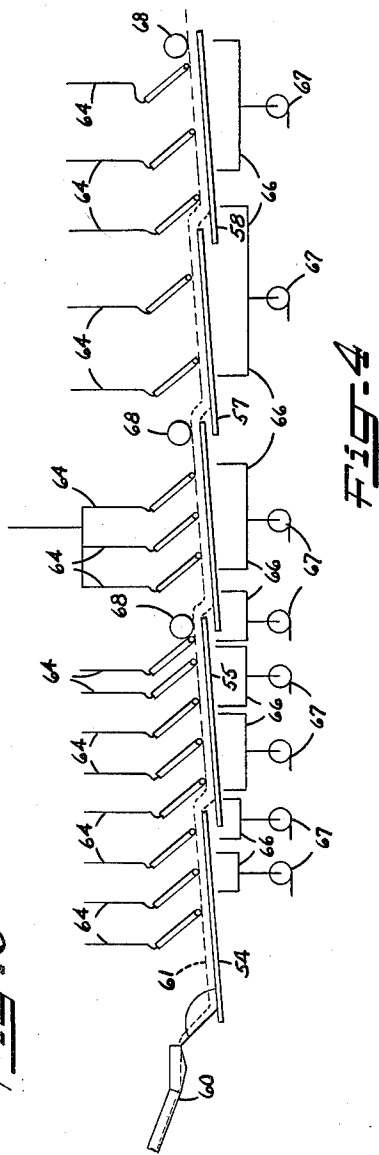
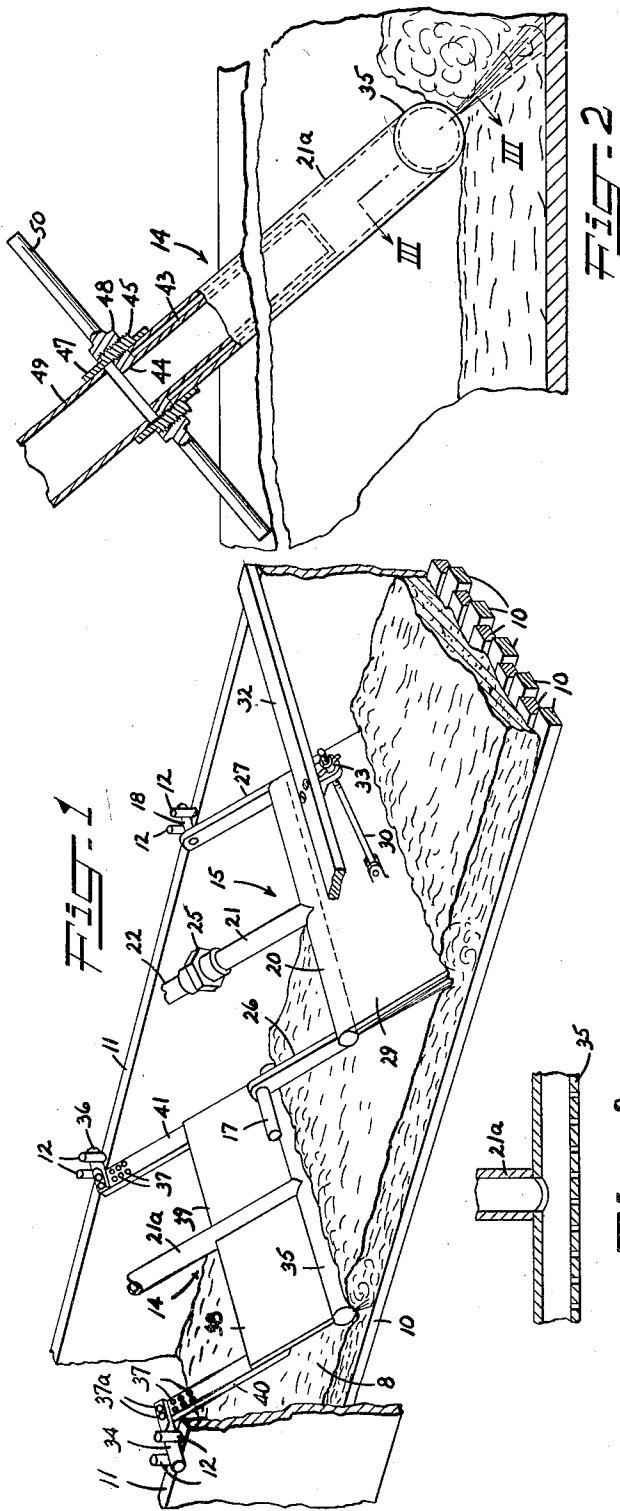


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METHOD OF TREATING A RUNNING BLANKET
OF STAPLE LENGTH ARTIFICIAL FIBERS
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METHOD OF TREATING A RUNNING
BLANKET OF STAPLE LENGTH ARTI-
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1 Claim. (Cl. 8—156)

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This invention relates to a process for wet treating a blanket of unconnected, loose fibers in bulk which is particularly useful for introducing liquids into running blankets of fibers of the lengths found in natural fibers such as cotton or wool, and the various types of synthetically produced staple fibers.

