Nov. 9, 1948. W. H. FURNESS 2,453,366

METHOD AND APPARATUS FOR LIQUID TREATMENT OF YARN, THREAD, AND THE LIKE

Filed Oct. 28, 1942 2 Sheets-Sheet 1

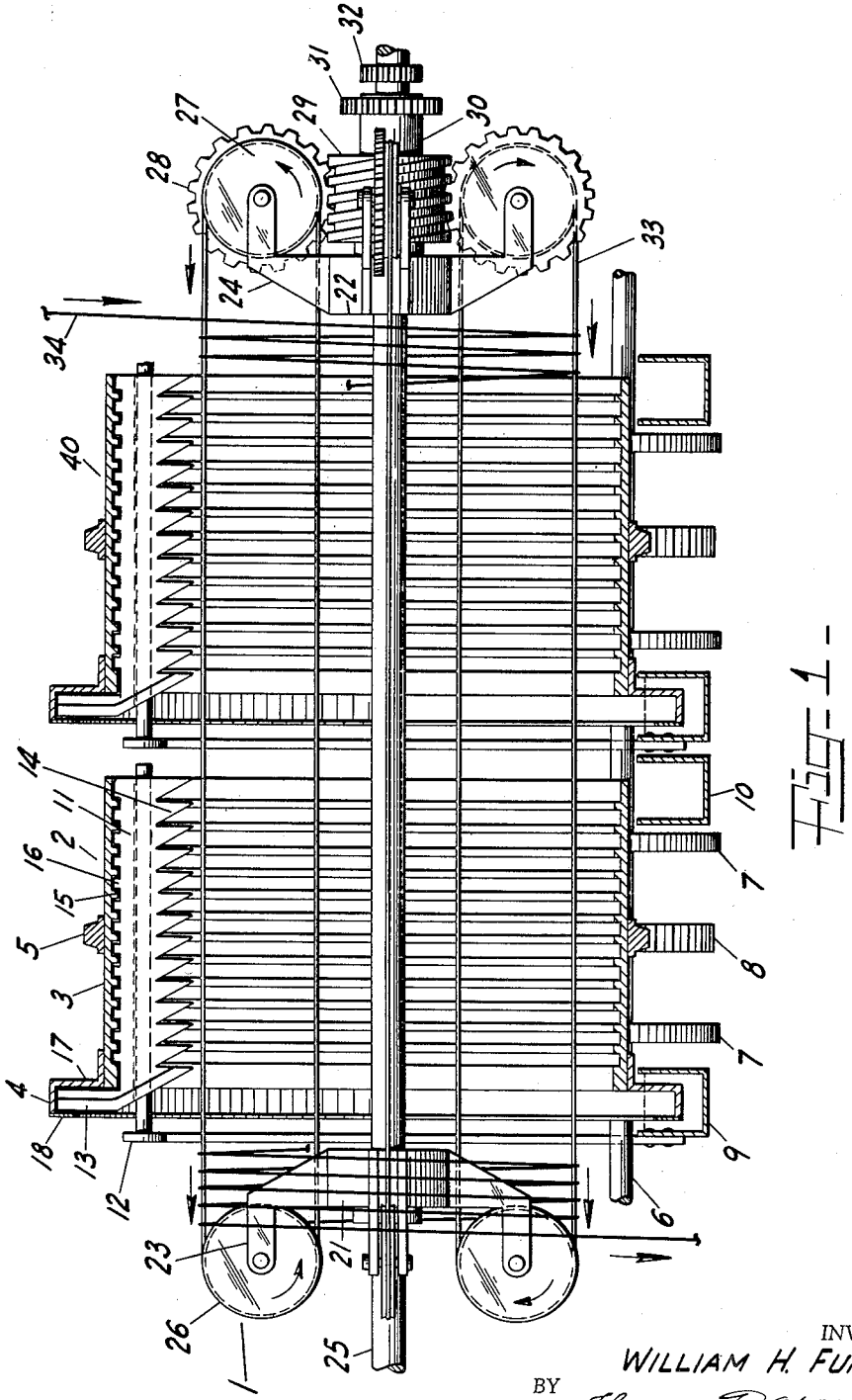


FIG. 1

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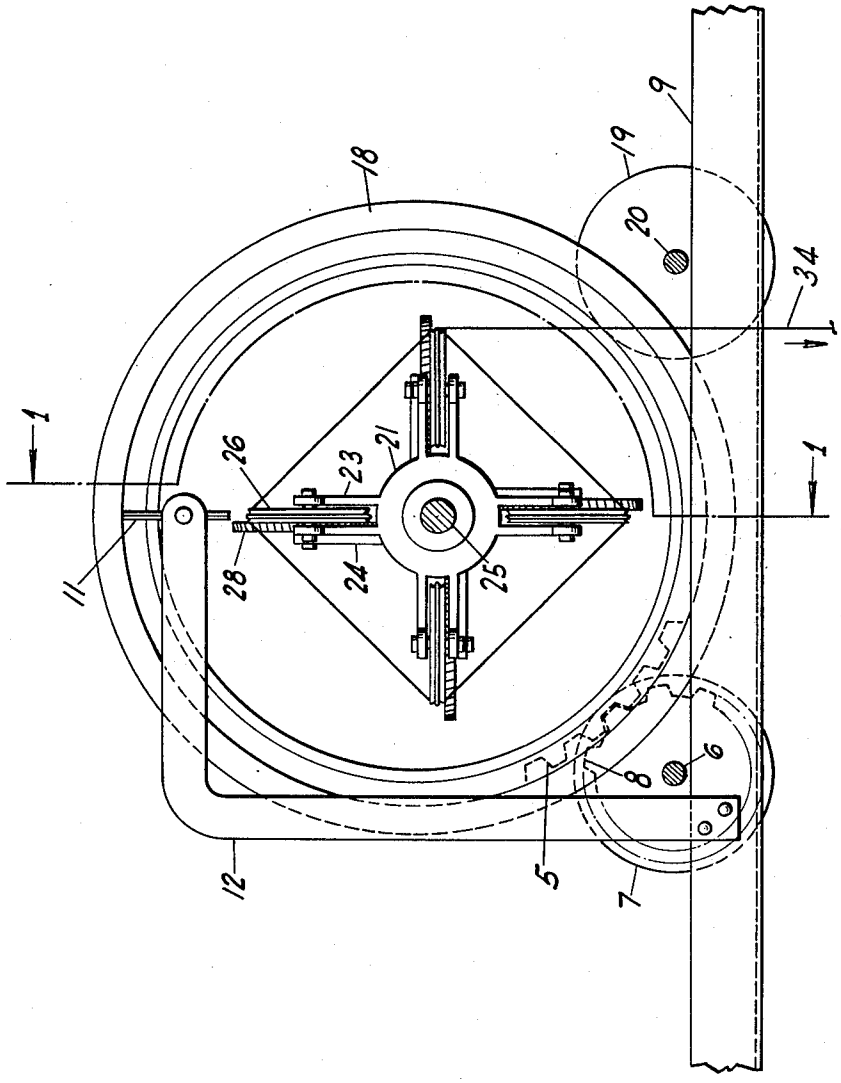


Fig. 2.

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METHOD AND APPARATUS FOR LIQUID TREATMENT OF YARN, THREAD, AND THE LIKE

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This invention relates to improvements in apparatus for the liquid treatment of traveling yarn, thread and the like.

The invention has for its principal object to provide improvements in apparatus for subjecting traveling yarn, thread, and the like to successive liquid treatments.

Another object of the invention is to provide improvements in apparatus for subjecting traveling yarn, thread, and the like to successive liquid treatments without substantially mixing the liquids during the operation.

A further object of the invention is to provide improvements in apparatus for subjecting traveling yarn, thread, and the like successively to treatments with different liquids.

These and other objects of the invention will be apparent from the following description and accompanying drawing.

