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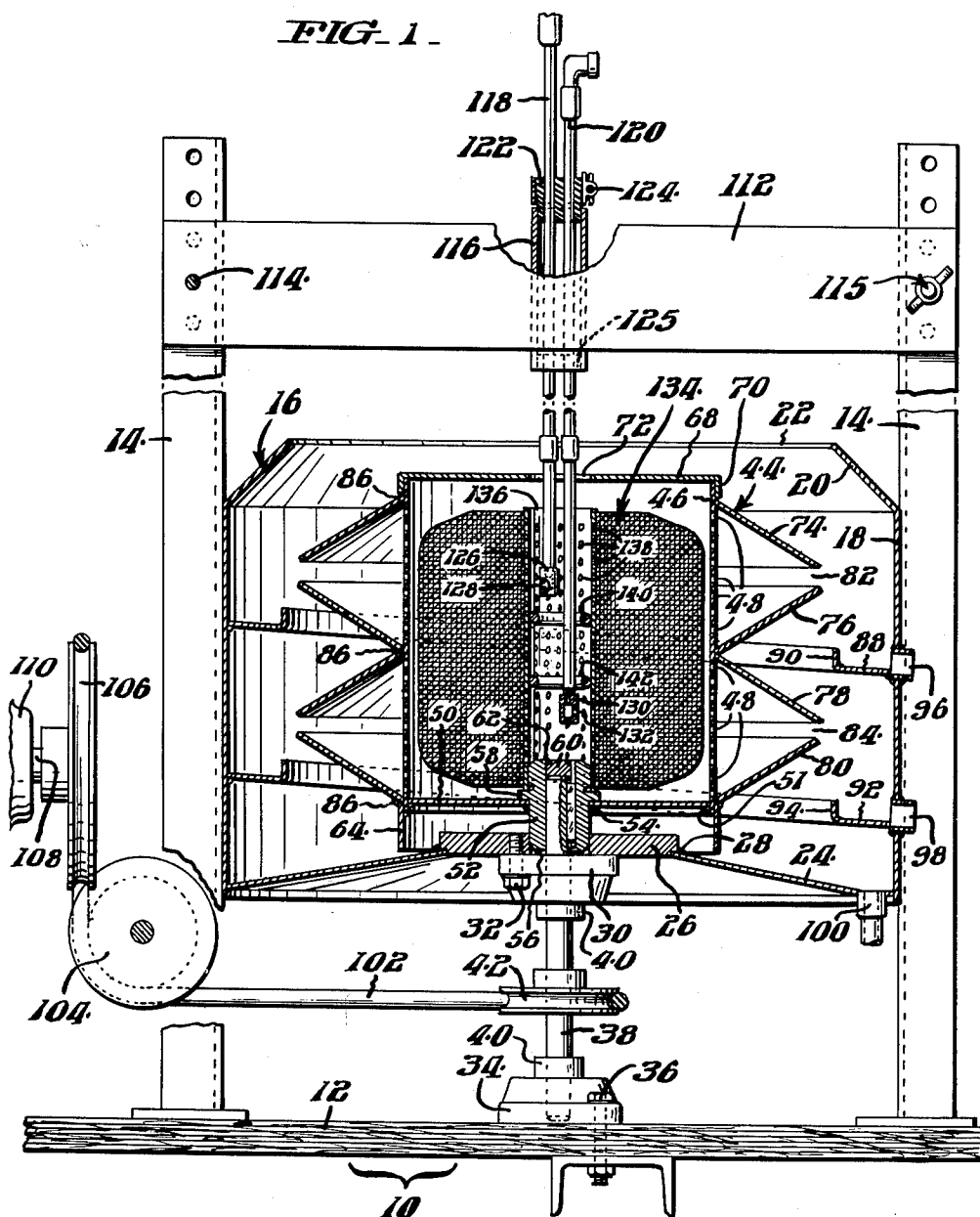
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APPARATUS FOR DYEING YARN PACKAGES