Nearly all types of textile fiber of the lengths found in natural fiber and artificially produced staple are subjected to wet treatments at some stage or other in their preparation for incorporation into finished manufactured goods. It is preferable to accomplish such processing by continuous methods. For example, in the preparation of rayon staple fiber, a preferred system of treatment involves wet cutting a tow comprising perhaps 100,000 or more filaments into lengths which may vary in length in a range of 1 to 6 inches, and distributing the output of the cutter over the surface of a conveyor having a foraminous surface as a blanket of uniform depth. One type of conveyor preferred by the staple manufacturer is a series of "walking rail" machines which are used to advance the blanket through a series of spray stations in which the blanket is showered with various treating liquids from overhead spray devices. Extending alongside the "walking rail" apparatus in the blanket are upright sidewalls or baffles which prevent the liquid from draining laterally from the blanket. The liquid infiltrates or trickles through the blanket and drains away through the clearances between the rails. The blanket, as it passes through the various shower stations, tends to become more packed and less permeable as a result of the liquid sprayed thereupon. To compensate for the slowness of liquid penetration resulting from packing the fibrous material, it is necessary to adjust the length of the wet treatment zones so that sufficient area and time will be provided for the liquid to pass through the blanket. Moreover, as slight differences in the thickness and density between sections of the blanket produce substantial differences in the rate of passage of the treating liquid through those sections of the blanket, uniformly treated fiber is difficult to obtain.

It is an object of the present invention to provide a method for wet treating a running blanket of unconnected fibers of textile length to obtain rapid passage of the treating fluid through the fiber and to substantially reduce the space and equipment needed to carry out the liquid treatment. It is another object to carry out a liquid treatment in which the treating liquid is more

efficiently used and the fiber is subjected to more thorough and uniform treatment. Another object is to disperse the fiber during the treatment so as to produce finished staple fiber having a high degree of separation or "openness." It is still another object to increase the capacity of existing wet treating equipment. Other objects, features, and advantages will be apparent from the following description of the invention and the drawings in which

Fig. 1 is a pictorial view of wet treating apparatus for fibrous blankets with portions cut away to better illustrate an embodiment of the invention and a modification thereof;

Fig. 2 is a fragmental section view of a fluid distributor of the apparatus shown in Fig. 1;

Fig. 3 is a section view taken along line III—III of Fig. 2; and

Fig. 4 is a diagrammatic elevation view illustrating the invention as used in a large scale wet treating apparatus.

Briefly, the invention comprises a method in which a sheet of, or a large number of small streams of, a treating liquid is discharged into a running blanket of loose or unconnected fibers of textile length, in a pattern extending transversely with respect to the movement of the blanket. The liquid is discharged in a direction such that it meets the blanket at a vertical angle less than a right angle measured between the approaching paths of the liquid and the blanket. The blanket is carried on a liquid-permeable conveyor surface. The liquid is prevented from leaving the blanket laterally by any suitable means such as upright walls or baffles extending along the edges of the conveyor surface.

In Fig. 1, a blanket 8 is shown supported on the rails 10 of a walking rail conveyor. The apparatus is provided with sidewalls or baffles 11 extending vertically from opposite sides of the surface of the conveyor to prevent the liquid from being discharged laterally from the blanket. Supported between the baffles 11 at each side are the liquid distributors 14 and 15, each pivotably supported by axial members such as the shafts 17 and 18 of the distributor 15 on the top edges of the baffles 11 between the pegs 12. The distributor 14 is supported in a similar manner on the baffles. The distributors 14 and 15 consist basically of conduits such as the tubes 20 and 25 supported transversely over the running blanket 8 which are apertured along a surface facing the blanket and which are supplied by suitable feed tubes 21 and 21a, respectively, and connected with a reserve liquid supply reservoir

