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MEANS FOR TREATMENT OF FRESHLY SPUN RAYON FILAMENT YARN

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FIG.1

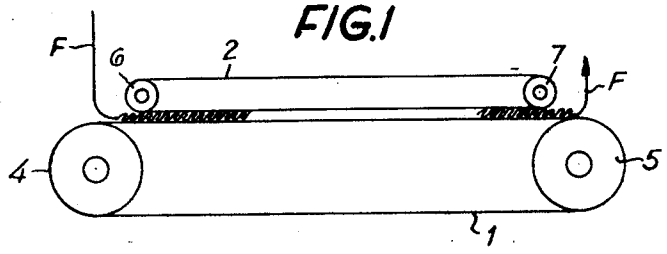


FIG.2

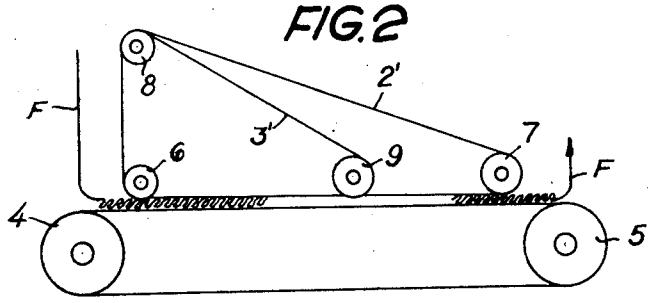


FIG.3

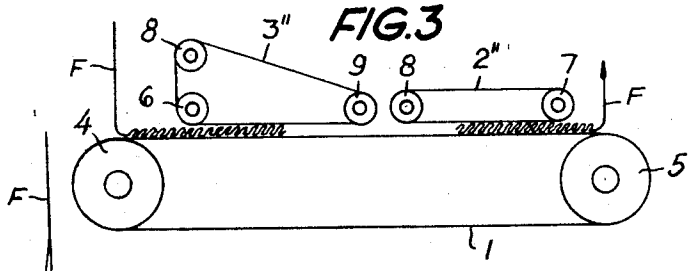
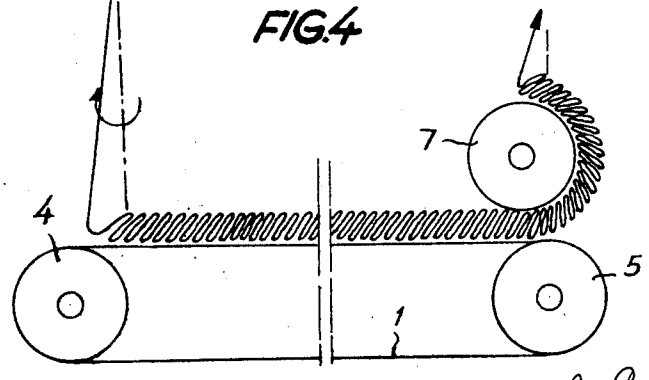


FIG.4



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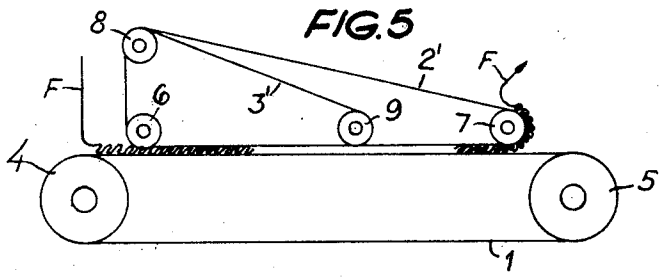
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FIG.5