Original Filed Dec. 11, 1961

2 Sheets-Sheet 1

FIG. 1 -



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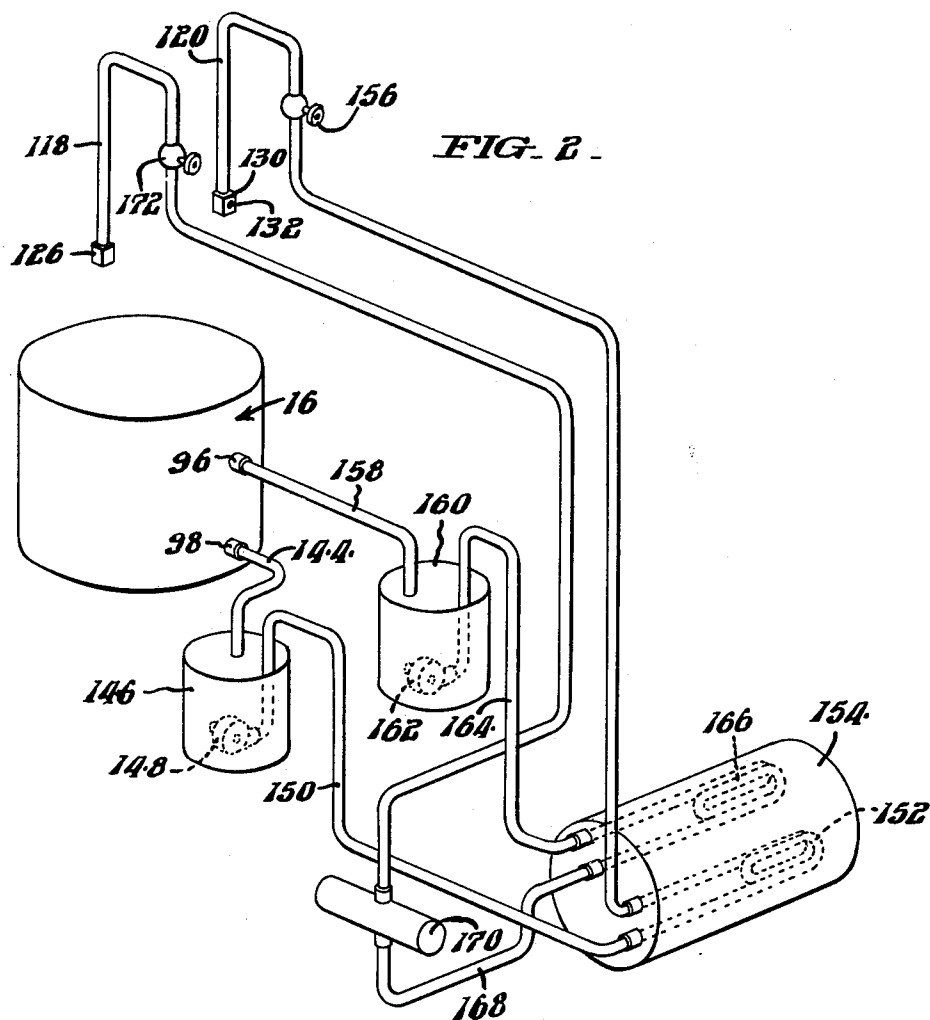
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APPARATUS FOR DYEING YARN PACKAGES
 William K. Wyatt, Lansdale, Pa., assignor to Turbo Machine Company, Lansdale, Pa., a corporation of Pennsylvania
 Original application Dec. 11, 1961, Ser. No. 158,486, now Patent No. 3,145,398, dated Aug. 25, 1964. Divided and this application Dec. 31, 1963, Ser. No. 334,753
 9 Claims. (Cl. 68—150)

This application is a division of my copending application Serial No. 158,486, filed December 11, 1961, now Patent No. 3,145,398, issued August 25, 1964.

This invention relates generally to dyeing of yarn packages and particularly to improved apparatus for multiple dyeing of yarn packages.

An important object of the present invention is to provide improved apparatus for dyeing axially spaced sections of a body of yarn wound on a hollow spool different colors.

Another object is to provide such apparatus with means for introducing dye liquids respectively to axially spaced different zones within the hollow spool and passing said liquids through the yarn by centrifugal force, collecting and keeping separate each dye liquid passed through the yarn and recirculating the same.

Another object is to provide such apparatus with means for restricting the flow of the dye liquids respectively to axially spaced different sections of the hollow spool.

Other objects of the invention will become apparent when the following description is read with reference to the accompanying drawings, in which:

FIG. 1 is a vertical section through the yarn package spinner; and

FIG. 2 is a perspective schematic view of the yarn package spinner and the system for recirculating dye liquids.

