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APPARATUS FOR THE WET TREATMENT OF YARNS IN WARP FORM

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Fig. 1.

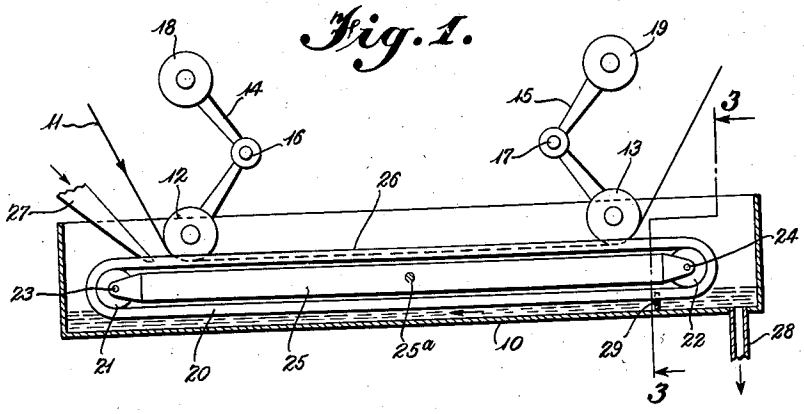


Fig. 2.

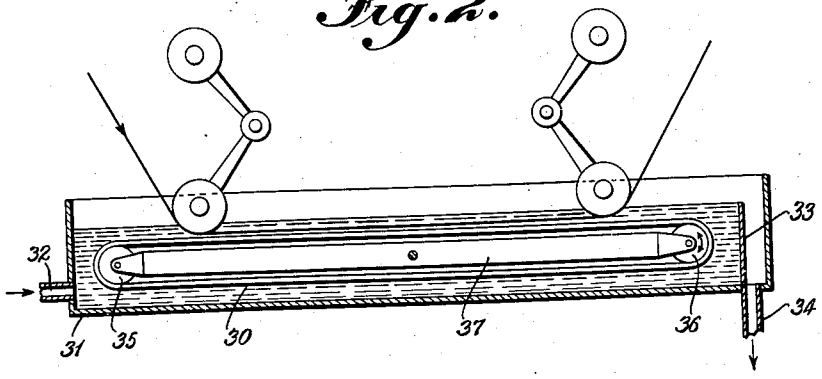
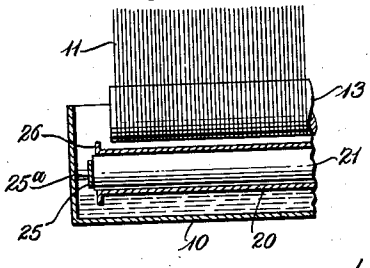


Fig. 3.



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APPARATUS FOR THE WET TREATMENT OF YARNS IN WARP FORM

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6 Claims. (Cl. 68—181)

This invention relates to the wet treatment of yarns or threads in warp form and more particularly to an improvement in rayon aftertreatment of the type shown in Van der Mei Patent 2,459,254.

When warps of yarn are passed through baths of treating liquid, parallel to but under the bath surface, the bath liquid is propelled to some extent by the yarns. If the yarns of the warp are spaced apart 7 mm. or less and the warp is moving at 60 or more meters per minute, it has been found that the yarn induced bath flow will be sufficiently turbulent to cause difficulties such as lateral shifting of the yarns with resulting sticking and tangling. Furthermore, bath turbulence may cause localized lateral pressures of sufficient magnitude to bring about stretch damage to the yarn.

Since bath turbulence is functionally related to yarn spacing and speed and yet since close spacing and high speed are desirable economic factors, many efforts have been made to control yarn induced bath turbulence while permitting close spacing of the yarns and high speed propulsion thereof. These efforts have led to schemes for controlling the direction of yarn induced bath flow and for circulating the bath liquid but no satisfactory solution has been heretofore reached.

It is therefore an object of this invention to provide for warp treatment of very closely spaced yarns at very high speeds without troublesome turbulence.

It is proposed according to the present invention to move the layer of liquid in which the yarns are treated in the same direction as the yarns at a speed differential of not more than about 50 meters a minute but at least enough to insure some relative movement between yarns and bath liquid.

By way of illustration of the present invention, and with reference to the accompanying drawings, two embodiments of the device according to the invention are described as follows:

Figure 1 is a view in vertical longitudinal section of one embodiment of the device according to the invention;

Figure 2 is a similar view in section of another embodiment; and

Figure 3 is a view in vertical cross-section taken along line 3—3 of Figure 1.

Referring now to the drawings it will be seen that only a part of a liquid treating system is shown. The entire system is one in which a plurality of freshly formed yarns are led from a spinning bath and are guided in parallel relationship as a warp by means of grooved rollers through a plurality of baths in which the yarns are contacted with various aftertreating liquids such as washing water and desulphurizing agents. This type of spinning has the inherent advantage that a single aftertreating bath may serve a large number of spinning positions, the yarns being led in parallel relationship over guide rollers into and through the aftertreating liquid.

A typical bath is shown in Figures 1 and 3 in which the numeral 10 denotes the tank. The warp of yarns 11 passes through the top of the tank, being guided by

grooved rollers 12 and 13. The rollers 12 and 13 are mounted on one arm of bell cranks 14 and 15 respectively, which are pivoted at 16 and 17. Rollers 18 and 19 are employed for threading in as is described in Patent 2,459,254 and, to this end, they are mounted on the opposite respective arms of the bell cranks 14 and 15.

