

[54] **METHOD FOR REELED YARN DYEING
AND APPARATUS FOR CARRYING
THE METHOD INTO EFFECT**

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[58] Field of Search.....8/154, 155, 155.2,
8/155.1, 148, 149

[56] **References Cited**

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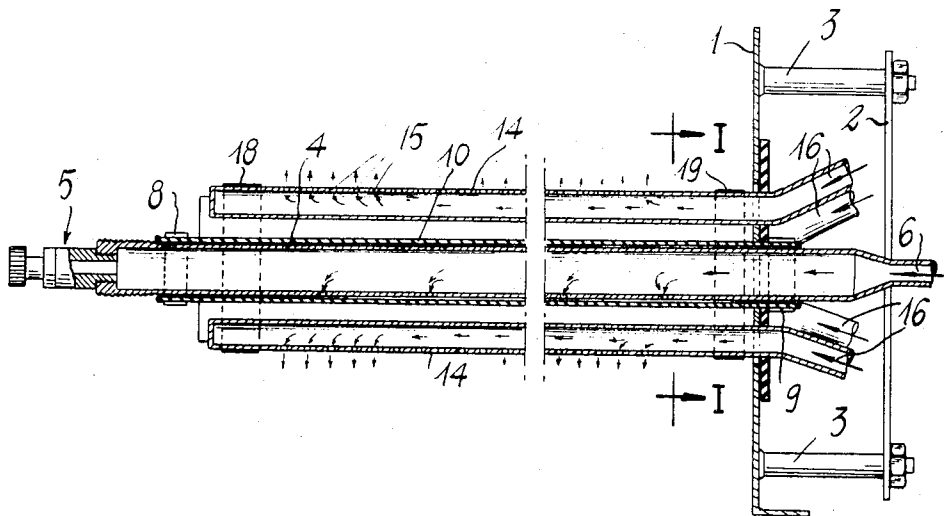
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[57] **ABSTRACT**

A method for reeled yarn dyeing as accomplished by operating from inside the yarn winding completely devoid of support, expansion means being provided for producing, upon expansion, individual tight-sealed compartments, in which the dye injectors are accommodated, and apparatus for carrying the method into effect.

