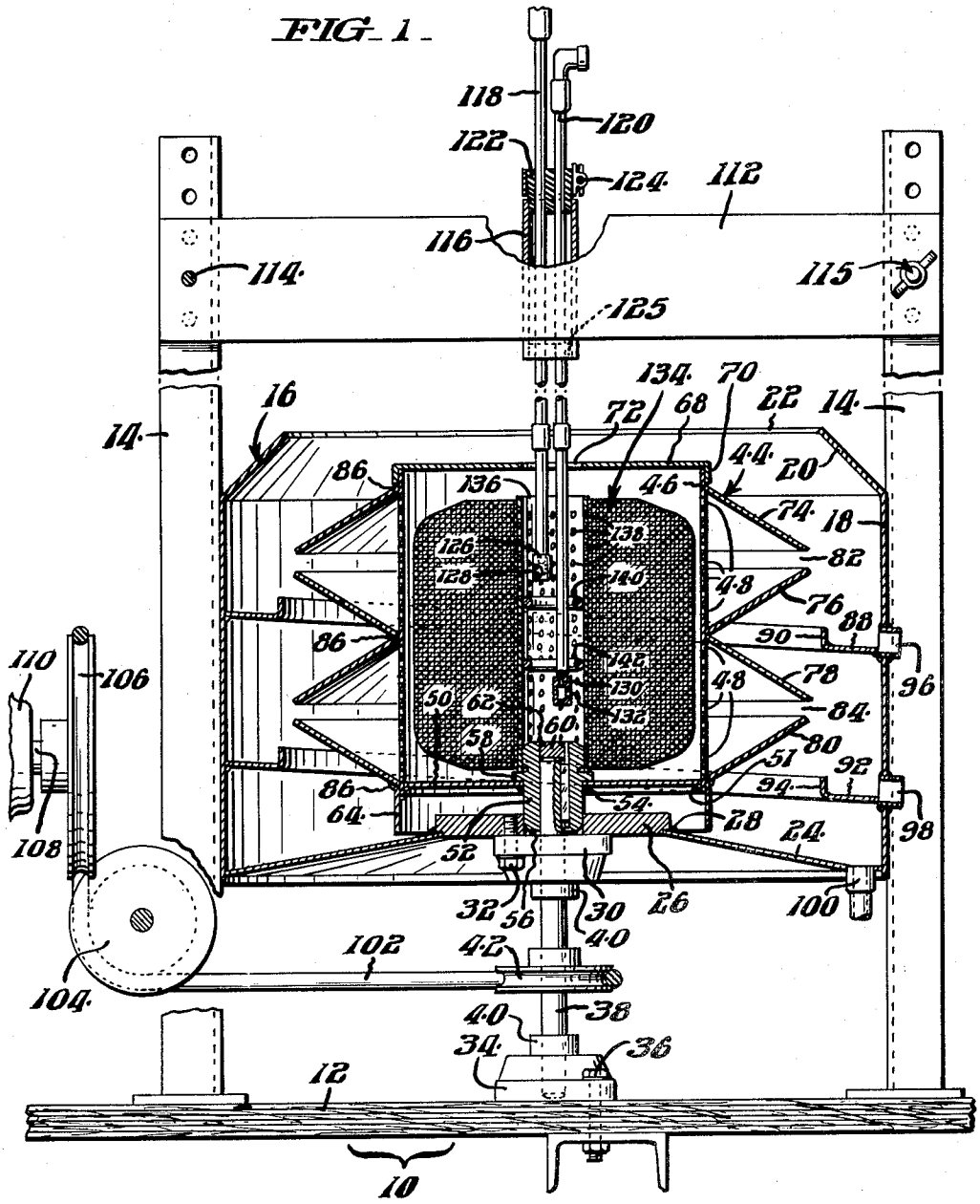
Aug. 25, 1964 W. K. WYATT 3,145,398

DYEING OF YARN PACKAGES

Filed Dec. 11, 1961 2 Sheets-Sheet 1

FIG. 1



INVENTOR.
William K. Wyatt,
BY
Paul & Paul
ATTORNEYS.

