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2,889,696

APPARATUS FOR TREATING YARN WITH A LIQUID

Filed May 24, 1954

2 Sheets-Sheet 1

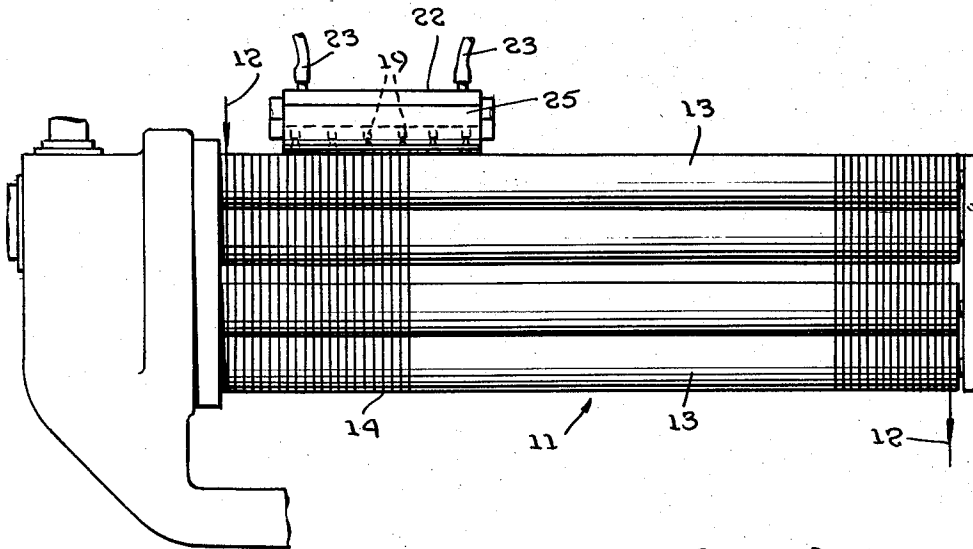


Fig. 1.

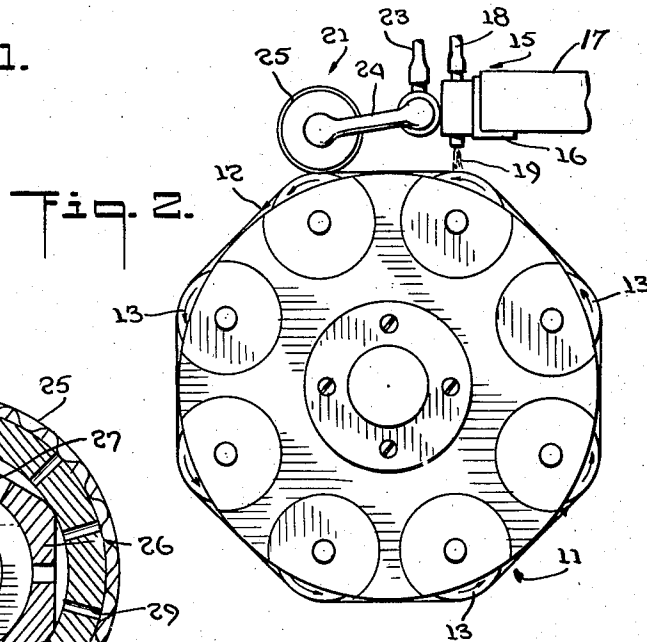


Fig. 2.

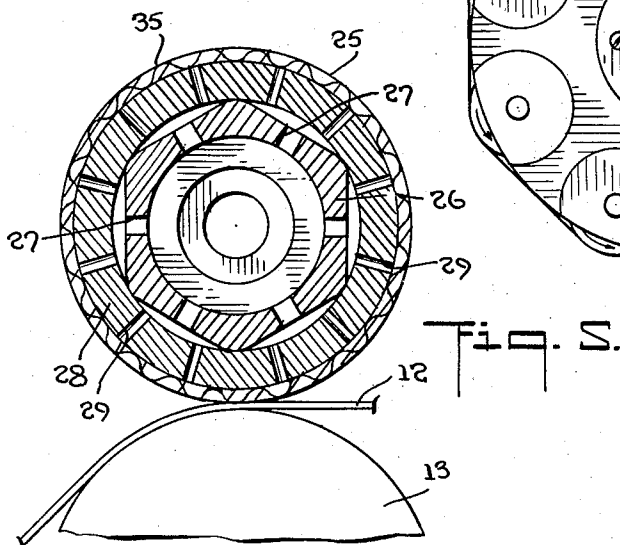


Fig. 3.