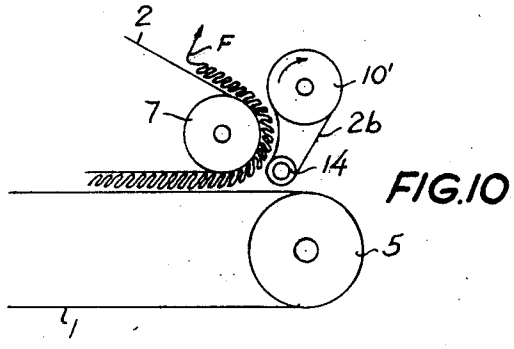


FIG.10

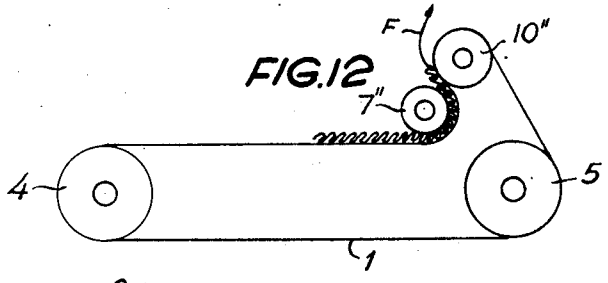


FIG.12

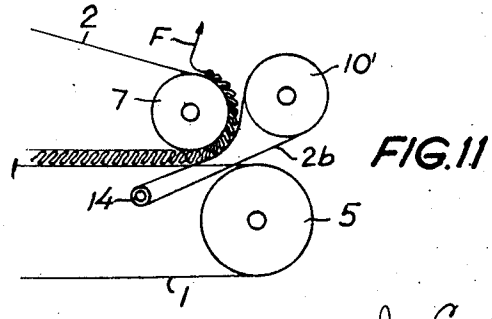


FIG.11

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FIG.6

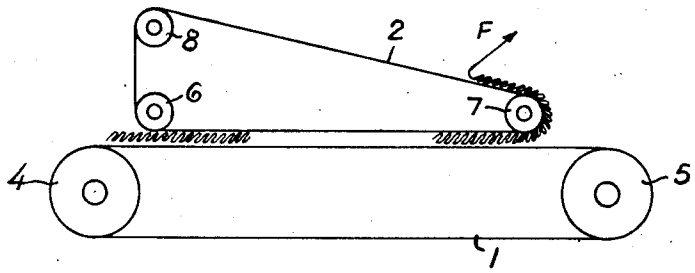


FIG.7

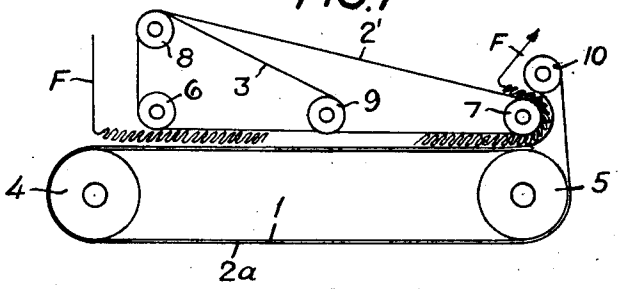


FIG.8

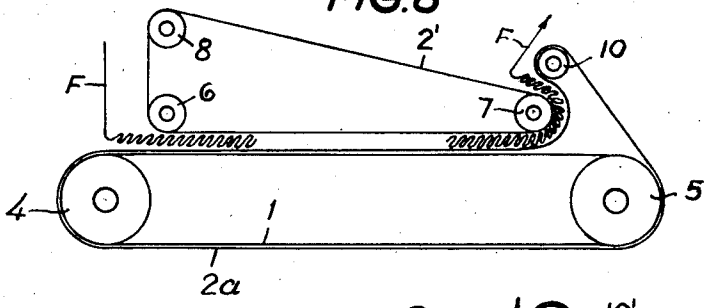
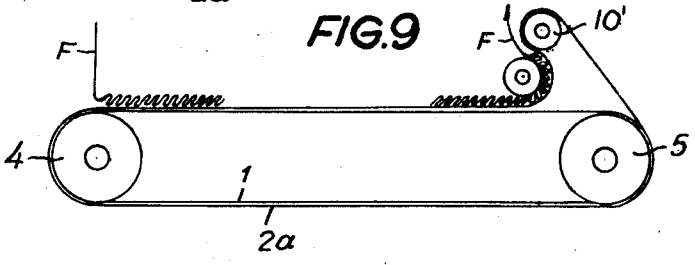


