April 6, 1954 E. T. JONES, JR 2,674,112

TEXTILE APPARATUS

Filed Dec. 13, 1951 2 Sheets-Sheet 1

FIG.1.

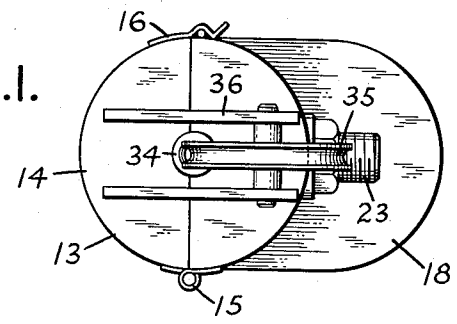
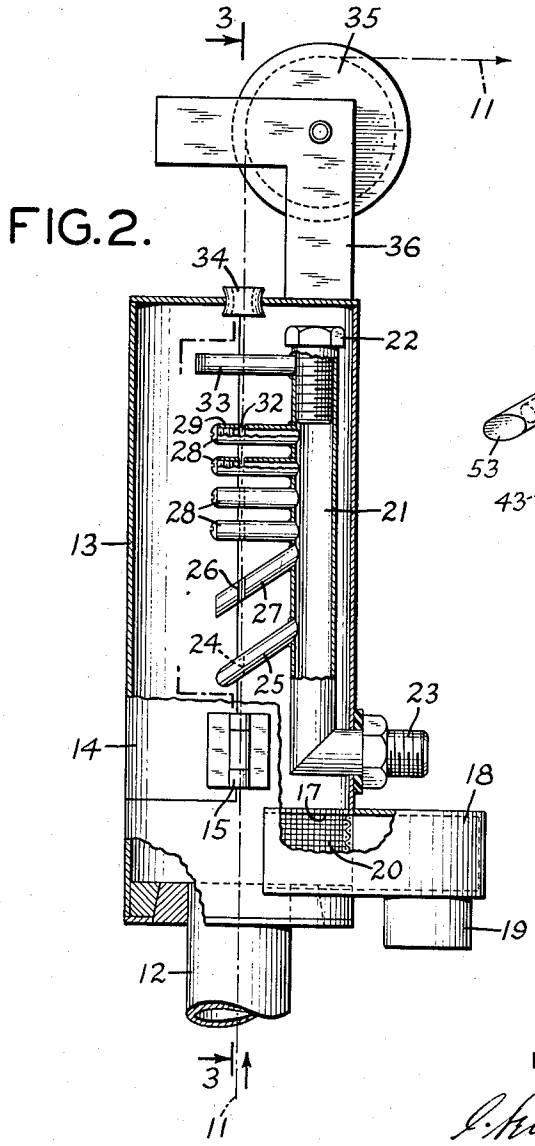


FIG.2.



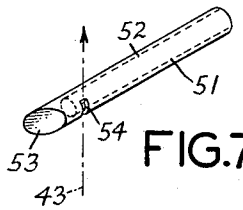


FIG.7.

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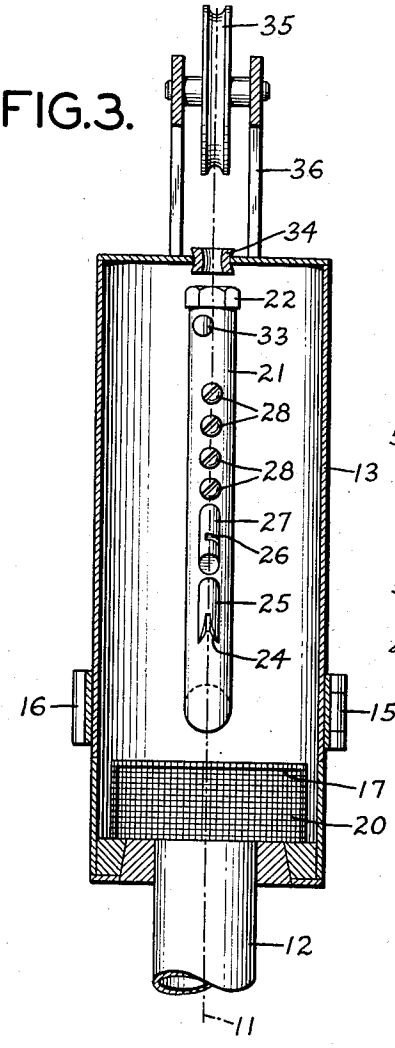
April 6, 1954 E. T. JONES, JR 2,674,112

TEXTILE APPARATUS

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FIG.3.