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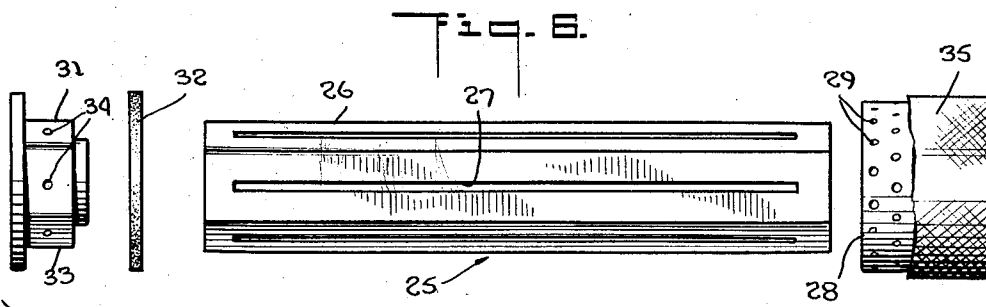
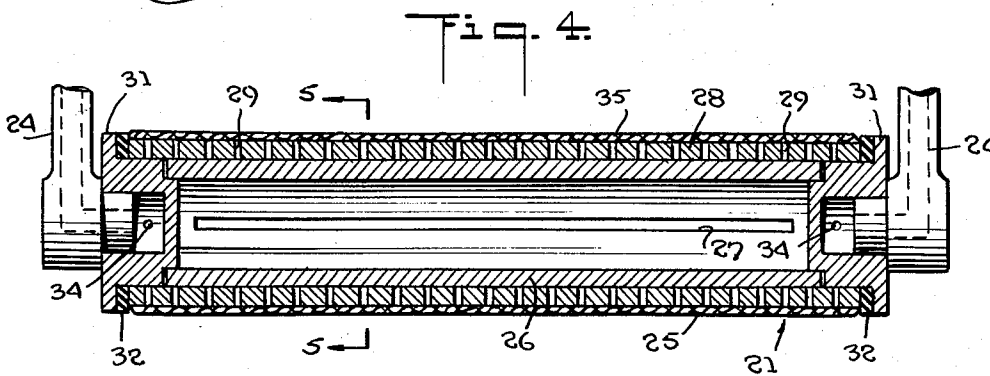
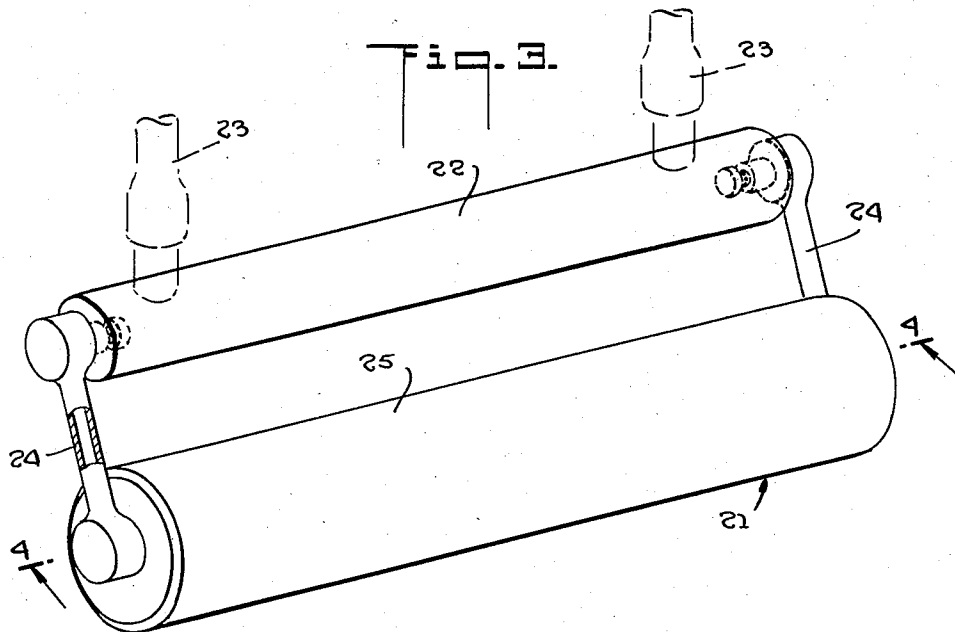
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APPARATUS FOR TREATING YARN WITH A LIQUID

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2 Sheets-Sheet 2



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APPARATUS FOR TREATING YARN WITH A LIQUID

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2 Claims. (Cl. 68—20)

This invention relates to a treating system and relates more particularly to an apparatus for treating a yarn with a liquid.