FIG.9



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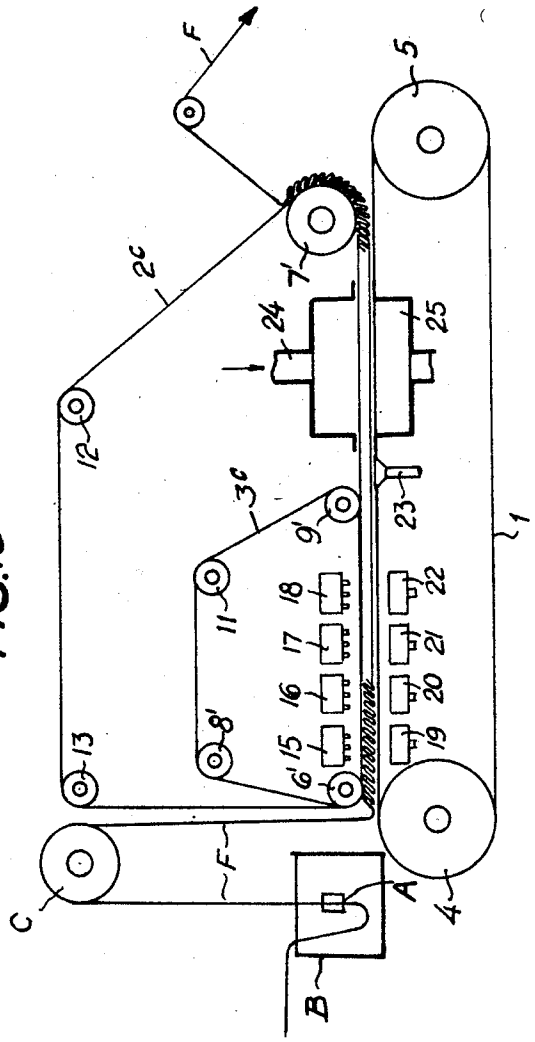
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FIG. 13



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United States Patent Office 2,817,227 Patented Dec. 24, 1957

2,817,227

MEANS FOR TREATMENT OF FRESHLY SPUN RAYON FILAMENT YARN

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Application August 3, 1951, Serial No. 240,126

2 Claims. (Cl. 68—20)

The present invention relates to means for after-treatment, such as washing, desulfuration, soaping, drying and so forth, of freshly spun rayon yarn arranged in the form of filaments or slivers in a relaxed, tensionless condition on a preferably endless conveyer band or the like so as to form bands or layers consisting of ringlets or coils of filaments or slivers.

It is previously known, for instance from the British Patent No. 26,878/1931, to wash, to after-treat, and to dry freshly spun rayon yarn laid up endlessly and in a non-stretched condition on a conveying net or the like. In practical operation, however, the method meets with certain difficulties which are, inter alia, due to the fact that the generally very thin rayon filaments arranged on the conveyer belt in the form of coils of a more or less regular configuration are displaced, through the influence of the washing and treating liquids, within the individual filament bundle and with respect to the relative position of the individual coils, which results in that the fibre or filament bundle when leaving the conveyer belt is not gathered with the fibres paralleling each other within the bundle and in the coils, but is more or less disoriented with the individual fibres and coils dislocated and brought into disorder through the influence of the treating liquids or the drying air. Hereby the filament layer will be more or less felted with the adjacent filament coils, which involves that the yarn when pulled off the endless conveyer belt for the purpose of being wound onto a bobbin or a reel, for example, gives rise to kinks or entangled portions which are not straightened out when being wound on but causes knots that make the filament or yarn useless for its purpose.

These disadvantages manifest themselves particularly in connection with very fine filaments, especially as the removal of the fibres from the endless conveyer belt for the purpose of being wound up is generally effected from the lower side of the fibre layer. Endeavours have been made to obviate this latter drawback by turning the layer of filaments or sliver, a suction roller having then been made use of which was placed above the termination of the endless conveyer belt. A certain improvement is believed to have been obtained by this measure, it is true, but on the other hand this proposal does not involve any satisfactory solution.

