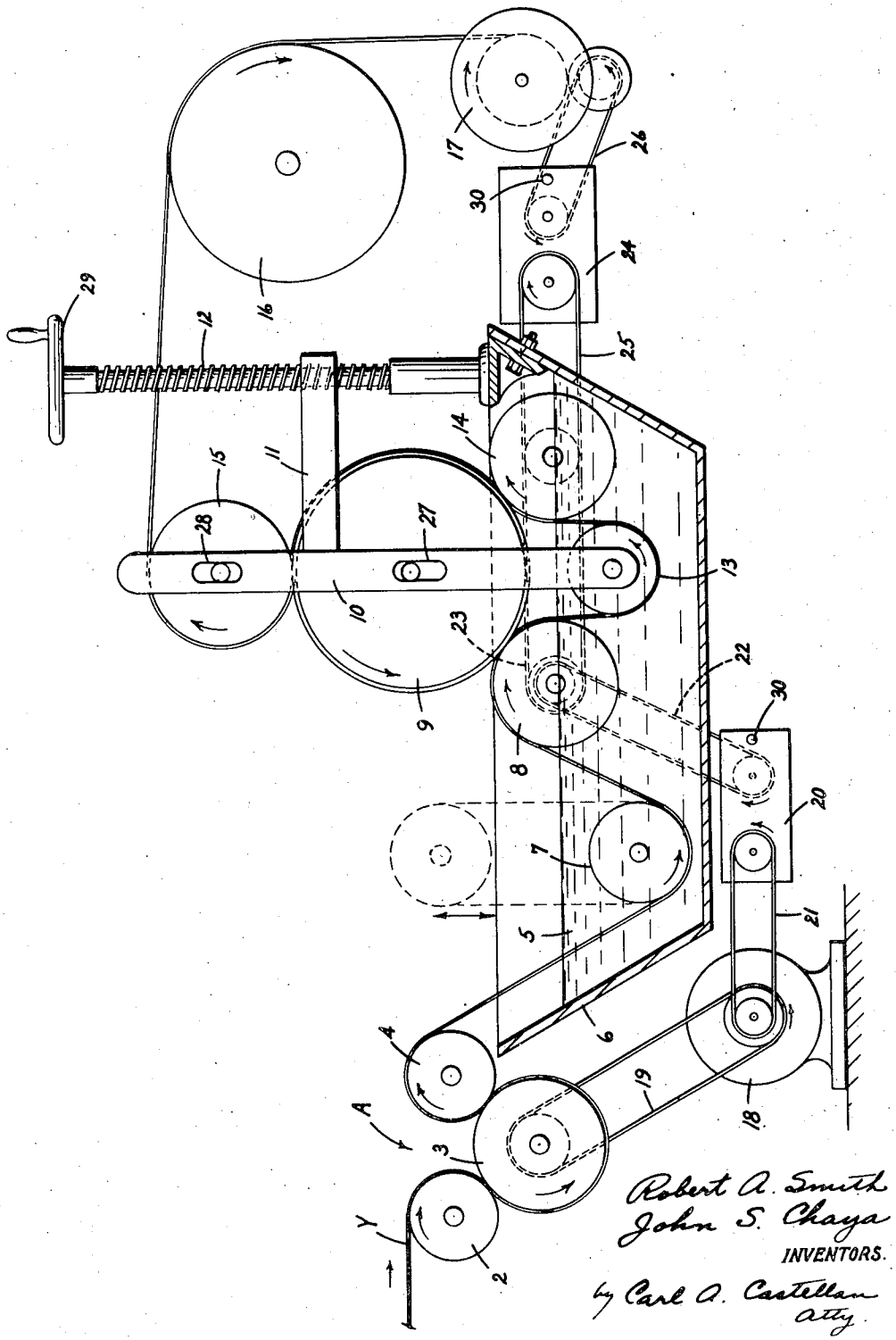
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METHOD AND APPARATUS FOR SLASHING YARNS

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METHOD AND APPARATUS FOR SLASHING YARNS

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The present invention relates to methods and apparatus for the sizing of yarns for the purpose of preparing them for weaving and the like. The methods and apparatus of the present invention are particularly adaptable for the slashing or sizing of rayon warps, e. g. spun yarns of regenerated cellulose staple fibers, though the invention is applicable as well to the slashing of yarns of other natural and artificial fibers whether "spun" or "continuous filament" yarns.

