and bobbin 28 is driven in the usual manner (not shown).

The swift 12 and skeins 20 and 22 thereon are rotated in the drawing of the thread from skein 20 by the driven bobbin 28. The moisture content of the rotating inner skein 22 is dissipated by centrifugal action as well as by evaporation accelerated by rotation so that, by the time the winding from the outer skein 20 is completed, the inner skein 22 is substantially dry with only about enough humidity retained to adapt the thread for winding to take place from said skein 22.

During the winding from the outer dry skein 20, said skein 20 rests upon the inner moist skein 22 instead of directly upon the cross members 18. This broad and continuous support serves to keep skein 20 extended to its full normal width and in good order throughout the winding of the thread therefrom and thus facilitates the finding of the thread end in the skein when breakages occur; and the moist skein 22, losing its moisture through centrifugal action as well as by evaporation, in so doing supplies needed humidification for the outer dry skein 20. Initially the inner part of dry skein 20 may receive from moist skein 22 more moisture than is conducive to good winding; but this condition is automatically rectified in ample time through

distribution and dissipation of such moisture as the rotation of the swift and skeins proceeds.

When the winding from the outer, dry skein 20 has been completed, the swift 12 carries only the skein 22, which has now been dried. Winding from skein 22 can now be proceeded with, but first, in practicing my invention, a new moist skein is disposed about the swift within the skein 22. This is accomplished by temporarily disposing the new moist skein around the exterior circumference of skein 22, and reversing the pair of skeins in the manner already described. The thread of the dried skein 22 is now attached to the spool, bobbin or the like and wound from skein 22, which is humidified by the new moist inner skein beneath it on the swift. The cyclical process above described can be repeated to any extent desired.

It will be seen that my invention effects a large saving in plant space; that it eliminates costly apparatus and the expense of operating same; that it greatly reduces, indeed almost eliminates, the labor cost of handling skeins in connection with the operation of drying; and that by its use the breakage of many threads is avoided. Such breakages are numerous when skeins are put into a drying machine, rehandled when taken out, and then routed through the plant in a dry and fluffy condition. When my invention is used the skeins are handled in the moist state and with little liability of thread breakage. They may be taken directly from the hydro-extractor to the winding machines in bundles or in the net bags commonly used for the protection of the skeins in soaking and hydro-extracting. It will also be seen that by my invention the skein threads, instead of drying in a slack state and crinkling, are kept more nearly straight, as they are held extended on the swifts, and tend to be even more completely extended by the action of centrifugal force as the swifts rotate. Furthermore, the outer or dry skein, as thread is drawn from it in the winding operation, is less apt to become excessively dry, because of the rotation of the swift, than it would become if it were the only skein on the swift. It is mildly humidified through its proximity to the moist skein beneath it and through the action of centrifugal force upon the moisture content of the said moist skein beneath it, so that the dry skein from which the thread is being drawn is maintained at a humidity level usually closely approximating the level considered ideal for the winding operation.

Modifications may be resorted to within the purview of my invention, which is not confined to the particular embodiments set forth for illustrating and affording an understanding of the invention, but is of breadth as defined by my claims.

I claim:

1. Process of drying a moist textile skein by mounting said skein beneath a dry skein upon an openwork rotatable support, and utilizing the rotation produced by drawing off the thread of the dry skein to dry the wet skein.

2. Process of drying a moist textile skein, which consists in providing a rotatable openwork mounting or support for a wet skein and a dry skein, rotating said support and skeins by winding the thread from the dry skein and drying the wet skein by means of such rotation.

3. Process of drying a textile skein, which consists in the steps of disposing a moist skein beneath a dry skein about an openwork rotatable member, and rotating the member and the skeins by drawing off the thread of the dry outer skein.

4. Process of drying a textile skein, which consists in the steps of imposing an outer moist skein upon an inner dry skein about an openwork rotatable member, reversing the two skeins upon said member so as to bring the dry skein to the outer position with the moist skein beneath it, and rotating the member and the skeins by drawing off the thread of the dry outer skein.

5. Process of increasing the moisture content of a dry skein while winding thread therefrom and simultaneously drying a moist skein, which process consists in the steps of imposing an outer moist skein upon and about an inner dry skein upon an openwork rotatable member, manually reversing the two skeins upon said member so that the dry skein is brought to the outer position with the moist skein beneath it, rotating the member and skeins by drawing thread from the dry skein while winding same into a wound package, utilizing the moisture thrown off by the moist skein for humidifying the diminishing dry skein, and coincidentally drying the moist skein, through both evaporation and the centrifugal force generated by rotation, so that the making of the package or packages may, when the thread composing the dry skein has been exhausted, be continued by winding additional thread from the erstwhile moist skein that has become dry.

6. In producing wound packages of thread from skeins, the cyclical process of drying and subsequently humidifying and winding the thread composing a skein, which process consists in the steps of imposing a moist skein which is to be dried upon and about a dry skein upon a rotatable swift, manually reversing the skeins to bring the dry skein to the outer or winding position and the moist skein to the inner position on the swift, connecting the thread of the now outer, dry skein to a rotatable take-up package, rotating the take-up package to wind thereon the thread from the outer, dry skein and utilizing the resulting pull of the thread to rotate the swift and skeins, thereby humidifying the outer, dry skein by centrifugally delivering to it moisture from the moist skein beneath it as the swift and skeins rotate and also thereby effecting the drying of the moist skein, in preparation for winding the thread from it in turn, by transference of moisture from it to the adjacent and covering dry skein as well as by evaporation, and subsequently, after all of the thread of the outer skein has been transferred to the take-up package, imposing a fresh moist skein upon the skein which has been dried and which remains in place on the swift and repeating the foregoing steps with successive skeins, each skein being dried and supplying humidity when in inner position, and receiving humidity and having thread wound from it, when dried and in outer position.

HENRY J. TYNAN.