In the drawing,

Figure 1 is a vertical sectional view of a preferred embodiment of the invention taken on the line I—I in Figure 2.

Figure 2 is an end elevational view of the embodiment of the invention shown in Figure 1.

Referring to the drawing, reference character 2 indicates generally means for applying liquids to traveling yarns, threads, and the like. The liquid applying means comprises a cylindrical drum 3 mounted to rotate about its axis which is substantially horizontal on the rollers 7 mounted on the drive shaft 6, and the rollers 19 mounted on the shaft 20. The drum is rotated about its axis by the gear 8 fixed to the drive shaft 6 which is in mesh with the gear 5 mounted on the periphery of the drum. An annular liquid receiving chamber comprising a cylindrical portion 4 and inwardly extending annular flanges 17 and 18 is attached to the liquid receiving end of the drum by the flange 17. The radial dimension of the flange 18 is less than that of the flange 17 and the inner diameter of the flange 18 is greater than the outer diameter of the drum. A reservoir 9 for the liquid to be applied to the yarn, thread, or the like is positioned at the receiving end of the drum into which a portion of the annular liquid receiving chamber extends. Liquid is maintained in the reservoir at a level above a portion of the inner extremity of the flange 18 so that liquid will flow from the reservoir into the annular chamber. The inside of the drum is provided with a plurality of parallel ridges 15 which extend all the way around the inside of the drum and at right angles to the axis of the drum. A wiping blade member 11 is mounted on the standard 12, which

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is supported on the reservoir, in contact with the upper extremity of the inner wall of the drum, with portion 13 of the wiping blade in contact with the upper extremity of the inner wall of the annular chamber. The lower portion of the wiping blade comprises a plurality of depending members 14. The sides of the depending members, which are adjacent the inlet end of the drum, extend at an angle downwardly and toward the discharge end of the drum. The upper extremity of the wiping blade has projecting portions 16 which engage the portions of the inner wall of the drum between the ridge members. A liquid receiving tank 10 is positioned beneath the discharge end of the drum.

Various means may be used for passing the yarn, thread, or the like 34 through the drum. The means shown in the drawing comprises the thread advancing reel generally indicated by reference character 1. The reel is composed of a plurality of pairs of pulley members 26 and 27 which are pivotally mounted to rotate in the same plane between the pairs of outwardly extending arms 23 and 24 on the spiders 21 and 22 which are fixed to the rotatable shaft 25. Continuous belt members 33 for supporting the yarn, or the like pass over each pair of pulleys. Worm wheels 28 are fixed to the pulleys 27 and rotate about the same centers and in engagement with the worm gear 29 fixed to the sleeve 30. The sleeve is mounted in a suitable bearing and is rotated relative to the reel supporting shaft 25 by the gear 31 fixed to the sleeve and driven by suitable driving means which are not shown. The reel shaft 25 is rotated by the gear 32 fixed to the shaft and in mesh with a suitable driving gear which is not shown. The shape of the teeth on the worm wheels 28 and on the worm gear 29 are such and the relative rotation of the spider and the worm gear are such that the outer pass of the belt members 33 moves towards the liquid inlet end of the drum as shown by the arrows in Figure 1.

In the operation of the invention, yarn, thread, or the like 34, to be subjected to liquid treatment is directed onto the reel member adjacent the liquid discharge end of the drum and the helix of yarn or thread that is formed on the reel is advanced towards the liquid inlet end of the drum. Liquid from the reservoir flows into the annular chamber which is rotating with the drum and the liquid that adheres to the walls of the chamber is carried upwardly to the wiping blade. The portion 13 of the wiping blade removes the liquid from the walls of the chamber and the liquid flows down the wiping blade and down the