In slashing yarns of rayon, the sizing material is generally applied in the form of an aqueous solution or emulsion and when the yarns strike the bath or are subjected to the aqueous medium, they spontaneously elongate. On the other hand, after leaving the sizing bath, the yarns proceed to a dryer and in being dried they contract. Heretofore, it has been the general practice either to reply upon the warp beam collecting the finally slashed yarns for drawing them from the supply beam or beams through the sizing bath, and over the drying drums or to rely upon some driving rolls positioned in the sizing bath, such as the squeeze rolls themselves, drawing or pulling the yarns from the supply beams into the bath. In either arrangement of drawing heretofore used, the yarns are subjected to tensions when wet which stretch them. This stretching is effected over and above any elongation that would spontaneously occur during wetting and produces a gain in the length of the final product over that taken from the supply beams which results in some price advantage to the converter who slashes the yarns but is not always of advantage to the weaver who converts the yarns into fabrics, and in many cases affects the characteristics of the fabric itself.

It has been suggested to provide separate warp driving means in advance of and beyond the sizing bath and to have tension responsive elements just beyond each such driving means for controlling its respective driving means but this permits uncontrolled stretching of the yarns when wet.

It is a primary object of the present invention to control the speed and tension of the yarns as they travel through the slashing apparatus so as to avoid the stretch while at the same time compensating for both the inherent elongation caused spontaneously upon wetting as well as for the contraction which occurs on drying, particularly with respect to rayon yarns though not necessarily limited thereto. Another object of the invention is to provide an improved form of sizing roll arrangement capable of imparting greater

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penetration and a more uniform distribution of the sizing upon the yarn. Another object of the invention is to provide a sizing roll arrangement which is adapted to be readily laced. Other objects and advantages of the invention will be apparent from the drawing and the description thereof hereinafter.

The single figure of the drawing illustrates in somewhat diagrammatic form a side elevation of one embodiment of apparatus for accomplishing the invention. The yarns to be slashed are drawn from a supply beam or section beams (not shown) by suitable feed means A which illustratively comprises a set of three rolls, designated 2, 3 and 4. Of these rotatable rolls, 2 and 4 are idlers which serve to assure a large peripheral contact of the yarn about the driven roll 3 and they may be in tangential contact or out of contact with such roll. This feeding means A is preferably arranged closely in advance of the sizing bath 5 contained in a suitable open receptable 6. As shown, the idler 4 serves to guide the yarns into the receptacle 6 in which it proceeds under an immersion roll 7 and then about a squeeze roll 8. The squeeze roll 8 cooperates with a rotatable roll 9 carried by a yoke 10 which is in turn secured to an arm 11 which has a screw threaded bore cooperating with the annularly adjustable screw 12. Preferably, as shown, the yarns thus proceed from the nip between rolls 8 and 9 about a rotatable immersion roll 13 and then to a nip outside the sizing bath between the driven rotatable roll 14 and the roll 9. If desired, only one squeeze roll 8 may be used in which event the rolls 13 and 14 may be left unlaced. At least one of the squeeze rolls 8, 14 is driven, and as shown in the figure, both 8 and 14 are preferably driven.

After leaving the nip between roll 9 and the first squeeze roll 8 or the last squeeze roll 14 whichever may be the case, the yarns proceed about the periphery of roll 9 for a final squeeze to improve the uniformity of distribution between the roll 9 and another squeeze roll 15. From this final squeeze roll 15, the yarns proceed to a dryer drum 16 or a plurality of such in sequence and finally are wound upon a take-up beam 17 or a plurality of sectional take-up beams. The take-up beam can be driven at a speed somewhat slower or faster than that of the squeeze rolls 8 and 14 to compensate for the contraction that occurs upon drying, in the first instance, or to create a controlled stretch if desired, in the last instance.

The various driving relationships may be effected by means of the motor 18, a sprocket

and chain connection between the motor and the driven roll 3 designated at 19, a variable speed reducer 20, such as one of the Reeves drive type which is connected by a sprocket and chain connection 21 with the motor 18 and by a sprocket and chain connection 22 with the squeeze roll 8. A similar sprocket and chain connection 23 may be provided to connect the squeeze roll 8 for driving the other squeeze roll 14 at the same speed. A speed reducer 24, which may be of the Reeves type, may be connected by a chain drive 25 to one of the squeeze rolls, such as 14, and by a chain and sprocket 26 to the take up 17. By means of the speed reducers 20 and 24, the squeeze rolls 8 and 14 may be driven at a substantially constant speed having a desired greater linear value than that of the speed of device A and on the other hand the take-up 17 may have a linear speed sufficiently slower or faster than the squeeze roll to compensate for the contraction that occurs on drying or to apply a controlled stretch when desired.