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(not shown). For example, in the distributor 15, the feed tube 21 is connected in T arrangement to a portion of the top wall of the tube 20 in the manner illustrated in Fig. 1. A supply line 22 is attached to the feed tube 21 at the union 25. Extending from each end of the tube 20 are brackets 26 and 27 having axle members or trunnions 17 and 18 extending therefrom. A baffle 29 is secured to the liquid distribution tube 20 along a length thereof corresponding to the width of the blanket 8. The baffle 29 extends from the tube 20 to the region in which the liquid discharged from the tube 20 enters the blanket 8. During operation of the apparatus, the baffle is supported at sufficient clearance with the conveyor rails 10 so that liquid and fibrous material of the blanket may pass under the baffle in the direction in which the blanket is advancing. The mixing of the liquid and the material of the blanket produces a suspension or slurry from which the liquid drains through the rails 10. A mass or body of slurry of appreciable height is obtained immediately in advance of the distributor 15 which would backwash into the stream of liquid discharged from the distributor were it not for the baffle 29 acting as a supporting barrier. Such backwashing would interfere with the impact and penetration of the treating liquid being directed into the blanket. The angle of the distributor 15 with respect to the general plane of the upper surface of the blanket, or that of the conveyor surface upon which the blanket is supported, may be adjusted to provide the desired direction for the liquid discharged therefrom by the threaded rod 30 pivotably connected to the baffle 29 and longitudinally adjustable with respect to the cross bar 32 by means of the nut 33.

The distributor 14 differs in construction from the distributor 15 in the respects that its baffling means is disposed above the distributing tube rather than below it so that the rounded surface of the tube 35 may ride upon the surface of the blanket 8, and the distributor may pivot freely upon its axles 34 and 36. Baffles 38 and 39 may be attached as shown along the upper surfaces of the tube 35 and to the side surfaces of a feed tube 21a. To the baffles 38 and 39 are secured support members 40 and 41, respectively. The members 40 and 41 are each perforated with holes 37 arranged in pairs to receive bolts 37a which extend through the trunnions 34 and 36. By bolting the axle elements 34 and 36 to the appropriate set of holes in the support members 40 and 41, a tilt of the distributor 14 may be obtained which produces alignment of the liquid being discharged therefrom in a direction which results in a desired effect on the blanket. The distributor 15 may be supported by similar axle elements in conjunction with the adjustable threaded rod 30 to give a desired fixed tilt. Assuming that the angle of the tilt is that measured by the dihedral angle between the path or plane along which the liquid is discharged and the surface of the conveyor carrying the blanket toward said path, the distributors 14 and 15 may be adjusted readily within the range of 30 to 60 degrees. In normal operation, a distributor free to swing on pivotal support means such as the distributor 14, will oscillate through a range of 5 to 10 degrees variation with the desired tilt.

Fig. 2 illustrates the distributor 14 sectioned along the center feed tube 21a. The distributor 14 is equipped with a changeable porous material filter 43 having an upper flanged portion 44

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fitting within the recess of an element 45 of a standard pipe union attached to the upper portion of the feed tube 21a. The interiorly-threaded rotatable union element 48 is rotatably secured to a third union element 47 by conventional overlapping flanges. The element 47 is secured in threaded relationship to the end of a supply line 49. Element 48 is provided with handles 50 to facilitate detachment of the fluid distributor 14 from the supply line 49.

Fig. 4 diagrammatically represents a series of "walking rail" conveyors 54, 55, 56, 57 and 58 which are used to convey a fibrous blanket 61 in a direction from left to right under a multiplicity of distributors 64 such as heretofore described with respect to the previous figures. The distributors are disposed at a plurality of points spaced lengthwise of the path followed by the blanket of fibers over the conveyors and arranged to receive and distribute a plurality of treating liquids in successive shower stations. The apparatus shown in Fig. 4 is illustrative of a portion of that used to treat viscose staple fiber produced by the wet cutting method in several successive wet treating stages. The staple fiber is washed or sluiced from a cutter (not shown) through a sluice 60 onto the conveyor 54. In one commercial process the advancing blanket 61 is subjected by the various distributors, in the following order recited, to streams of recirculated water, fresh hot water, a desulfurizing solution containing sodium sulfide or the like, more water, a bleach solution, water, and a soap solution. Squeeze rolls are disposed along the path of the blanket at points where it is desired to express the liquid from the blanket to a greater degree than can be accomplished by the action of walking rail conveyors. For example, a squeeze roll may be positioned to squeeze the blanket after the sulfide or any other of the treatments before subjecting it to a washing treatment. Catch basins 66 provided with pumps 67 are positioned under the conveyor to receive the liquid that drains through the spaces between the rails 10. The basins may be arranged in any manner desired to recirculate treating liquids. For example, treated water may be pumped from one basin to a distributor at a less advanced position along the blanket path for more efficient use thereof.