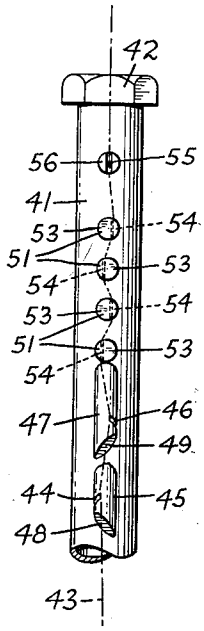


FIG.6.

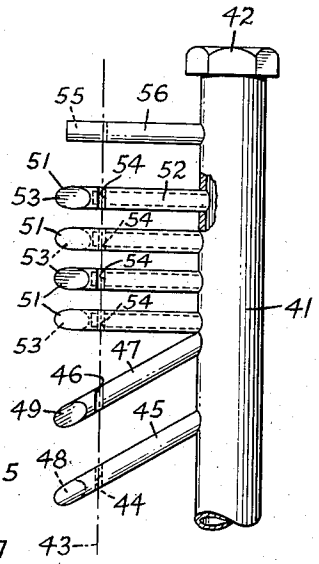


FIG.5.

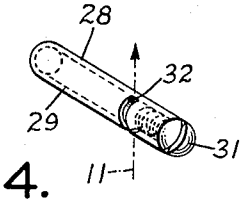


FIG.4.

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2,674,112

UNITED STATES PATENT OFFICE

2,674,112

TEXTILE APPARATUS

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Application December 13, 1951, Serial No. 261,439

15 Claims. (Cl. 68—20)

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This invention relates to textile apparatus and relates more particularly to means for removing from a wet yarn a portion of the liquid adhering thereto.

In the production and processing of textile yarns, it is common to pass the yarn through a liquid treating bath. For example, in the wet-spinning of textile yarns, a filament-forming composition is forced through a spinnerette into a liquid coagulating medium wherein it is caused to set. As the yarn emerges from the spinning bath it carries with it a considerable amount of liquid. For many purposes, it is desirable to remove from the wet yarn a portion of the liquid adhering thereto without abrading or otherwise damaging the yarn. This presents a difficult problem since the yarn is extremely sensitive to damage when it is wet and newly formed.

It is an important object of this invention to provide an apparatus for removing from a wet yarn a portion of the liquid adhering thereto without causing harm to the yarn.

A further object of this invention is to provide an apparatus for removing from a wet yarn a portion of the liquid adhering thereto with a minimum of physical contact with the yarn.

Other objects of this invention, together with certain details of construction and combinations of parts, will be apparent from the following detailed description and claims.

According to the present invention, there is provided, for example in an apparatus wherein a yarn and a liquid treating medium travel upwardly through a conduit, a chamber into which the yarn and the liquid treating medium enter as they emerge from the conduit. The chamber, which is operatively connected to said conduit and in vertical alignment therewith, is provided with an opening positioned in its lowermost portion adapted to discharge the major portion of the liquid entering said chamber with the yarn. The wet yarn then moves upwardly through the chamber and passes through the slots in one or more wiping elements, comprising solid elements having slots therein, which will remove from the wet yarn a certain amount of the liquid adhering thereto. To remove from the wet yarn a further quantity of the liquid adhering thereto, without abrading or otherwise damaging the yarn, the wet yarn is then passed through one or more suckers wherein it is subjected to suction which will extract liquid from the yarn with a minimum of mechanical contact. The suckers may, for example, be constructed of a short section of tubing, one end of which is

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closed and the other end of which is operatively connected to a pump or other means which will draw the air therefrom. The tubing is provided with a slit extending through the wall thereof and the yarn is caused to travel through the said slit so as to permit the suction to act thereon and remove the liquid therefrom. The suckers may be arranged so that the slits all open in the same direction. Alternatively, the suckers may be arranged so that the slits open alternately in opposite directions and extend only partway to the centerline of the suckers so as to produce a ribboning effect on the yarn which will increase the efficiency of the applied suction. In another modification of the invention, the tips of the wipers and the suckers are bevelled and serve to direct the yarn into engagement with the operative portions thereof so as to make the same substantially self-threading. After passing through the suckers, the yarn may be guided out of the chamber and subjected to any further desired treatments. Through the use of the apparatus of this invention, there may be removed from the wet yarn not only a portion of the liquid adhering thereto, but also the vapors of any volatile constituents adhering thereto thus eliminating potential hazards and permitting recovery of valuable materials.