Aug. 25, 1964 W. K. WYATT 3,145,398

DYEING OF YARN PACKAGES

Filed Dec. 11, 1961 2 Sheets-Sheet 2

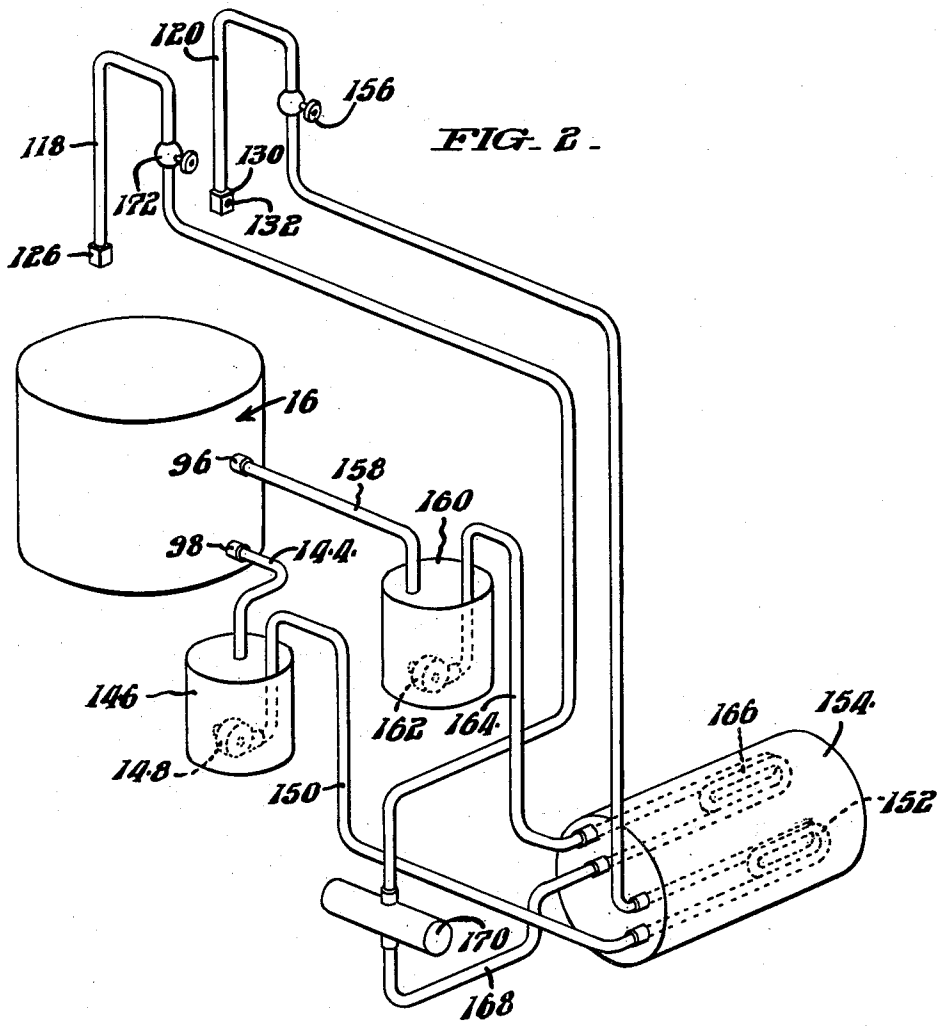


FIG. 2.

INVENTOR.
William K. Wyatt,
BY
Paul & Paul
ATTORNEYS.

United States Patent Office 3,145,398 Patented Aug. 25, 1964

3,145,398

DYEING OF YARN PACKAGES

William K. Wyatt, Lansdale, Pa., assignor to Turbo Machine Company, Lansdale, Pa., a corporation of Pennsylvania

Filed Dec. 11, 1961, Ser. No. 158,486
2 Claims. (Cl. 8—155.1)

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

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

Another object is to dye such a body of yarn by introducing different 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 automatically recirculating the same.

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 dished bottom **24** provided at the center thereof with a plate **26** secured to the bottom **24** by welding **28**.

Abutting the undersurface 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 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 **50** 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 pre-determined 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 colors. 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 any 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.

Having thus described my invention, I claim as follows:

1. In a method of dyeing a package of yarn having a hollow core extending therethrough, the steps comprising simultaneously introducing a plurality of different dye liquids respectively to axially spaced zones in said core, restricting flow of each dye liquid to its zone of introduction, and rotating said package to drive each dye liquid radially outwardly by centrifugal force through the yarn wrapped about its zone of introduction.

2. In a method of dyeing a package of yarn having a hollow core extending therethrough, the steps comprising simultaneously introducing a plurality of different dye liquids respectively to axially spaced zones in said core, restricting flow of each dye liquid to its zone of introduction, rotating said package to drive each dye liquid radially outwardly by centrifugal force through the yarn wrapped about its zone of introduction, and separately collecting and automatically recirculating the different dye liquids not taken by said yarn.

References Cited in the file of this patent

UNITED STATES PATENTS

1,724,015	Gere	Aug. 13, 1929
1,759,157	Gere	May 20, 1930
2,017,690	Drum et al.	Oct. 15, 1935
2,276,946	Else	Mar. 17, 1942
2,300,254	Jackson	Oct. 27, 1942
2,566,431	Steiding et al.	Sept. 4, 1951