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TENSIONING MEANS

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FIG. 1.

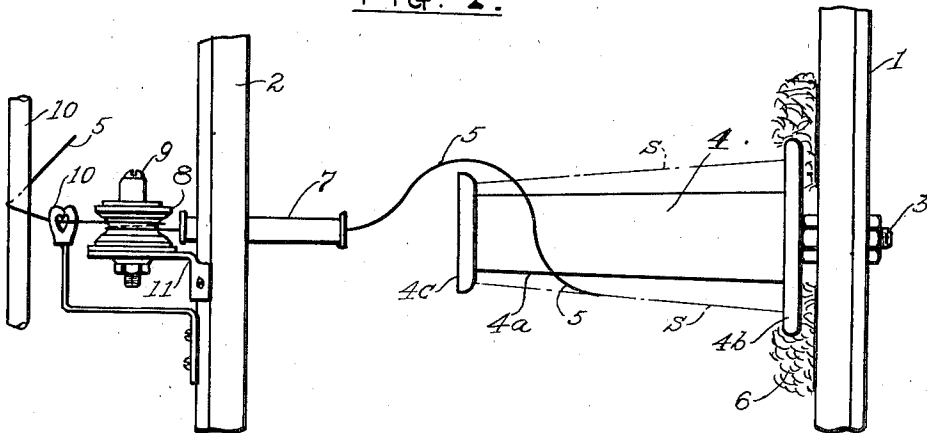
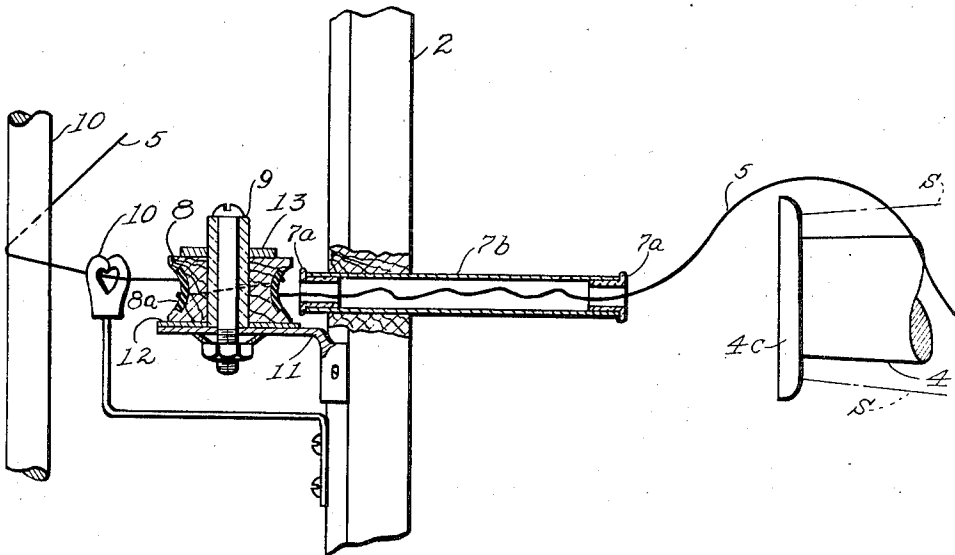


FIG. 2.



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TENSIONING MEANS

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1 Claim. (Cl. 242—131)

This invention relates to improvements in tensioning means. More especially it relates to means whereby the desired tension may be applied to such yarns as rayon, acetate, raw silk and cotton.

In the mechanical handling of yarn, as where it is transposed from one carrier to another by mechanical means, it is essential that a proper tension be imposed and maintained upon the yarn to insure uniformity in product. This is not ordinarily a difficult matter where the yarn is of sufficient size and consistence to maintain its initial status but where the yarn is easily stretched the application of tension thereto has caused considerable trouble. This is particularly so where rayon yarn or the like is being pulled since a yarn of this type easily stretches and becomes finer as it elongates. Indeed it is not uncommon to start with a desired count or denier and discover in the course of travel of this yarn that it has been changed to appreciably different counts or deniers throughout its length.

Heretofore it has been the accepted practice to wind the yarn on spools and to pull it therefrom while permitting the spool to rotate. This alone has a marked effect on the yarn and what is worse has a varying effect, because obviously the pull necessary to rotate a well-filled spool is greater than that required to rotate the same spool as it becomes more nearly empty. Numerous devices have been proposed with the end in view of effecting a proper tension and of maintaining that tension unchanged, but so far as I am aware these devices have been applied to yarn drawn from rotating spools and thus have not succeeded in overcoming or counteracting the varying effect due to the changing resistance offered by the rotating spool.

It is a principal object of the present invention to provide simple and inexpensive means for imposing and accurately maintaining a desired tension on fine yarns. To avoid the hitherto troublesome effect of a rotating spool, it is a feature of the present invention to draw or pull the yarn from a fixed spool in such manner as to impose no appreciable restriction on the yarn movement. Indeed the freedom with which the yarn leaves the spool is so great that it is an object of the invention to provide means to check this movement and keep it within due bounds. And of course it is an important object to provide a tension device capable of very fine and almost unlimited adjustment for actually applying and maintaining a desired uniform tension.

The improved means embodying the present

invention can be used with any kind of machine where yarn is drawn or pulled. It is herein shown in its application to a warper but this is merely illustrative and it is to be understood as not limiting the scope of the invention to such particular use. On the contrary it is intended that the patent shall cover by suitable expression in the appended claim whatever features of patentable novelty exist in the invention as a whole.

In the accompanying drawing:

Figure 1 is an elevation showing the improved means applied to the creel of a warper; and

Figure 2 is an enlarged view, in section, showing details.