Preferred embodiments of this invention are shown in the accompanying drawings wherein

Fig. 1 is a top plan view of the apparatus,

Fig. 2 is a front-elevational view of the apparatus, partly in section,

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2, and looking in the direction of the arrows,

Fig. 4 is a detail perspective view, on an enlarged scale, of one of the sucker members.

Fig. 5 is a side-elevational view of a modified form of apparatus,

Fig. 6 is a front-elevational view of the apparatus shown in Fig. 5 and

Fig. 7 is a detail perspective view, on an enlarged scale, of a modified sucker member.

Referring now to the drawings, the reference numeral 11 designates a yarn which is moving upwardly through a conduit 12 together with a liquid treating medium. Secured to the upper end of the conduit 12 is a chamber 13, provided with an access door 14 hingedly connected to the wall of said chamber by means of a hinge 15 and held in closed position by means of a spring latch 16.

As the liquid treating medium and the yarn 11 enter the chamber 13, the major portion of the

liquid will be discharged from said chamber through an opening 17 in the wall thereof into a collector 18 and then into a discharge conduit 19. The opening 17 is covered with a screen 20 to prevent any fibers or other solid material, which may be present in the liquid, from entering into and possibly clogging the conduit 19. Positioned vertically within the chamber 13 is a header 21, the upper end of which is closed by means of a cap 22 and the lower end 23 of which extends through the wall of said chamber for connection to a vacuum pump (not shown). As the wet yarn 11 moves upwardly, it first passes through a slot 24 in a wiping element 25, which is carried by the header 21 and which acts to remove from the wet yarn a small portion of the liquid adhering thereto. The wet yarn 11 next passes through a slot 26 in a wiping element 27, which is also carried by the header 21 and which acts to remove from the wet yarn a further portion of the liquid adhering thereto. As shown in the drawings, the wipers 25 and 27 are inclined at an angle so that the liquid removed from the yarn 11 will tend to run away from the slots 24 and 26, respectively, thereby improving the efficiency of said wipers.

Although the wipers 25 and 27 will remove from the wet yarn a certain amount of the liquid adhering thereto, the yarn will still retain a considerable proportion of liquid. To remove a further quantity of liquid from the wet yarn 11, without abrading or otherwise damaging the same, there are provided four suckers 28. Each of the suckers 28, comprises a short section of tubing 29, one end of which is closed as by means of a screw 31 and the other end of which extends through the wall of the header 21 so that the interior of the tubing 29 is open to the interior of said header. At some point between its ends, the tubing 29 is provided with a slit 32 extending through the wall thereof. The slits 32 are aligned vertically and the suckers 28 are so positioned that the wet yarn 11 will pass through said slits as it travels upwardly through the chamber 13. During operation, the header 21 is connected to a vacuum pump, or other suitable means, which will suck the air therefrom and thereby apply suction to the wet yarn 11 as it passes through the slits 32. The suction will remove from the wet yarn 11 a portion of the liquid adhering thereto with a minimum of mechanical contact.

After passing through the slit 32 in the topmost of the suckers 28, the yarn 11 is directed by means of a rod guide 33, supported by the header 21, to a guide 34 through which said yarn emerges from the chamber 13. The yarn 11 next passes over a freely rotatable wheel 35 carried by a bracket 36 and may then be subjected to any further desired treatments.

A modified form of construction of the header and the elements carried thereby is illustrated in Figs. 5, 6, and 7, wherein the reference numeral 41 designates a header, the upper end of which is closed by means of a cap 42. As the wet yarn 43 moves upwardly alongside the header 41, it first passes through a slot 44 in a wiping element 45, which is carried by the header 41 and which acts to remove from the wet yarn a small portion of the liquid adhering thereto. The wet yarn next passes through a slot 46 in a wiping element 47, which is also carried by the header 41 and which acts to remove from the wet yarn a further portion of the liquid adhering thereto. As shown in the drawings, the slots 44 and 46 of the wipers 45 and 47, respectively, open in opposite directions and extend only partway to the centerline of said wipers. As a result, the wet yarn 43 will be flattened or ribboned and the efficiency of the wiping action will be increased. The tips 48 and 49 of the wipers 45 and 47, respectively, are bevelled toward the slots 44 and 46, respectively, and serve automatically to direct the wet yarn 43 into said slots.