Now, the present invention relates to a means obviating all of the above-mentioned disadvantages in a satisfactory manner. It has been found that said disadvantages in earlier arrangements of this kind can be eliminated by the rayon layer being covered, for instance, with one or more cloths of a suitable material and of a suitable density, said cloths preventing the liquid drops, liquid jets or air currents from "opening" the filament and from felting the rayon layer together. When the rayon layer thus covered passes the various steps of treatment, the fibres of the filaments therefore still extend parallel to one another. Thus, the invention is principally distinguished by the feature that one or more cloths or bands of a suitable material and a suitable density, for instance in the

form of endless bands, are arranged over the conveyer belt, said bands being adapted to bear on and to follow the rayon layer during its advancement, in a manner such that displacement under the influence of the various treating agents on the individual filament of the rayon layer is prevented.

The cloth (or cloths) in consideration, called the covering cloth in the following, is preferably constituted by an endless band covering the filament or sliver layer, said band extending over a number of return rollers from the point of the conveyer belt where the rayon layer is applied to the point where the fibre is drawn off for being wound onto a bobbin, reel or the like, for example.

If desired, it is possible within the covering cloth laid in the form of an endless band about a suitable number of return rollers to arrange a second covering cloth, which only extends along a portion of the distance by which the rayon layer is advanced by means of the conveyer belt, for instance along that portion thereof where the rayon layer is subjected to the liquid treatments. In certain cases, however, it may be found suitable to arrange these two covering cloths behind one another in the direction of movement of the conveyer belt.

Other features of the invention will appear from the following description of a few different forms of embodiment of means arranged according to the principles of the present invention and illustrated in the accompanying drawings by way of diagrammatic representation.

Fig. 1 is a side view of an apparatus constructed in accordance with the present invention.

Figs. 2–9 inclusive are side views of further modifications.

Figs. 10, 11, and 12 are detailed side views of other modifications, and

Fig. 13 is a side view of a complete assembly installed in accordance with the present invention.

Fig. 1 is a diagrammatic view of a contrivance where the covering cloth **2**, which in this case is made as an endless band running over return rollers **6** and **7**, protects the rayon layer against a disturbing influence from treating liquids supplied from above as well as from warm air supplied thereto.

In certain cases, it may be found suitable, as shown in Fig. 2, for example, to provide a plurality of covering cloths such as two cloths **2'** and **3'**, the latter cloth **3'** having substantially for its object to protect the rayon layer against a disturbing influence from the treating liquids, whereas the cloth **2'** substantially has for its object to protect the rayon layer against the detrimental effect of air currents, such as currents of warm air supplied to the rayon filament layer. In this case, the cloth **2'** may be made considerably thinner than the cloth **3'**. The cloth **2'** will thus absorb and entrain a smaller quantity of water, which is to be caused to evaporate, and for this reason drying takes place more rapidly and requires a smaller quantity of heat. In certain cases, the cloth **2'** may be replaced by a warp, that is to say by parallel longitudinally extending threads without any weft threads.

Fig. 3 shows an arrangement where the cloths **2''** and **3''** are separated from each other and arranged behind one another in the direction of movement of the fibre layer F.

Particularly in case of filaments or yarn of a high degree of fineness (a lower denier) it will be found preferable to turn the rayon layer upside down. This is due to the fact that the rayon filaments falling or laid down onto the travelling conveyer belt **1** take the form of bends or coils covering each other, as is diagrammatically illustrated in Fig. 4. It will be clearly seen from this figure that drawing off of the yarn in order to wind it onto a

bobbin, reel or the like is effected much easier, if the yarn or fibre layer is turned prior to being drawn off.

Such turning of the filament or yarn layer F is shown in Figs. 5 and 6 and is here effected in a manner such that the covering cloth passing the return roller 7 and lying outermost on the same is provided with a surface of such nature that the yarn or fibre layer F has a greater tendency to stick thereto than to the conveyer belt 1. If desired, this sticking may be increased by the return roller 7 being made as a suction roller. This involves a considerable advantage in comparison with the use of a suction roller alone, which is known per se. Among the other things, a considerably greater space is obtained for the laying of the turned fibre layer F, which is of great importance in industrial uses. One has, so to say, facilities of obtaining a "stock" of rayon prior to the winding-off operation, whereby more time may be allotted to the mending of any breaks of the yarn, and so forth, when required.