inclined side of the depending portion of the wiping blade and drips off the point of the depending portion into the drum. The ridge members in the drum confine the liquid that drips off the depending portions of the wiper blade to a relatively narrow region below the portion of the wiper blade off of which the liquid drips. By means of the inclined sides of the depending portions of the wiping blade, the liquid progresses through the drum in successive steps from the inlet end to the discharge end. As liquid is maintained in the annular chamber the liquid will drip from the depending portions of the wiper blade in substantially steady streams. The annular chamber in effect serves as a metering device and the liquid is introduced into the drum at a uniform rate. The liquid will flow out of the drum at the discharge end after being applied to the yarn a plurality of times as the yarn moves on the reel through the drum. The yarn is moved through the drum in a direction counter to the direction in which the liquid flows through the drum. Where yarn containing chemicals such as acid, sulphur, and the like which will contaminate the treating liquid is processed, the yarn will be first treated with liquid that is contaminated and then with purer liquid as the yarn approaches the inlet end of the drum until it is treated with pure liquid at the inlet end of the drum. The ridges in the drum prevent the liquid from mixing to any great extent in the drum.

This invention may be used with a single drum, but where it is desired to treat the yarn with different kinds of liquids, a plurality of axially spaced drums, one for each treating liquid, may be used. In Figure 1 of the drawings is shown such an arrangement with two liquid treating drums in which the drum **40** and associated parts are the same as in the drum **2**.

In order to treat a plurality of yarns a plurality of drums may be arranged in side by side relation with the annular chambers on the drums extending into the same reservoir, which is of sufficient length to supply liquid to all the drums.

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

What I claim is:

1. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable hollow member, means for moving yarn and the like through the hollow member, means for applying liquid to the inner wall of the hollow member, and means for directing the liquid applied to the inner wall of the hollow member onto the yarn and the like being moved through the hollow member.

2. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable hollow member mounted to rotate about a substantially horizontal axis, means for moving yarn and the like through the hollow member, means for applying liquid to the inner wall of the hollow member, and means for directing the liquid applied to the inner wall of the hollow member onto the yarn and the like being moved through the hollow member.

3. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum having a liquid inlet end and a liquid discharge end mounted to rotate about a substantially horizontal axis, means for moving yarn and the like through the drum, means for applying liquid to the inner wall of the drum adjacent the liquid inlet end, and means for directing the liquid applied to the inner wall of the drum onto the yarn and the like being moved through the drum.

4. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum having a liquid inlet end and a liquid discharge end mounted to rotate about a substantially horizontal axis, means for moving yarn and the like through the drum from the liquid discharge end to the liquid inlet end, means for applying liquid to the inner wall of the drum, and means for directing the liquid applied to the inner wall of the drum onto the yarn and the like being moved through the drum.

5. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum, means for moving yarn and the like through the drum, means for applying liquid to the inner wall of the drum, and means for directing the liquid applied to the inner wall of the drum onto the yarn and the like being moved through the drum in successive regions along the length of the drum.

6. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum, means for moving yarn and the like through the drum, means for applying liquid to the inner wall of the drum, means for directing the liquid applied to the inner wall of the drum onto the yarn and the like being moved through the drum, and means for preventing the liquid from flowing in an axial direction along the inner wall of the drum.

7. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum having a liquid inlet end and a liquid discharge end, means for moving yarn and the like through the drum, means for applying liquid to the inner wall of the drum adjacent the liquid inlet end, and means for directing the liquid applied to the inner wall of the drum toward the discharge end of the drum and onto the yarn and the like being moved through the drum.

8. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum, means for moving yarn and the like through the drum, an annular chamber attached to one end of the drum, means for applying liquid to the inner wall of the annular chamber, and means for directing the liquid applied to the inner wall of the annular chamber onto the yarn and the like being moved through the drum.

9. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum having a liquid inlet end and a liquid discharge end, means for moving yarn and the like through the drum, an annular chamber attached to the drum at the liquid inlet end, means for applying liquid to the inner wall of the annular chamber, and means for directing the liquid applied to the inner wall of the annular chamber toward the discharge end of the drum and onto the yarn and the like being moved through the drum.