Although the wipers 45 and 47 will remove from the wet yarn a certain amount of the liquid adhering thereto, the yarn will still retain a considerable portion of liquid. To remove a further quantity of liquid from the wet yarn 43, there are provided four suckers 51. Each of the suckers 51 comprises a short section of tubing 52, one end 53 of which is closed and bevelled and the other end of which extends through the wall of the header 41 so that the interior of the tubing 52 is open to the interior of said header. At some point between its ends, the tubing 52 is provided with a slit 54 extending through the wall thereof. The slits 54, though vertically coplanar, are horizontally offset and do not extend to the centerline passing through the suckers 51, and said suckers are so positioned that the slits 54 open alternately in opposite directions. As a result, the wet yarn 43 in passing through said slits will be flattened or ribboned. During operation, the header 41, like the header 21, is connected to a vacuum pump, or other suitable means, which will suck the air therefrom and thereby apply suction to the wet yarn 43 as it passes through the slits 51, so as to remove from said yarn a portion of the liquid adhering thereto. As shown in the drawings, the tips 53 are bevelled toward the slits 54 so as to make the suckers 51 substantially self threading. After passing through the slit 54 in the topmost sucker 51, the yarn 43 passes through a slot 55 in a guide 56 supported by the header 41 and may then be drawn from the apparatus.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. In a textile apparatus for removing from a wet yarn a portion of the liquid adhering thereto, the combination with suction means comprising a tubular member having a slit extending through the wall thereof and means for applying suction to the tubular member, said tubular member having openings only at the slit and at the point of application of the suction whereby the suction will cause air to enter said tubular member through said slit, of means for moving the wet yarn along a predetermined path passing through said slit for applying suction to the wet yarn.

2. In a textile apparatus for removing from a wet yarn a portion of the liquid adhering thereto, the combination with a wiping element, of suction means, and means for moving the wet yarn along a predetermined path passing into contact with the wiping element to remove from the wet yarn a portion of the liquid adhering thereto and then into contact with the suction means for applying suction to the wet yarn to remove therefrom a further portion of the liquid adhering thereto.

3. In a textile apparatus for removing from a wet yarn a portion of the liquid adhering thereto, the combination with a wiping element, of suction

means, and means for moving the wet yarn along a predetermined path passing into contact with the wiping element to remove from the wet yarn a portion of the liquid adhering thereto and then into contact with the suction means for applying suction to the wet yarn to remove therefrom a further portion of the liquid adhering thereto, said wiping element being inclined at an angle so that the liquid removed by the wiper will tend to move away from the yarn.

4. In a textile apparatus for removing from a wet yarn a portion of the liquid adhering thereto, the combination with a wiping element, of suction means comprising a tubular member having a slit extending through the wall thereof, said tubular member having openings only at the slit and at the point of application of the suction whereby the suction will cause air to enter said tubular member through said slit, means for applying suction to the tubular member, and means for moving the wet yarn along a predetermined path passing into contact with the wiping element to remove from the wet yarn a portion of the liquid adhering thereto and then through said slit for applying suction to the wet yarn to remove therefrom a further portion of the liquid adhering thereto.

5. In a textile apparatus for removing from a wet yarn a portion of the liquid adhering thereto, a plurality of suction means comprising tubular members having slits extending through the walls thereof, means for applying suction to the tubular members, and means for moving the wet yarn along a predetermined path passing through said slits for applying suction to the wet yarn to remove from the wet yarn a portion of the liquid adhering thereto, said suction means being so positioned that the slits open alternately in opposite directions and said slits being vertically coplanar and horizontally offset whereby the yarn is ribboned as it passes through said slits.

6. In a textile apparatus for removing from a wet yarn a portion of the liquid adhering thereto, a plurality of suction means comprising tubular members having slits extending through the walls thereof, means for applying suction to the tubular members, and means for moving the wet yarn along a predetermined path passing through said slits for applying suction to the wet yarn to remove from the wet yarn a portion of the liquid adhering thereto, said suction means being so positioned that the slits open alternately in opposite directions and said slits extending only partway to the centerline passing through said tubular members.

7. In a textile apparatus for removing from a wet yarn a portion of the liquid adhering thereto, the combination with a wiping element of a plurality of suction means comprising tubular members having slits extending through the walls thereof, means for applying suction to the tubular members, and means for moving the wet yarn along a predetermined path passing into contact with the wiping element to remove from the wet yarn a portion of the liquid adhering thereto and then through said slits for applying suction to the wet yarn to remove from the wet yarn a further portion of the liquid adhering thereto, said suction means being so positioned that the slits open alternately in opposite directions and said slits being vertically coplanar and horizontally offset whereby the yarn is ribboned as it passes through said slits.