Apparatus constructed in accordance with the invention comprises a frame, generally designated 10, having a horizontally extending base 12 and four upright legs 14.

Carried by the legs 14 is a shroud, generally designated 16, having a cylindrical main body 18 terminating at its upper end in an axially tapered portion 20 defining an access opening 22, and having a dish bottom 24 provided at the center thereof with a plate 26 secured to the bottom 24 by welding 28.

Abutting the under surface of the plate 26 is a bearing 30 secured to the plate 26 by studs 32. Mounted upon the base plate 12 is a bearing 34 secured in position by studs 36. A shaft 38 has its lower end portion seated in the bearing 34. The upper end of the shaft 38 extends through the bearing 30 and plate 26. A pair of collars 40 respectively abutting the bearings 30 and 34 secure the shaft 38 against axial shifting movement. Affixed to the shaft 38, between the collars 40, is a pulley 42.

Overlying the plate 26 is a receptacle, generally designated 44, having a cylindrical body 46 which is perforated, as at 48. The receptacle is provided with a bottom 50 which is welded, as at 51, to the body 46. Extending centrally through the bottom 50 is a sleeve 52 secured to the bottom 50 by welding 54. The lower terminal portion of the sleeve 52 is received in a depression 56 in the top of the plate 26. The sleeve 52 is provided with a radially extending flange 58 seated upon the bottom 50 of the receptacle. The upper end of the sleeve 52 is plugged, as at 60, the plug being welded in place, as at 62. Extending about the lower terminal portion of the receptacle is a skirt 64. The receptacle is provided with a cover 68 having a flange 70 and a central opening 72.

Extending about the receptacle are two pairs of annular baffle plates 74, 76, 78, and 80. The baffle plates

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are axially tapered, as shown. Between the outer peripheries of the upper pair of baffle plates 74 and 76 is an opening 82, and between the outer peripheries of the lower pair of baffle plates 78 and 80 is an opening 84. The baffle plates are affixed to the body 46 by welds 86.

Extending about the interior of the shroud 16 is a trough 88 having a flange 90 and a trough 92 having a flange 94. The troughs 88 and 92 slope downwardly respectively to outlets designated 96 and 98. In the bottom 50 of the receptacle is a third outlet, designated 100.

A belt, designated 102, is trained about the pulley 42, and the two sides thereof are trained respectively about a pair of axially spaced pulleys 104 from whence they extend over a motor pulley 106 carried by the shaft 108 of an electric motor 110.

Extending between two of the legs 14 of the frame 10 is a bracket 112. One end of the bracket is secured to one of the legs 14 by a pivot bolt 114. The other end of the bracket is secured to the other leg 14 by a bolt and wing nut 115. Directly over the receptacle 44 is an upright sleeve 116 affixed to the bracket 112. Two conduits 118 and 120 extend through a rubber stopper 122 and are clamped together, as at 124. The stopper is received by the upper end of the sleeve 116. The conduits then extend through the sleeve 116 and through a rubber stopper 125 in the lower terminal portion of the sleeve 116. The conduit 118 terminates in a nozzle 126 having a horizontally extending outlet 128, and the conduit 120 terminates in a nozzle 130 having a horizontally extending outlet 132.

The yarn package, generally designated 134, has a tubular spool or core 136, perforated as at 138. Within the core 136 are a pair of axially spaced baffle rings 140 and 142 preferably made of rubber and secured in position by a tight fit in the spool.

Extending from the outlet 98 is a conduit 144, which empties into a reservoir 146. Within the reservoir is a pump 148 from which extends a conduit 150 connected to a coil 152 in a heat exchanger 154. The coil 152 is connected to conduit 120, which is controlled by a needle valve 156. The outlet 96 is connected to a conduit 158, which empties into a reservoir 160. A pump 162 in the reservoir 160 is connected by a conduit 164 to a coil 166 of the heat exchanger 154. The coil 166 is connected by a conduit 168 to a thermal switch 170, which is connected to the conduit 118 controlled by a needle valve 172.

In the operation of the apparatus, the stopper 122 is removed from the sleeve 116, and the conduits 118 and 120 and the stopper 122 are moved upwardly as a unit a distance sufficient for removing the nozzles 126 and 130 from the receptacle 44. Then the wing nut 115 is loosened, and the bracket 112 is turned upwardly about the pivot 114 so that the nozzles 126 and 130 are positioned out of the way. For this purpose suitable sections of the conduits 118 and 120 are made flexible.