7 Claims, 3 Drawing Figures



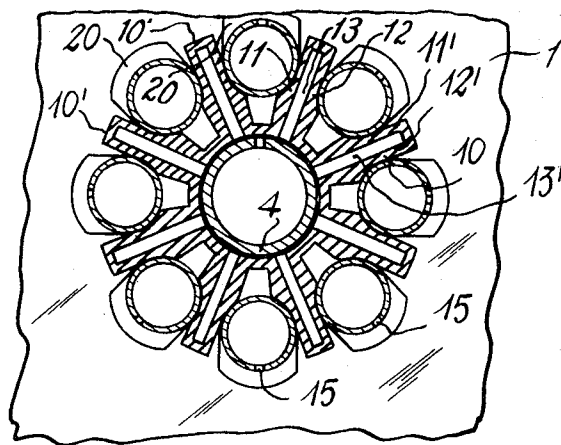


Fig. 1

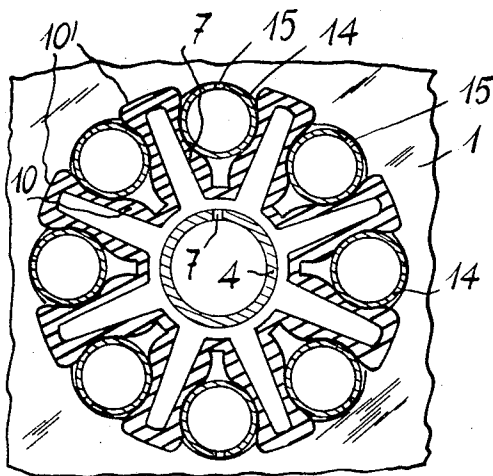


Fig. 2

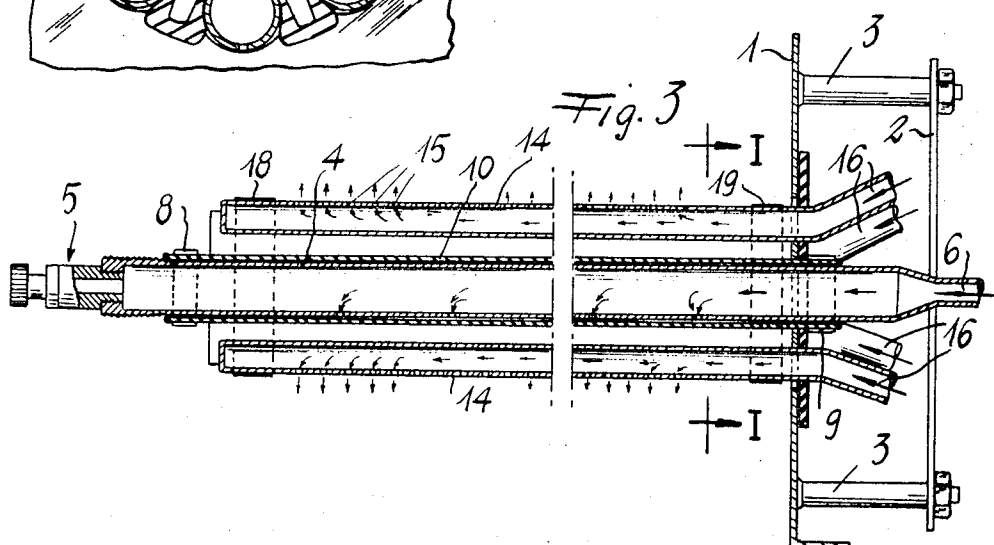


Fig. 3

METHOD FOR REELED YARN DYEING AND APPARATUS FOR CARRYING THE METHOD INTO EFFECT

This invention relates to a method for reeled yarn dyeing to obtain the so-called "flamings" with controllable distribution, length and evenness, as provided by the inside from the yarn winding devoid of support and to the associated apparatus for carrying the method into effect.

Several methods and machines have been already known for obtaining reeled yarn dyeing with chromatically discrete flamings, such methods and machines contemplating the injection of the several dyes either from outside or inside the yarn winding. As to distribution evenness and marketable features, the best results in the finished products have been certainly provided by the methods and apparatus contemplating dye injection from inside the winding. To this end, the yarn must be wound according to known techniques on particular large spindles which are internally divided into a plurality of compartments, in which the dyes are successively injected under pressure, such dyes subsequently reaching the reeled yarn through suitably arranged orifices and apertures. These methods suffer from the serious disadvantage of requiring a definite reeling on the special large spindles prior to dyeing and associated re-winding after dyeing with the resulting time loss, yarn damage, demand in labor and machinery and, above all, the use of many large spindles of a particular design, the cost of which is very considerable.

Finally, it should be noted that not always the dyeing results are good, since the sealing between one section or compartment intended for a dye and the adjoining compartments is only and exclusively provided by the pressure exerted by the yarn wound up on the large spindle and, as apparent, color mixtures or undesired superimpositions would occur whenever the dye injection pressure exceeds at some location the pressure being exerted by the yarn on the large spindle.

In order to overcome the above mentioned disadvantages, the present invention proposes a method according to which the dyeing is performed from inside the reeled yarn completely devoid of support by an expansion apparatus, essentially comprising a resilient deformable expansion chamber of a radial arrangement or configuration, internally having, between two adjoining arms, independent channels, through which the dye is injected in the yarn, a tight-seal between the several compartments being assured through the pressure exerted by the deformable chamber directly against the inner walls of the yarn winding, this pressure being the same as or higher than the dye injection pressure.

This invention can be better understood from the following detailed description, given by mere-way of example, and with particular reference to the accompanying drawings in which:

FIGS. 1 and 2 are sectional views according to line I-I of FIG. 3 prior to and after expansion, respectively; and

FIG. 3 is a longitudinal sectional view showing the apparatus according to the invention.

As shown, the apparatus substantially comprises two plates 1 and 2, respectively, which are interconnected by posts 3, so as to form a supporting base, these plates

being fixedly connected to a preferably metal, central tube 4 which at its end opposite the base is closed by a throttle valve, designated as a whole at 5, an inlet 6 being provided at the other end thereof for air feeding or other pressure fluid. About the rigid central tube 4, fitted with radial through holes 7 at one or more locations, a deformable resilient chamber is provided and secured to the opposite ends of the tube by clamping clips 8 and 9, ensuring the sealing thereof relative to the outer surface of tube 4.

Said deformable resilient chamber, designated as a whole at 10, is in the example shown in the drawings shaped with several radial bendings, so as to cause the same to take a star-like arrangement with radially arranged walls 11-12, 11'-12', etc., respectively enclosing therebetween spaces 13, 13', etc.

Externally of the chamber 10 and at the space available between radial walls 12-11', etc., pipes 14 are provided and substantially parallel with the central tube 4, thus having a cylindrical sector attitude coaxial with said tube 4. These pipes are closed at their outer end and provided with a set of holes 15 arranged along one or more generatrices outwardly facing of each pipe, the other end of each pipe being connected at 16 to the inside of the support comprising said plates 1 and 2 with feed conduits for pressure dyes.