8. In a textile apparatus for handling a yarn, a member having a free end and having a slit therein extending inwardly from the surface thereof and spaced from said free end for the passage of the yarn, said free end being bevelled toward said surface for guiding the yarn into said slit.

9. In a textile apparatus wherein a yarn and a liquid treating medium travel through a conduit, a chamber positioned to receive the yarn and liquid as they emerge from the conduit whereby the yarn will move through the chamber along a predetermined path, means for draining liquid from said chamber, and suction means positioned in said chamber along the path of the yarn for applying suction to the wet yarn to remove from the wet yarn a portion of the liquid adhering thereto.

10. In a textile apparatus wherein a yarn and a liquid treating medium travel through a conduit, a chamber positioned to receive the yarn and liquid as they emerge from the conduit whereby the yarn will move through the chamber along a predetermined path, means for draining liquid from said chamber, and suction means comprising a tubular member having a slit extending through the wall thereof and means for applying suction to the tubular member, said suction means being positioned in said chamber along the path of the yarn so that the yarn passes through said slit for applying suction to the wet yarn to remove from the wet yarn a portion of the liquid adhering thereto.

11. In a textile apparatus wherein a yarn and a liquid treating medium travel through a conduit, a chamber positioned to receive the yarn and liquid as they emerge from the conduit, means for draining liquid from said chamber, a plurality of suction means comprising tubular members having slits extending through the walls thereof, means for applying suction to the tubular members, and means for moving the wet yarn along a predetermined path extending through said chamber and passing through said slits for applying suction to the wet yarn to remove from the wet yarn a portion of the liquid adhering thereto, said suction means being so positioned that the slits open alternately in opposite directions.

12. In a textile apparatus wherein a yarn and a liquid treating medium travel through a conduit, a chamber positioned to receive the yarn and liquid as they emerge from the conduit whereby the yarn will move through a chamber along a predetermined path, means for draining liquid from said chamber, a wiping element positioned in the chamber along the path of the yarn for contacting the wet yarn and removing from the wet yarn a portion of the liquid adhering thereto, and suction means positioned in said chamber further along the path of the yarn for applying suction to the wet yarn to remove from the wet yarn a further portion of the liquid adhering thereto.

13. In a textile apparatus wherein a yarn and a liquid treating medium travel through a conduit, a chamber positioned to receive the yarn and liquid as they emerge from the conduit whereby the yarn will move through a chamber along a predetermined path, means for draining liquid from said chamber, a wiping element positioned in the chamber along the path of the yarn for contacting the wet yarn and removing from the wet yarn a portion of the liquid adhering thereto, and suction means comprising a tubular member having a slit extending through the wall thereof and means for applying suction to

the tubular member, said suction means being positioned in said chamber further along the path of the yarn so that the yarn passes through said slit for applying suction to the wet yarn to remove from the wet yarn a further portion of the liquid adhering thereto.

14. In a textile apparatus wherein a yarn and a liquid treating medium travel through a conduit, a chamber positioned to receive the yarn and liquid as they emerge from the conduit whereby the yarn will move through the chamber along a predetermined path, means for draining liquid from said chamber, a wiping element positioned in the chamber along the path of the yarn for contacting the wet yarn and removing from the wet yarn a portion of the liquid adhering thereto, a plurality of suction means comprising tubular members having slits extending through the walls thereof, and means for applying suction to the tubular members, said suction means being positioned in said chamber along the path of the yarn so that the yarn passes through said slits for applying suction to the wet yarn to remove from the wet yarn a further portion of the liquid adhering thereto, and said suction means being so positioned that the slits open alternately in opposite directions.

15. In a textile apparatus wherein a yarn and a liquid treating medium travel through a conduit, a chamber positioned to receive the yarn and liquid as they emerge from the conduit whereby the yarn will move through the chamber

along a predetermined path, means for draining liquid from said chamber, a wiping element positioned in the chamber along the path of the yarn for contacting the wet yarn and removing from the wet yarn a portion of the liquid adhering thereto, a plurality of suction means comprising tubular members having slits extending through the walls thereof, and means for applying suction to the tubular members, said suction means being positioned in said chamber along the path of the yarn so that the yarn passes through said slits for applying suction to the wet yarn to remove from the wet yarn a further portion of the liquid adhering thereto, and said suction means being so positioned that the slits open alternately in opposite directions, and said suction means having free ends and the slits therein being spaced from said free ends, and said free ends being bevelled toward said slits for guiding the yarn into said slits.

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