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CONTINUOUS PROCESSING OF FILAMENTARY TOW

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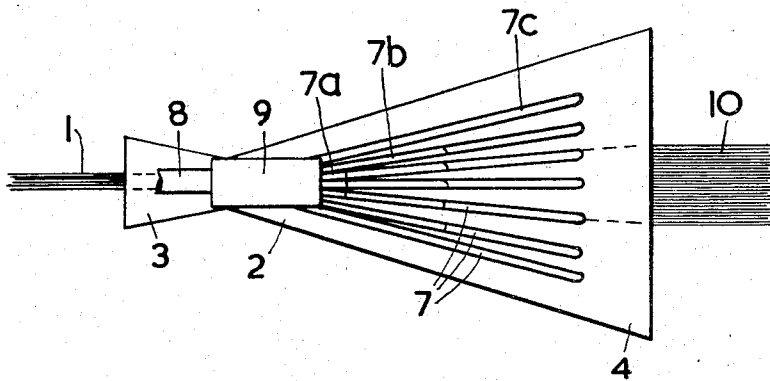


FIG. 1.

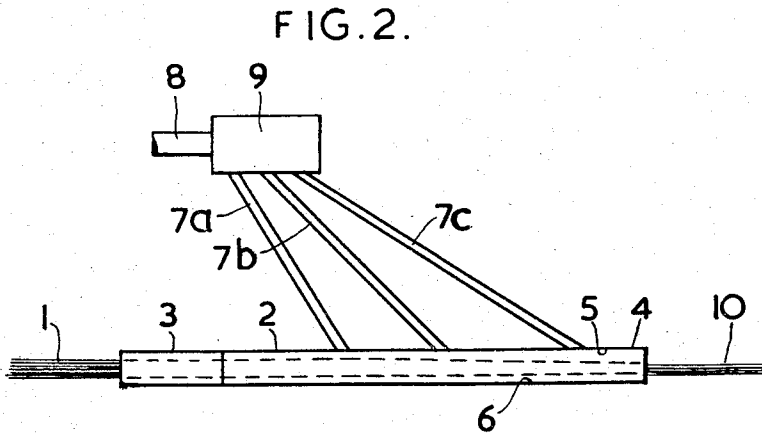


FIG. 2.

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UNITED STATES PATENT OFFICE

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CONTINUOUS PROCESSING OF
FILAMENTARY TOW

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3 Claims. (Cl. 19-48)

1

This invention relates to the continuous processing of filamentary tow and more particularly to spreading a compact tow of substantially parallel continuous filaments into a flat band of substantially uniform thickness.

In the production of a tow of continuous rayon filaments, for example viscose rayon filaments, filaments from a number of multi-hole jets are usually led together to form a thick tow having a denier which is at least 50,000 and which may be as high as 1,000,000. The resultant tow is subjected to a number of wet treatments such as desulphurising, washing and bleaching, followed by drying, for example on a series of heated rollers. Before the drying stage, the tow is usually mangled by passage through the nip of a pair of squeeze rollers to remove surplus treatment liquid. The tow passing from the squeeze rollers is therefore generally in the form of a compact mass which is difficult to dry uniformly and quickly on the heated drying rollers because the tow has a small ratio of surface area to unit volume and the heat does not readily reach the central filaments.

The object of the present invention is to facilitate uniform and efficient drying of the filamentary tow.

According to the present invention, a method of spreading a compact tow of substantially parallel continuous filaments into a flat band of substantially uniform thickness comprises passing the tow over and in close proximity to a flat or substantially flat surface and directing a series of oblique air jets on to the moving tow, the jets collectively having components of velocity both in and transversely to the direction of movement of the tow, so that the air passing through the tow spreads the filaments and is immediately deflected back through the tow by the flat surface. The surface may be entirely flat or may be provided with spaced transverse ribs which assist in deflecting the air.

In a preferred form of the invention the tow is passed through a tube having a flat internal surface on to which jets of air are obliquely directed in the direction of movement of the tow from above the flat surface. The number of air jets is preferably increased in the direction of travel of the tow. Reciprocating air jets may also be used.

The process of the present invention is useful for spreading a wet tow preparatory to drying on heated rollers but it can be applied to other processes in which it is required to spread a com-

2

compact tow into a flat band having a substantially uniform thickness for processing purposes.