Referring now more particularly to the drawing, the creel of the warper, represented by the upright members 1 and 2, is provided with numerous spindles 3 on each of which it has heretofore been the practice to place a rotatable spool carrying the yarn to be pulled. The yarns thus drawn from the spools pass thence to the warper front where the aggregation is wound on a suitable drum or other carrier. When a spool filled with yarn is placed on the creel spindle the force required to rotate it is at first very appreciable due to the friction caused by the weight of the filled spool but this force becomes smaller as the spool becomes empty. This force is of course transmitted by the yarn itself and if the yarn is very fine and of such make-up as rayon, for example, this transmitted pull will cause the yarn to stretch lineally and become thinner or finer. This is not only exceedingly objectionable where uniformity of product is desired, but results in many breaks of the yarn and materially slows up the production of the machine. Also more attention must be paid to the machine and the number of yarns that an operative can attend is rather definitely limited.

In place of the ordinary and customary rotatable spool, the present invention makes possible the use of a fixed spool 4. This spool may have a truly cylindrical body 4a as shown, or may have a truncated body. The yarn surface (represented by the dot and dash lines s) in either case is of truncated configuration and the yarn 5 is wound helically. The filled spool is placed on the spindle with its larger end 4b adjacent the creel frame member 1, there being preferably a cushion 6 of lambskin or the like against which the spool end abuts. The smaller end 4c of the spool projects toward the outer member 2 and in the latter, substantially in alignment with axis of the spool, is mounted a tube 7.

This tube may be entirely of porcelain or as

illustrated have porcelain eyes 7a at the ends of a metal or composition cylinder 7b. The function of this tube is two-fold, in that it guides the yarn with uniformity to the tension device and also prevents the snarling or tangling of the yarn leaving the spool. As will presently appear, the yarn is pulled or drawn from the spool, or indeed it might be said to be lifted therefrom, and since in this movement it necessarily unwinds, it has a marked tendency to whip about. Were it not for the tube, this tendency to whip might easily, and in fact would, cause a rather large loop to be formed between the spool and the tension device. If this loop should become crossed or the yarn should snarl breakage would promptly follow, but by suitable proportioning the tube, both as to its internal size and its length, the loop of the yarn caused by the centrifugal force acting upon it, can be limited so that the yarn nicely clears the small end of the spool with no undesirable excess. This is advantageous as it permits the spools on the creel to be positioned relatively close to one another without danger of the yarns interfering.

Beyond the tube in the direction of travel of the yarn is applicant's improved means for applying the tension. This consists of simple roller 8 mounted on a vertical spindle 9. The roller has a concave surface 8a, and it is a feature of the invention that part, or all, of this surface is made of rubber or like composition. It has been found that rubber of about the same consistency as is used in automobile tires is especially suitable as the operating surface of the roller. Such a surface prevents any slipping of the yarn and insures its passage thereon with the desired uniformity. The yarn from the tube is passed one or more times around the roller as shown and thence is led by suitable guides 10 to the warper front.

The roller spindle 9 may be of porcelain suitably mounted on a support 11. Interposed between the roller and this support is a loose steel washer 12 having a finished surface on which the roller rests and turns. The vertical spindle extends upward beyond the roller so that one or more washers 13 may be placed on the roller and retained there by the spindle. These washers are weights by means of which the friction generated between the roller and the lower washer may be regulated. If considerable tension is desired, the roller is relatively heavily weighted, if little or very light tension is required, only a very small weight is placed on the roller.

In practice the variation of tension can be readily checked and the weight washers suitably marked or colored to indicate to the operative the effect such washer, when placed on the roller, will have on the tension. In this way, the adjustment of the tension is exceedingly simple and almost

limitless, as of course washers of any different weights may be used.

Since there is no appreciable drag on the yarn between the roller and the spool, the tension is at all times controlled by the roller and its weights and since this control is in no wise affected by the emptying of the spool, the tension is maintained at the desired amount. This amount will of course be such as to cause no stretching or thinning of the yarn and only sufficient in amount to insure the numerous yarns being wound on the front carrier with the necessary uniformity. Such light tension obviously imposes no breaking stress on the yarn and one of the marked advantages of the invention is thereby realized. One operative can attend many more yarns, indeed in some cases, it has been found that one operative can supervise the operation of several machines, each handling many yarns. And since the yarn is unchanged, because of the light tension made possible by this invention, the product of a mill employing the improved tensioning means is of unusual uniformity and strength.

I claim as my invention:

Yarn controlling means for a warper or the like having a creel with a yarn supplying spool mounted fixedly thereon with its axis substantially horizontal, and means for pulling the yarn therefrom, comprising, in combination, a bracket mounted on said creel having a horizontally disposed surface; a non-rotatable spindle attached at its lower end to said bracket and upstanding therefrom with its axis vertical; a washer rotatable on said spindle and lying on the horizontally disposed surface of the bracket and having on its opposite side a smooth surface; a roller rotatable on said spindle having a smooth surface resting on the smooth surface of the aforesaid washer and having a grooved face; a band of rubber lying in said grooved face and constituting a surface around which the yarn is wound so as to rotate the roller during the pulling of the yarn; a washer resting on said roller to control the frictional resistance between the smooth surface thereof and the smooth surface of the washer below the roller, whereby the desired tension on the yarn is effected; and a tube having a diameter less than the width of the grooved face of the roller and having a length several times greater than its diameter mounted on the creel with its axis substantially in alignment with the axis of the supply spool, with one end closely adjacent to the rubber surface of the roller and with its other end near the delivery end of the spool, whereby the yarn is withdrawn from the spool in approximate alignment with its surface and guided uniformly to the rubber surface of the roller.

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