Within the reservoir 10 there is provided, according to the present invention, an endless belt 20 running between supporting rollers 21 and 22. One of the rollers 21 or 22 is driven by conventional means not shown. The rollers 21 and 22 are mounted on shafts 23 and 24 and these shafts are journaled in plates 25 which extend between the shafts on both sides of the belt.

The belt 20 is provided with an endless edge 26 on each side. These edges, one of which shows in Figure 3, are from 7 to 9 mm. in height. It can be seen that the edges with the belt define a liquid trough and this trough is fed from a supply conduit 27 which discharges the liquid evenly across its width through a slit-like mouth. Thus, liquid is discharged into the trough and the layer of liquid so formed is moved with and by the belt-trough, although the layer of liquid is itself at rest. At the end of the top run of the belt, near the roller 22, the liquid is discharged into the reservoir 10 and drains out through a drain 28. It can be seen that the tank 10 only serves to protect the conveying belt and does not function as a reservoir, since the treating liquid is carried by the belt and discharged thereby through the outlet 28. A dam 29 extends across one end of the reservoir to prevent liquid from flowing back under the belt.

The yarns are moved through the treating liquid which is moving bodily with the trough. In so moving the yarns are running between guiding rollers 12 and 13. The guiding rollers 12 and 13 are so mounted that the warp is held about 3 mm. above the bottom of the belt. The liquid level within the belt-trough is held at about 7 to 9 mm. It has been found that a good treating effect can be achieved if the thread and belt are moved concurrently at a speed difference of about 40 meters a minute. The liquid is moved at about 40 meters a minute faster than the speed of the warp, although the relationship may be reversed.

During the threading-in operation described in Patent No. 2,459,254, it is necessary that the conveying belt be able to swing out of normal position. This is made possible by mounting the plates 25 from a central pivot at 25*a*. In order to adjust the relative spacing between the rollers 12 and 13 and the top surface of the belt 20, the pivot at 25*a* can be connected to vertically adjustable members or the pivots 16 and 17 can be made vertically adjustable by conventional means, not shown. The conveying belt 20 may be of elastic material with integral endless sides and suggested materials are natural or synthetic rubber.

In Figure 2 there is shown another form of the invention. In this case the conveying belt, which bears numeral 30, is not provided with edges. Here the reservoir tank 31 is necessary to contain liquid rather than just to protect the belt assembly. Liquid is fed into the reservoir through an inlet 32 and it spills out over a dam 33 at the opposite end. An outlet 34 drains the liquid which spills over the dam 33 from the reservoir 31. The belt 30 moves the same way as the belt 20 and the warp guiding elements correspond exactly in structure and function to the parts 12 to 19, inclusive.

The height of the dam 33 is so adjusted that the liquid level in the reservoir 31 is maintained about 7 to 9 mm. above the top of the upper run of the belt 30. The yarns are moved parallel to the belt and in the same direction as the belt about 3 mm. above its upper surface, which is from 4 to 6 mm. below the surface of the liquid. The supply of liquid through the conduit 32 is

so regulated that there is no flow of liquid above the belt 30 with the result that the only movement of the liquid in that zone is brought about by the belt.

In the construction of Figure 2, where in operation the reservoir is filled with liquid, it is possible to support the belt guiding rollers 35 and 36 from a floating body 37 and means may be provided to limit the upper movement of the body 37, whereby to control the spacing between the upper run of the belt and the rollers which guide the warp through the reservoir.

What is claimed is:

1. Apparatus for the wet treatment of yarns in warp form comprising a driven endless belt having flanges which define a trough, a conduit having an opening extending laterally across the belt at one portion thereof for supplying liquid to the trough, means adjacent another portion of the belt for receiving liquid discharged therefrom, said conduit and said liquid receiving means being so related as to maintain on the upper run of said belt between said flanges a liquid body which is static with respect to the belt and means to guide a warp of yarns in co-directional spaced relation to said belt above the upper run thereof a distance less than the height of the flanges.

2. Apparatus for the wet treatment of yarns in warp form comprising a driven endless belt having flanges which define a trough, a conduit having an opening extending laterally across the belt at one portion thereof for supplying liquid to the trough, means adjacent another portion of the belt for receiving liquid discharged therefrom, said conduit and said liquid receiving means

being so related as to maintain on the upper run of said belt between said flanges a liquid body which is static with respect to the belt but which has a relative motion of approximately 40 meters per minute with respect to said warp and means to guide a warp of yarns in co-directional spaced relation to said belt above the upper run thereof a distance less than the height of the flanges.

3. Apparatus as set forth in claim 2 wherein said belt and said liquid body travel at a speed greater than that of said warp of yarns.

4. Apparatus as set forth in claim 2 wherein said belt and said liquid body travel at a speed less than that of said warp of yarns.

5. Apparatus as set forth in claim 2 wherein the trough defining flanges are from 7 to 9 mm. in height.

6. Apparatus as set forth in claim 2 further comprising a container and means to pivotally support the belt within said container to facilitate threading-in of said warp of yarns.

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