The immersion roll 7 is adjustably movable to an upper position indicated in dotted lines where it is entirely outside the bath 5. This is a feature of conventional slashers which use this immersion roll. The yoke comprising side bars 10 carried by arms 11 support the rolls 13, 9 and 15. All of these rolls are rotatable within the yoke but 9 and 15 are movable within the slots 27 and 28 provided in the sides 10 of the yoke. The squeeze rolls 8 and 14 are spaced apart sufficiently to allow the immersion roll 13 to pass freely therebetween and it will be noted from the construction that merely by turning the hand wheel 29, the yoke with its three rolls is lifted out of the bath 5 entirely. In such upward motion the rolls 9 and 15 will become separated since the bottoms of the slots 27 and 28 are so arranged that they are farther apart than the sum of the radii of the two rolls. It is by this construction that facile lacing of the machine is made possible.

The Reeves drive speed reducers may be adjusted by means of knobs 30, which affects the spacing of the conically spaced pulleys or equivalent mechanism thereof all in conventional manner, in order to provide the desired ratio between the speed of feed by means of the rolls A and the squeeze rolls 8 and so forth. This differential may be sufficient to just take up all slack that would be produced in the yarns as they proceed to the squeeze roll 8 through the bath but without placing any tension upon such yarns. In this manner, stretching of the yarns is entirely avoided at this stage. On the other hand, if it is desired, a controlled amount of stretching may be accomplished at this stage by suitably adjusting the ratios between the speed of squeeze rolls 8 and feed rolls 2 to 4. Similarly, adjustment of the speed reducer 24 is preferably such as to compensate completely for shrinkage or contraction in the yarns during drying. If desired, internal stresses and strains may be imparted to the finally slashed yarn by adjusting the speed to only partially compensate for the contraction during drying. As stated hereinabove, the invention is particularly applicable when sizing yarns of regenerated cellulose, such as those produced from viscose or cuprammonium cellulose, but it is also applicable for the sizing of yarns consisting only partially of such regenerated cellulose fibers whether spun or continuous filament as well as of other artificial or natural fibers which tend to elongate upon wetting or to contract upon drying.

It is to be understood that changes and variations may be made without departing from the invention as defined by the appended claims.

We claim:

1. The method of slashing a warp of yarns which spontaneously elongate on wetting comprising delivering the yarns into an aqueous sizing medium at a predetermined speed, drawing the yarns out of the medium at a predetermined faster speed so related to that of delivery to the medium as to compensate entirely for the spontaneous elongation of the yarns upon wetting without substantially stretching the yarns, squeezing the yarns, drying the yarns, and collecting the dried yarns at a predetermined linear speed which is so related to that of withdrawal from the sizing medium as to compensate entirely for the contraction that occurs on drying, thereby preventing the imparting of internal strains to the dried yarns.

2. The method of slashing a warp of rayon yarns of regenerated cellulose comprising delivering the yarns into an aqueous sizing medium at a predetermined speed so related to that of withdrawal from the medium as to compensate entirely for the spontaneous elongation of the rayon upon wetting without substantially stretching the yarns, squeezing the yarns, drying the yarns, and collecting the dried yarns at a predetermined linear speed which is so related to that of withdrawal from the sizing medium as to compensate entirely for the contraction that occurs on drying thereby preventing the imparting of internal strains to the dried yarns.

3. Apparatus for the treatment of yarns and the like with liquids comprising a container for a liquid treating medium, two immersion rolls arranged to guide the yarns under the liquid in the container, a squeeze roll disposed between the immersion rolls with at least a portion thereof extending outside the liquid, a second squeeze roll beyond the second immersion roll and arranged with at least a portion thereof extending outside the liquid, a third squeeze roll entirely out of the liquid forming nips with the first two squeeze rolls outside the liquid, and a fourth squeeze roll entirely outside the liquid forming a nip with the third squeeze roll beyond the nips with the first two squeeze rolls in the direction of yarn travel thereabout.

4. Apparatus for the treatment of yarns and the like with liquids comprising a container for a liquid medium, two stationary rolls arranged partially immersed in said liquid medium laterally spaced from each other, a yoke extending downwardly between the two stationary rolls, a roll rotatably mounted adjacent the lowermost part of the yoke, a plurality of rolls mounted rotatably and slidably in said yoke, one of said movably and slidably mounted rolls being arranged to come into contact with each of the stationary rolls upon downward motion of the yoke to a predetermined position, another of the rotatably and slidably mounted rolls being arranged to come into contact with the first mentioned rotatably and slidably mounted roll upon further movement downward of said yoke past such predetermined position, and the rotatably mounted roll adjacent the lower end of the yoke being arranged to move past the stationary rolls into a submerged position within the medium, means for moving said yoke upwardly and downwardly, said rolls mounted in said yoke being so arranged

as to separate from each other upon movement upward at a predetermined position.

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