In certain cases it may be found advantageous, in place of relying on the greater adhesion between the rayon layer and the covering cloth, to provide a special supporting cloth having for its object to prevent the rayon layer from falling down onto the conveyer belt 1, when the rayon layer is to be moved upwardly and round the return roller 7. Various embodiments of this proposal are illustrated in Figs. 7–12.

In the arrangements according to Figs. 7–9, a further band (cloth) 2*a* has been introduced between the conveyer belt 1 and the rayon layer F, said band 2*a* embracing the return rollers 4 and 5 of the conveyer belt. From the return roller 5, this band, however, passes further upwardly over an additional return roller 10 arranged above the return roller 7. The fibre layer F will thus be subjected to a certain contact pressure directed against the return roller 7, said pressure ensuring a reliable turning of the filament layer. Otherwise, Figs. 7 and 8 agree with the means previously described with reference to Figs. 1 and 2. Fig. 9, however, has no covering cloth and only refers to the turning of the rayon layer for the purpose of facilitating the drawing off of the fialment or yarn.

In the arrangements according to Figs. 10 and 11, a special turning or supporting cloth 2*b* is provided, said cloth extending between two return rollers 10' and 14. The mode of operation is believed to appear clearly from the figures presented. In the arrangements according to Fig. 11, the conveyer belt 1 and the supporting cloth 2*b* have been made in such manner that these two band-shaped cloths cross each other, whereby a particularly good contact with the return roller 7 is obtained. This has been made possible by the fact that the two bands consist of parallel warp filaments without any transversely extending weft threads. In other cases too, the supporting cloth may be advantageously replaced by closely disposed parallel threads, "warp threads."

Fig. 12 shows a modification of the arrangement according to Figs. 7–9, in that the turning is effected solely by the conveyer belt 1, which is extended upwardly and over the return roller 10'', whereby a contact pressure against the return roller 7'' is provided for.

Fig. 13 likewise is a diagrammatic representation of a more detailed form of embodiment of an installation according to the present invention. The reference characters to be found in this figure agree with those used in connection with the arrangements already briefly described with reference to Figs. 1–12.

Provided in a tank of precipitating bath B is an ordinary spinning nozzle A, from which a filament F is drawn upwardly and caused to pass over a wheel or the like C. The filament F is permitted to hang down from this wheel, and is laid in coils on the conveyer belt 1 extending over two return rollers 4 and 5. Two covering bands 2^c and 3^c are arranged above the conveyer belt, which moves the filament layer toward the other return roller 5. Of said covering bands the band 2^c extends along the whole distance by which the filament layer F is advanced on the conveyer belt, whereas the band 3^c, which is placed within the endless band 2^c, only extends along a certain part of said distance, that is to say, that part thereof where the fibre layer is to be subjected to treatment with various liquids, for instance for washing, desulfuration, soaping and so forth. The outer one of these covering bands extends over return rollers 6', 7', 12 and 13. The inner band extends over return rollers 6', 9', 11 and 8'. The return roller 6' is thus common to both bands. Obviously, there is nothing that would prevent also making the rollers 12 and 13, for example, common to both bands, in which case the rollers 8' and 11 would be omitted.

By the fact that the fibre layer F adheres to the covering band 2^c, the same will be moved upwardly at the return roller 7 so as to leave the conveyer belt 1. After that, the filament or sliver F is drawn off to be wound onto a bobbin, reel or the like.

As will appear from Fig. 13, the rayon layer is covered at the commencement of the two covering bands 2^c and 3^c. Above this portion of the advancement of the rayon layer there are means 15–18 for the supply of various treating liquids, for instance for washing, desulfuration, soaping, and so forth. Below these means and underneath the fiber layer there are collecting means 19–22 to collect the respective treating liquids. Immediately after the return roller 9 of the inner covering cloth 3^c there is an arrangement 23 to suck off any remaining liquid for the purpose of facilitating and shortening the subsequent drying operation. Warm air is introduced into a housing enclosing the bands, as at 24, and is drawn off at 25. Here, the band 2^c, which is the one adjacent to the fibre layer, is made from a relatively thin fabric, for which reason it only retains small quantities of liquid, which highly shortens the time of drying.