The cover 68 is now removed from the receptacle 44, and a yarn package 134 is lowered into the receptacle, the lower terminal portion of the spool 136 being fitted over the upper end portion of the sleeve 52. Then the cover 68 is replaced, the bracket 112 is swung back to and locked in its original position, and the nozzles 126 and 130 are lowered into the spool 136, as shown.

The motor 110 is now energized, whereupon, through pulley 106, belt 102, and pulley 42, the receptacle and the yarn package therein are rotated at the rate of approximately 3,600 r.p.m.

Dye liquids are directed through nozzles 126 and 130 upon the inner surface of the spool 136. The flow of dye liquids axially along this surface is restricted, i.e., the liquid from nozzle 126 is restricted to the zone above

ring 140, and the liquid from the nozzle 130 is restricted to the zone below ring 142. The rings 140 and 142 keep the dye liquids out of the central zone, between the rings 140 and 142.

Centrifugal force quickly drives the dye liquids through the openings 138 in the spool 136, the yarn 134 and the openings 48 in the cylindrical wall 46. Thereafter the dye liquids strike the baffles 74, 76, 78, and 80. The dye liquid from nozzle 126 is directed by baffles 74 and 76 outwardly through opening 82 and strikes the cylindrical body 18, above trough 88. The dye liquid from nozzle 130 is directed by baffles 78 and 80 outwardly through opening 84 and strikes the cylindrical body 18, between troughs 88 and 92. The dye liquids flow downwardly respectively to the troughs and outwardly from the shroud through the outlets 96 and 98. Any of the dye liquid which is not collected on the troughs 88 and 92 drops to the bottom 24 of the receptacle and is discharged through the outlet 100.

The dye liquid from outlet 98 is discharged through conduit 144 into the reservoir 146, from whence it is forced by pump 148 through conduit 150 to the coil 152 of the heat exchanger 154. From the coil 152 the liquid passes through conduit 120 and control valve 156 to nozzle 130.

The dye liquid from outlet 96 is discharged through conduit 158 into the reservoir 160, from whence it is forced by pump 162 through conduit 164 to coil 166 of the heat exchanger 154. From the coil 166 the liquid passes through conduit 168 to the thermal switch 170 and from there through conduit 118 and control valve 172 to nozzle 126.

After a predetermined treatment period, the flow of dye liquids is terminated, and the motor 110 is turned off, whereupon the nozzles 126 and 130 are raised from the receptacle 44 and the bracket 112 is swung out of the way, as described hereinbefore. The receptacle is then uncovered, the dyed package removed, and a new package to be dyed is mounted in position.

In the arrangement shown, the yarn wrapped about the zone above the ring 140 is dyed, the yarn wrapped about the zone below the ring 142 is dyed, but the yarn wrapped about the intermediate zone between the rings 140 and 142 is not dyed. However, if desired, one instead of two rings may be inserted in the spool 136, in which event the entire yarn package is dyed.

It is possible to introduce a third dye liquid to the intermediate zone, in which case the yarn package is dyed three different color. It will be understood, however, that in this case an additional set of baffle plates and an additional trough, etc. are required.

If desired, the package may be dyed one color at a time, excellent results being obtained by the following procedure: First, the upper length of the yarn package is dyed. The dye liquid is recovered and recirculated twice, making a total of three passes through the yarn. Operation is then terminated, and the package is inverted. Then the procedure is repeated with the second color. The dye liquid is forced through the yarn in about 20 seconds, with the yarn package rotating at approximately 3,600 r.p.m.

It will be understood, of course, that the present invention, as described and shown, is susceptible to various changes and modifications which may be made without and departure from the general principles or real spirit of the invention. Accordingly, it is intended to claim the present invention broadly, as well as specifically, as indicated in the appended claims.

What is claimed is:

1. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a revolvable receptacle, means for introducing dye liquids respectively to axially spaced zones within the hollow core of a yarn package mounted within said receptacle for rotation therewith, means for rotating said receptacle and yarn package

to drive said dye liquids by centrifugal force from said hollow core, through said yarn package and from said receptacle, means on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and baffle means for receiving dye liquids discharged from said receptacle and directing them separately respectively to said collecting means.

2. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a shroud, a revolvable receptacle within said shroud, means for introducing dye liquids respectively to axially spaced zones within the hollow core of a yarn package mounted within said receptacle for rotation therewith, means for rotating said receptacle and yarn package to drive said dye liquids by centrifugal force from said hollow core, through said yarn package and from said receptacle, means within said shroud and on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and baffle means for receiving dye liquids discharged from said receptacle and directing them separately respectively to said collecting means.

3. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a shroud, a revolvable receptacle within said shroud, means for introducing dye liquids respectively to axially spaced zones within the hollow core of a yarn package mounted within said receptacle for rotation therewith, means for rotating said receptacle and yarn package to drive said dye liquids by centrifugal force from said hollow core, through said yarn package and from said receptacle, means within said shroud and on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and axially spaced baffle means embracing said receptacle for respectively receiving dye liquids discharged from said receptacle and directing them separately respectively to said collecting means.

4. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a shroud, a revolvable receptacle within said shroud including a cylindrical main body with passages for dye liquids, means for introducing dye liquids respectively to axially spaced zones within the hollow core of a yarn package mounted within said receptacle for rotation therewith, means for rotating said receptacle and yarn package to drive said dye liquids by centrifugal force from said hollow core, through said yarn package and from said receptacle, means within said shroud and on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and a plurality of annular axially tapered baffle plates embracing the main body of said receptacle for respectively receiving dye liquids discharged from said receptacle and directing them separately respectively to said collecting means.

5. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a shroud, a revolvable receptacle within said shroud including a cylindrical main body with passages for dye liquids, means for introducing dye liquids respectively to axially spaced zones within the hollow core of a yarn package mounted within said receptacle for rotation therewith, means for rotating said receptacle and yarn package to drive said dye liquids by centrifugal force from said hollow core, through said yarn package and from said receptacle, means within said shroud and on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and a plurality of annular axially tapered baffle plates embracing the main body of said receptacle and carried thereby in axially spaced relation to each other for respectively receiving dye liquids discharged from said receptacle and directing them separately respectively to said collecting means.

6. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a shroud, a revolvable receptacle within said shroud, means for introducing dye liquids respectively to axially spaced zones

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within the hollow core of a yarn package mounted within said receptacle for rotation therewith, means for rotating said receptacle and yarn package to drive said dye liquids by centrifugal force from said hollow core, through said yarn package and from said receptacle, axially spaced trough means extending about the interior of said shroud and on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and baffle means for receiving dye liquids discharged from said receptacle and directing them separately respectively to said trough means.

7. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a shroud, a revolvable receptacle within said shroud, a hollow spool within said receptacle mounted for rotation therewith, means in said spool effectively dividing the interior thereof into axially spaced zones, means for introducing dye liquids respectively to said zones, means for rotating said receptacle, spool and a yarn package wrapped upon said spool to drive said dye liquids by centrifugal force from said spool, through said yarn package and from said receptacle, means within said shroud and on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and baffle means for receiving dye liquids discharged from said receptacle and directing them separately respectively to said collecting means.

8. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a shroud, a revolvable receptacle within said shroud, a perforated cylindrical spool within said receptacle removably mounted for rotation therewith, annular means extending about the interior of said spool and effectively dividing the interior thereof into axially spaced zones, means for introducing dye liquids respectively to said zones, means for rotating said receptacle, spool and a yarn package wrapped upon said spool to drive said dye liquids by centrifugal force from said spool, through said yarn package and

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from said receptacle, means within said shroud and on the outside of said receptacle for collecting dye liquids discharged from said receptacle, and baffle means for receiving dye liquids discharged from said receptacle and directing them separately respectively to said collecting means.

9. In apparatus for centrifugally dyeing yarn packages multiple colors, the combination comprising a revolvable receptacle, a hollow spool within said receptacle mounted for rotation therewith, means in said spool effectively dividing the interior thereof into upper and lower axially spaced sections embraced respectively by upper and lower sections of said receptacle, means for introducing dye liquids respectively to said spool sections, means for rotating said receptacle, spool and a yarn package wrapped upon said spool to drive each dye liquid by centrifugal force through one of said spool sections, the section of the yarn package wrapped about said spool section and the associated section of said receptacle, means associated respectively with the upper and lower sections of said receptacle for collecting the dye liquids discharged from said receptacle, and baffle means associated respectively with the upper and lower sections of said receptacle for receiving the dye liquids discharged therefrom and directing them separately respectively to said collecting means.

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