It has previously been proposed to carry out the treatment of a yarn with a liquid during the movement of said yarn in the form of a helix along an advancing reel comprising a plurality of rollers and adapted to rotate around their longitudinal axes. One such arrangement is shown, for example, in U.S. Patent No. 2,660,808 to J. N. Birmingham. In carrying out the treatment of the yarn in this manner, the efficiency of such treatment, by which efficiency is meant the rapidity with which any given treatment of the yarn is completed, is of great importance. If the efficiency of the treatment is low, it will be necessary either to reduce the speed of the yarn in its movement around the advancing reel or to increase the size of such reel to get an adequate treatment of the yarn. Both of these expedients increase the expense of the equipment and the labor needed to carry out the treatment of a given amount of yarn. It is therefore highly desirable that the treatment of the yarn with a liquid as it moves along the advancing reel be carried out in a highly efficient manner.

It is an important object of this invention to provide an apparatus for treating yarn with a liquid which will fulfill the foregoing requirements and which will be especially effective in operation and simple in construction.

A further object of this invention is to provide an apparatus for treating yarn with a liquid during the movement of the yarn in the form of a helix along an advancing reel, which treatment will be carried out with a high degree of efficiency.

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, the treatment of a yarn with a liquid during the movement of said yarn in the form of a helix along an advancing reel, comprising a plurality of rotatable elements or rollers adapted to rotate around their longitudinal axes, is carried out by applying a single treating liquid to said yarn in such a manner that the liquid contacts a plurality of turns of the yarn spaced along the length of the advancing reel. The major portion of the treating liquid applied in this manner is removed from the yarn between the successive applications of fresh liquid to the yarn. As a result, on each application of fresh treating liquid to the yarn, there is little residual treating liquid left on the yarn to contaminate the freshly applied liquid. The treatment of the yarn accordingly takes place with a high degree of efficiency.

In carrying out this invention, the treating liquid may be applied to the yarn from an elongated source arranged along the length of the advancing reel so

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that fresh treating liquid contacts the yarn at several points spaced along the length of the advancing reel. The elongated source may comprise a liquid header having a number of jets therein which direct sprays of treating liquid against the yarn as the said yarn passes over one of the rollers in the advancing reel. By spacing the jets closely it is possible to have fresh treating liquid contact each turn of the yarn in the helix, especially since the treating liquid spreads out along the surface of the roller to some extent.

To remove the major portion of the treating liquid from the yarn between successive applications of the treating liquid thereto, there is provided a sucker roll comprising an elongated hollow roll to the interior of which suction is applied. The said roll is provided with a plurality of perforations extending through the periphery thereof and is positioned to contact the yarn between the successive applications of fresh treating liquid thereto. Advantageously, the sucker roll is freely rotatable and bears against the yarn as the said yarn passes over one of the rollers of the advancing reel so that a highly efficient removal of the treating liquid from the yarn is effected. The suction applied to the interior of the sucker roll causes a stream of air to flow through the perforations in the sucker roll, carrying with it the treating liquid. The sucker roll may be covered with a fabric which acts to distribute the suction more uniformly over the surface of the said roll. The fabric also acts to absorb from the yarn some of the treating liquid adhering thereto, which liquid is removed from the fabric, during the rotation of the sucker roll, by the stream of air flowing therethrough.

A preferred embodiment of this invention is shown in the accompanying drawings wherein

Fig. 1 is a side elevation of the treating apparatus, Fig. 2 is an end view of the treating apparatus, Fig. 3 is a perspective view of the sucker roll assembly,

Fig. 4 is a cross-sectional view taken along the line 4—4 in Fig. 3 in the direction of the arrows,

Fig. 5 is a detail cross-sectional view, on an enlarged scale, taken along the line 5—5 in Fig. 4 in the direction of the arrows, and

Fig. 6 is an exploded view showing the construction of the sucker roll.

Referring now to the drawings, the reference numeral 11 designates generally an advancing reel, of the type shown in the Birmingham patent referred to above, to which a yarn 12 is directed from any suitable source, such as a spin pot (not shown). The yarn travels around rollers 13 of the advancing reel 11 in the form of a helix 14, being drawn from the advancing reel 11 after it has traversed the full length of the said reel.

As the yarn 12 moves along the advancing reel 11, it has applied thereto a treating liquid from an elongated source, indicated generally by reference numeral 15, which serves to direct the liquid to a plurality of successive turns of the said yarn. The elongated liquid source 15 comprises a supporting channel 16 which carries a header to which a treating liquid is supplied through a conduit 18. The treating liquid emerges from the header 17 in the form of a plurality of sprays 19 and contacts the yarn 12 as the said yarn moves over one of the rollers 13. The yarn 12, wet with the treating liquid, moves on to another of the rollers 13 and during its movement over said other roller passes under a sucker roll assembly, indicated generally by reference numeral 21.

The sucker roll assembly 21 comprises a header 22 to which suction is applied through conduits 23. Pivotaly mounted in the ends of the header 22 are a pair

of brackets 24 which support between them at their lower ends for free rotation a sucker roll 25. The brackets 24 are hollow and provide a passageway through which the suction applied to the header 22 is also applied to the sucker roll 25.