The process just indicated with respect to viscose staple fiber is merely illustrative of the many uses to which the invention may be applied in connection with the preparation of all types of synthetic staple and natural fibers. The fluid distributors may be used with any type of blanket conveyor having a sufficiently opened or foraminous surface to permit drainage of liquid. Such a liquid distributor system as described may be canted at small angles which do not appreciably interfere with the normal progress of the blanket. The fluid distributors may be held in a fixed position by adjustable means such as the rod 30 which holds the distributor 15 in a fixed position or they may be allowed to ride upon the surface of the blanket as it passes under them while free to swing on pivotable supports in the manner of the distributor 14 as shown in Fig. 1.

It is found, for example, in a conveyor 38 inches wide that two pieces of pipe may be formed into a T manifold already described with respect to distributors 14 and 15 of Fig. 1. The horizontal branch of the T may be provided with $\frac{1}{8}$ inch holes having parallel axes spaced with

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centers approximately $1\frac{1}{4}$ inches apart although many other arrangements as to size and spacing of the holes are satisfactory. The distributor operates successfully when positioned so that the jets of fluid issuing from the holes discharge into the blanket along a plane or path extending at an angle of approximately 40 degrees with the surface of the conveyor supporting the blanket. With the distributor canted at such an angle, the fluid satisfactorily penetrates a depth of five inches when supplied at a pressure of at least 30 pounds per square inch.

The fluid stream as it penetrates the blanket is deflected and its force is dissipated throughout the section of the blanket which has passed under the distributor. The deflection may be accomplished entirely by collision of the sheet of liquid with the relatively dense unfluffed blanket portion continuously passing into the path of the liquid discharged from the distributor, or if the stream is sufficiently powerful, a portion of it may reach the surface of the conveyor. The pressure may be varied to produce any penetration desired. Preferably, the liquid sheet or portion thereof should not reach the conveyor surface with sufficient force to wash fibers through the openings of the surface and cause appreciable fiber loss. Generally, it will be desired to penetrate the blanket almost completely; a preferable manner of operating the fluid distributor is to impart merely such velocity to the fluid that its force becomes entirely dissipated as it reaches the lowest strata of the blanket.

The action of the liquid applied from the distributor is such that the portion of the blanket which most recently passed into the liquid stream takes the form of a liquid suspension of fibers of greatly increased volume in which the adjacent fibers are very effectively separated from each other in a preponderance of the liquid. In addition to thoroughly disintegrating any bunches or other compact masses of fibrous material that may have been contained in the blanket, the fibers are subjected to very thorough and uniform liquid treatment. As the blanket is carried away from the distributor, the liquid rapidly drains out of the fluffed and "opened" blanket through the foraminations in the conveyor at a greater rate than is obtainable through the relatively compact blanket characteristic of conventional wet treatment processes.

As a consequence of utilizing high velocity treating liquid to fluff or open fibrous blankets, the capacity of a given amount of conveyor area, assuming adequate permeability of the conveyor to liquids, is increased substantially when using fluid distributors of the type herein described instead of conventional shower devices; or stated otherwise, the washing or liquid treating of running fibrous blankets may be accomplished by the invention in but a portion of the space now allotted for the continuous wet treatment of blankets of comparable thickness and texture.

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While preferred embodiments of the invention have been shown, it is understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claim.

I claim:

A method of treating artificial fibers of staple length comprising the steps of continuously advancing a running blanket thereof having a generally flat upper face along a continuous path while supporting the blanket from underneath by a liquid-permeable upper surface of a conveyor comprising closely-spaced elongated parallel rectangular areas, discharging at each of a plurality of fixed positions spaced at intervals along the path a thin high-velocity sheet of liquid downwardly into and through the blanket along a plane making a dihedral angle between 30 and 60 degrees with the upper face of that portion of the blanket advancing into the sheet of liquid, each sheet of liquid extending the full width of the blanket and being discharged at a velocity less than that which will cause any liquid passing completely through the blanket to force an appreciable quantity of fiber through said surface, and deflecting upwardly by said surface substantially all of the liquid of each sheet which goes completely through the blanket, said blanket being continuously advanced relative to the sheets of liquid to disintegrate successive portions of the blanket at repeated intervals and to repeatedly suspend the fibers thereof in the liquid derived from each sheet, and draining the liquid from each suspension of fibers through said surface as said suspension is carried by the surface away from the respective sheet of liquid which produced the suspension to repeatedly reform the blanket.

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