The present invention is illustrated by way of example in the accompanying diagrammatic drawings in which

Figure 1 is a plan view of a suitable apparatus for spreading tow by the process according to the invention, and

Figure 2 is a side elevation of the apparatus shown in Figure 1.

Referring to the drawings, a tow 1 of wet rayon filaments, which has passed through a series of liquid treatments and then through the nip of a pair of rollers (not shown) to remove excess liquid, is passed into a flat tube 2 having a narrow converging entrance channel 3 and a diverging and appreciably longer channel 4 where the spreading of the tow takes place. The upper and lower inner surfaces 5, 6 of the tube are substantially flat and a total of fifteen pipes 7, carrying compressed air supplied from a pipe 8 and a distribution chamber 9 mounted above the tube 2 at its narrow end, pass obliquely downwards to open into the tube 2 on its upper, inner surface 5. The pipes 7 are mounted in three groups containing three, five, and seven pipes respectively, the group containing the three pipes 7a being arranged near the entrance end, the group containing the seven pipes 7c being arranged near the exit end and the group of five pipes 7b being between the other two groups. Each group of pipes is also splayed between the chamber 9 and the tube 2 so that the centre pipe of each group is in line with the longitudinal axis of the tube 2 whilst the other pipes form an increasing angle with the longitudinal axis (in plan view) as they are positioned away from the centre of each group.

Air jets entering the tube 2 by means of the first group of three pipes 7a strike the moving tow 1 causing the filaments to spread out slightly, the immediate deflection of the air jets by the flat, lower, inner surface 6 of the tube assisting in spreading of the filaments. The partially spread tow then passes under the air jets from the second group of five pipes 7b where further spreading takes place and finally, after passing under the jets of air from the third group of seven pipes 7c, the tow is spread into a flat band of filaments 10 having a substantially uniform thickness. The flat band of filaments 10 is finally dried.

Where there is a tendency for the flat band of filaments to reform into a compact tow after passing through a part of the dryer the tow may be passed through a further spreading tube as

described above, before passing on to the second part of the dryer.

What I claim is:

1. Apparatus for spreading a compact wet tow of substantially parallel continuous filaments into a flat band of substantially uniform thickness comprising a substantially flat tube having a narrow converging entrance channel and a divergent exit channel substantially longer than the entrance channel and substantially wider at the exit end than the width of the entrance channel, for receiving a tow of wet filaments, said tube having substantially flat upper and lower inner surfaces, and a compressed air supply source above said flat tube, in combination with a series of groups of pipes connecting the compressed air source to said flat tube, the groups being spaced from each other lengthwise of the exit channel, and the pipes in each group being spaced from each other widthwise of said channel, and each of said groups of pipes meeting the flat tube at an acute angle whereby compressed air from the compressed air source passes downwardly through said groups of pipes in a direction which is both transverse to and in line with the movement of the tow through said flat tube, and whereby the air from the pipes passes through the tow and strikes the lower flat surface of said flat tube and is immediately deflected back through the tow by said lower surface, thereby spreading the filaments of the tow.

2. Apparatus as claimed in claim 1, wherein the number of pipes in each group increases in the direction of travel of the tow.

3. Apparatus for spreading a compact wet tow of substantially parallel continuous filaments into a flat band of substantially uniform thickness comprising a substantially flat tube having a narrow converging entrance channel and a di-

verging exit channel substantially longer than the entrance channel and substantially wider at the exit end than the width of the entrance channel, for receiving a tow of wet filaments, said tube having substantially flat upper and lower inner surfaces, and a compressed air supply source above said flat tube, in combination with a series of three groups of pipes connecting the compressed air source to said flat tube, one group having its exit near the entrance end of the flat tube; another group having its exit near the exit end of the flat tube and the third group having its exit between that of the other two, the center pipe of each group being in line with the longitudinal axis of said flat tube and the other pipes of each group forming an increasing angle with said longitudinal axis as they are positioned away from the center of each group, and each of said groups of pipes meeting the flat tube at an acute angle whereby compressed air from the compressed air source passes downwardly through said groups of pipes in a direction which is both transverse to and in line with the movement of the tow through said flat tube, and whereby the air from the pipes passes through the tow and strikes the lower flat surface of said flat tube and is immediately deflected back through the tow by said lower surface, thereby spreading the filaments of the tow.

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