Fig. 13 shows a form of embodiment according to the present invention in connection with washing, desulfuration, soaping and drying of the filaments and fibre bundles in a relaxed condition. In certain cases it may be desirable only to treat the filaments and fibre bundles by a wet treatment in a non-stretched relaxed condition. In such cases the wet-treated filaments and fibre bundles are drawn in a wet state from the endless conveyer belt or the covering cloth for further treatment.

As will appear from the description hereinbefore, the present invention provides for a condensed and reliable treatment of the fibre layer without incurring the risk of entanglement and resulting drawbacks and loss of time. It will be noted that the endless bands, shown in Figures 2, 3, 7, and 13, are so positioned relative to each other, so as to insure engagement of a major portion of the thin filament layer carried by the conveyor with one of the endless bands. Further, each of the bands has a reach or portion directly over and substantially parallel with the conveyor.

Obviously, the arrangement is not limited to the treatment of a single filament, a single thread or a single sliver, inasmuch as these may be doubled or multiplied broadwise to an arbitrary number. Furthermore, it is not absolutely necessary to arrange the drying within the means shown in Fig. 13, for example, inasmuch as such drying may take place on the outside, for instance on rotating warm drying rollers or cylinders, the drying permitting them of being performed at a certain tension in the filament or sliver.

What I claim is:

1. An apparatus for wet treatment of thin rayon filament yarn layers in a relaxed loose tensionless condition, including in combination, an endless conveyor, a pair of endless bands above and spaced from the conveyor so as to follow the filament layer during its advancing movement on the conveyor, each of said bands having a reach directly over and parallel to said conveyor, longitudinally spaced roller means above and spaced from the

conveyor for imparting movement to said endless bands, each of said endless bands having a protective cloth surface consisting of open-meshed fabric which readily permits the passage of the treating liquids without retaining any appreciable quantities thereof and which allows free passage of air therethrough, one of the endless bands being of greater length than the other, guide rollers associated with each of said bands, the shorter band being arranged within the longer band and covering a part of the distance the filament layer is advanced on the conveyor, said endless bands during their advancing movement being positioned so as not to impart any appreciable pressure to the filament layer, means subjecting said filament layer to a wet treatment as it is advanced over the conveyor, and means for drying the filament layer while on the conveyor and covered by a protective cloth surface, each of said protective cloth surfaces being of suitable density and movable on the conveyor without applying any appreciable pressure and in such a manner as to prevent displacement of the individual fibers of the filament layer.

2. An apparatus for wet treatment of rayon filament yarn layers, including in combination, an endless conveyor, an inner endless band, an outer endless band, said bands having reaches adjacent to each other and being positioned above and spaced from the conveyor so as to follow the filament layer during its advancing movement on the conveyor, roller means above and spaced from the conveyor for imparting longitudinal movement to said endless bands, each of said endless bands having a protective cloth surface, consisting of open-meshed fabric which

readily permits the passage of the treating liquids without retaining any appreciable quantities thereof and which allows free passage of air therethrough, the outer band being longer than the inner band and enclosing the same, guide rollers associated with each of said bands, said inner band extending for a shorter distance than the outer band over the filament layer as the latter is advanced over the conveyor, said endless bands during their advancing movement on the conveyor being positioned so as not to impart any appreciable pressure to the filament layer, means within the inner protective cloth surface for subjecting the filament layer to a wet treatment as it is advanced past the conveyor, and means for drying the filament layer while moving over the conveyor and covered by the outer cloth surface, said protective cloth surfaces being of suitable density and movable with the rayon filament during its advancing movement on the conveyor without applying any appreciable pressure and in such a manner as to prevent displacement of the individual fibers of the filament layer under the influence of the wet treatment.

References Cited in the file of this patent

UNITED STATES PATENTS

821,812	Mather et al.	May 29, 1906
975,074	Robson	Nov. 8, 1910
1,916,946	Fruh	July 4, 1933
2,080,635	Schramek et al.	May 18, 1937
2,196,695	Davies	Apr. 9, 1940
2,366,136	Waldstein	Dec. 26, 1944
2,494,807	Haeberlin	Jan. 17, 1950