The sucker roll 25 comprises a hollow hexagonal core 26 which is provided with slots 27 extending therethrough along the major portion of the length of each of its faces. The core 26 fits snugly into a cylindrical shell 28 having a plurality of perforations 29 extending therethrough and distributed around its entire circumference. The ends of the cylindrical shell 28 are closed by means of plugs 31, into which the brackets 24 fit, and gaskets 32 that are compressed between the plugs 31 and the ends of the cylindrical shell 28. The plugs 31 are each provided with a portion having a hexagonal cross-section 33 through the flat faces of which extend apertures 34 for applying suction from the brackets 24 to the interior of the sucker roll 25. Fitted over the sucker roll 25 is a knitted fabric cover 35 which acts to absorb the treating liquid from the yarn 12 and to distribute the suction uniformly over the entire periphery of the sucker roll 25.

Because of the hexagonal outer surface of plugs 31 and core 26 (Fig. 6) and the cylindrical inner surface of shell 28, six elongated passageways of arcuate cross-section are defined therebetween (not visible in Fig. 4). The ends of these passageways communicate through apertures 34 with the interior of plugs 31 which in turn communicate with the hollow brackets 24.

As the yarn 12 passes under the sucker roll assembly 21, it has removed therefrom, by the suction applied to the said sucker roll assembly, a large portion of the treating liquid adhering thereto. Then, when fresh treating liquid is applied to the yarn 12, when it again passes under the elongated liquid source 15, the said fresh treating liquid will not be diluted with a large volume of treating liquid already on the yarn. In this way, there is obtained a plurality of successive treatments of the yarn 12 with fresh treating liquid whereby the efficiency of such liquid treatment is high and the said liquid treatment will be completed in a relatively short period of time. The treating liquid removed from the yarn 12 is carried along with the stream of air that is caused to flow through the sucker roll assembly 21 by the suction applied thereto and may be discarded, recycled together with fresh make-up or treated to recover chemical values therefrom, all depending on the nature of the yarn treatment and the treating liquid.

In the embodiment shown in the drawings, the sucker roll 25 contacts the yarn 12 when the said yarn has moved from the roller 13, where it has the treating liquid applied thereto, to the immediately adjoining roller 13. Such an arrangement is satisfactory when the yarn treatment takes place with great rapidity after the application of the treating liquid thereto, although it does not go to completion until after several successive treatments. When it is desired to increase the length of time between the application of the treating liquid and the removal of the major portion thereof by the sucker roll 25, it is only necessary to shift the sucker roll assembly 21 to bring the sucker roll into contact with the yarn 12 on a roller 13 further removed from the roller 13 at which the treating liquid is applied. It is also possible to dispose a plurality of sucker roll assemblies 25 and liquid sources 15

about the periphery of the advancing reel 11 further to accelerate the treatment of the yarn 12.

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 an apparatus for the treatment of a yarn with a liquid during the movement of said yarn in the form of a helix along an advancing reel comprising a plurality of rollers adapted to rotate around their longitudinal axes, an elongated liquid header having a plurality of jets for directing a plurality of streams of a single treating liquid against a plurality of turns of the yarn spaced along the length of the advancing reel, a header to which suction is applied, a pair of hollow brackets pivotally mounted in said suction header and in communication with the interior of said suction header, and a hollow sucker roll having a plurality of apertures in its circumference rotatably mounted between said brackets and in communication with the interior of said brackets whereby suction is applied to the interior of said sucker roll, said sucker roll being adapted to bear against the yarn for removing from the yarn the major portion of the treating liquid applied thereto between successive applications of fresh treating liquid to the yarn.

2. In an apparatus for the treatment of a yarn with a liquid during the movement of said yarn in the form of a helix along an advancing reel comprising a plurality of rollers adapted to rotate around their longitudinal axes, an elongated liquid header having a plurality of jets for directing a plurality of streams of a single treating liquid against a plurality of successive turns of the yarn spaced along the length of the advancing reel while said yarn passes over one of the rollers of the advancing reel, a header to which suction is applied, a pair of hollow brackets pivotally mounted in said suction header and in communication with the interior of said suction header, a hollow sucker roll having a plurality of apertures in the circumference thereof rotatably mounted between said brackets and in communication with the interior of said brackets whereby suction is applied to the interior of said sucker roll, said sucker roll being adapted to bear against the yarn while said yarn passes over another of the rollers of the advancing reel for removing from the yarn the major portion of the treating liquid applied thereto between successive applications of fresh treating liquid to the yarn, and a fabric covering said sucker roll for distributing the suction more uniformly over the sucker roll.

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