10. Apparatus for the liquid treatment of traveling yarn and the like comprising a rotatable drum having a liquid inlet end and a liquid discharge end, means for moving yarn and the like through the drum, an annular chamber attached to the drum at the liquid inlet end, means for applying liquid to the inner wall of the annular chamber comprising a reservoir into which a portion of the annular chamber extends, and means for directing the liquid applied to the inner wall

of the annular chamber toward the discharge end of the drum and onto the yarn and the like being moved through the drum.

11. Apparatus for treating traveling yarn or the like comprising means for moving a run of the yarn in air in a given general direction, a reservoir for treating liquid, a movable machine element mounted to dip into the reservoir in a part of its cycle of movement and to overlie a portion of the traveling yarn in another part of its cycle of movement, and means for causing liquid entrained upon the surface of said movable machine element to drip upon said yarn, said means being so positioned as to cause the drip to fall upon and drain from the yarn onto a surface of the machine element other than that moistened by dipping into the reservoir, and said means further being extended so as to cause liquid which has dripped from the yarn upon the machine element to drip from the machine element upon another portion of the traveling yarn before such portion reaches the zone of its travel in which it would be subjected to the drip of fresh liquid entrained by said machine element in passing through the reservoir.

12. Method of treating yarn or the like while it is traveling in a given direction with a body of liquid which is progressively displaced in the opposite direction, which method comprises the steps of wetting a surface with fresh liquid, moving the surface to overlie the yarn, wiping entrained liquid from the surface, and dripping it upon a portion of the traveling yarn in a zone near the end of its travel; receiving the liquid draining from the yarn upon a second surface, moving said second surface to overlie the yarn, wiping entrained liquid from said second surface and dripping it upon another portion of the traveling yarn before such portion reaches the zone in which fresh liquid is applied.

13. The method of treating yarn or the like, comprising the steps of continuously passing the yarn through a helical path, continuously forming a film of liquid and carrying it in a generally circular path disposed around the yarn path, and deflecting at least a portion of the film of liquid inwardly from the circular path to the yarn.

14. The method of treating yarn or the like, comprising the steps of continuously passing the yarn through a helical path disposed horizontally, continuously forming a film of liquid and carrying it in a plurality of generally cylindrical paths around the helical yarn path, and deflecting at least a portion of the film of liquid axially of one cylindrical path to the point within an adjacent cylindrical path and inwardly into contact with the yarn adjacent to top of the helical path.

15. The method of treating yarn or the like comprising the steps of continuously moving the yarn through a generally horizontally disposed helical path, continuously forming a film of liquid and carrying it in a plurality of generally cylindrical paths around the helical yarn path, deflecting an increment of the film of liquid at each of a plurality of positions adjacent the top of the helical path and laterally offset in the direction of the axis of the cylindrical path, directing the respective deflected increments axially from one cylindrical path to the point within an adjacent cylindrical path and to the yarn path so that they strike the yarn at positions in advance of the points of deflection from the cylindrical path, and allowing liquid to drain from the yarn by gravity and return to the bottom of the cylindrical path.

16. Apparatus for treating traveling yarn or the like comprising means for moving a run of the yarn in air in a given general direction, a reservoir for treating liquid, a movable machine element having a smooth surface, mounted to dip into the reservoir in a part of its cycle of movement to entrain upon said smooth surface a film of treating liquid and to overlie a portion of the traveling yarn in another part of its cycle of movement, and deflecting means mounted above the traveling yarn and positioned to intercept the film of entrained liquid, carried thereto upon the smooth surface of said machine element, and to drip liquid so deflected onto said yarn.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,682,453	Willheim	Aug. 28, 1928
1,724,230	Struve	Aug. 13, 1929
1,777,989	Lane	Oct. 7, 1930
1,882,439	Murphy	Oct. 11, 1932
1,884,713	Jerabek	Oct. 25, 1932
1,983,221	Furness	Dec. 4, 1934
2,108,285	Forrest	Feb. 15, 1938
2,246,735	Kline et al.	June 24, 1941
2,272,182	Burkholder	Feb. 10, 1942
2,326,150	MacLaurin et al.	Aug. 10, 1943