These pipes 14 are held together from outside by resilient bonds, such as resilient end clips 18 and 19 enabling them to radially move and to this end there may be provided oblong slots 20 in plate 1.

The operation of the apparatus according to the invention is substantially as follows:

The yarn, as reeled in an ordinary way, is unthreaded from the support on which the winding was provided and, without any replacement of the support, is threaded onto the assembly of pipes 14 maintained at the clamped position, as shown in FIG. 1, by the resilient clips 18 and 19; whereupon, pressure air or fluid is supplied through inlet 6 to tube 4, thus causing the resilient expansion chamber 10 to bulge and bring its outer portions 10' to contact the inner surface of the yarn winding, thereby exerting a suitable pressure thereon and dividing the inner zones of the winding into as many tight-sealed compartments as the loops of the expansion chamber, or the pipes 14 which are also urged by the expansion chamber against the inner surface of the winding. Just following this, the pressure dyes are supplied through the inlets 16 into the several pipes 14. Therefore, these dyes will reach the yarn winding from the inside through the holes 15 as pressed against the inner surface of the winding. When the dye injection has been performed, the duration of which will be adjustable at will in accordance with requirements, the dye supply is cut off and the circuit is opened for depressurizing the expansion chamber. The resilient clips 18 and 19 bring the pipe and expansion chamber assembly back to its original position as shown in FIG. 1, thus making it possible to unthread the yarn winding from the apparatus (or vice versa) in order to accomplish then the subsequent washing operations and the like by usual techniques.

As it will be clearly apparent from the foregoing, the essential advantage of the method and apparatus according to the invention is that the dyeing can be accomplished to provide chromatically discrete flamings

from inside the yarn winding without any need of winding up the yarn on particular supports or large spindles, thus obtaining the division into as many tight-sealed compartments as the various desired zones to be involved by a single dye with a truly tight-sealing between one and another compartment, this sealing being substantially adjustable at will and assured by a pressure which may be higher than or the same as that required for dye injection.

Although only one embodiment of the invention has been described, those skilled in the art may readily devise many changes and modifications, all of which shall be intended as within the object of the present invention. Particularly, the expansion chamber could have particular star-like or radial configurations also at a rest condition, so that peripheral zones would be already provided for adhering to the inner surface of the reeled yarn and zones for accomodating the various pipes for dye injection, whilst, as a limit, this chamber could be simply a tubular chamber allowing for the final required deformation by expansion to be caused by the resistant forces (inner surface of the reeled yarn in the interspace between two pipes and said pipes).

Of course, any materials can be used and, particularly, the expansion chamber may be made of natural or synthetic rubber of the type capable of withstanding the temperatures involved.

What we claim is:

1. A method for reeled yarn dyeing as carried out by operating from inside the yarn winding completely devoid of support, having expansion means capable upon expansion of providing individual tight-sealed compartments, within which dye injectors are accomodated.

2. A method as claimed in claim 1, wherein the air or fluid pressure causing the expansion is at least as great as the dye injection pressure.

3. In an apparatus for dyeing reeled yarn from the inside of the yarn winding the combination therewith of a

resiliently deformable expansion chamber, a plurality of tubes associated therewith and arranged for dye injection of said yarn winding and positioned externally of said chamber, means for applying fluid pressure to said expansion chamber, means for introducing and feeding dyes to said tubes with said tubes containing orifices to permit flow of said dyes to said yarn winding, the configuration and/or arrangement of said expandible chamber and said tubes being such that upon supply of fluid pressure to the interior of said chamber, said chamber will bring the tubes into contact with the inner surface of the yarn winding and portions of said chamber will directly contact the inner surface of the wound yarn for an appreciable distance between the said tubes so that each of said tubes is tightly sealed from the adjacent tubes during injection of dyes therefrom and each tube is in effect disposed in an individual tight-sealed compartment.

4. An apparatus for dyeing reeled yarn as defined in claim 3, wherein the fluid pressure causing the expansion of said chamber is at least as great as the dye injection pressure.

5. An apparatus for dyeing reeled yarn as defined in claim 3, wherein said resilient deformable expansion chamber is of a radial configuration with said dye tubes positioned with each tube extending in independent channels thus formed by two adjacent radial arms of said expansion chamber.

6. An apparatus as claimed in claim 3, comprising resilient clips or similar means for inwardly assembling said tubes or pipes and said expansion chamber when pressure fluid is cut off.

7. An apparatus as claimed in claim 3, wherein a perforated tube is provided in the expansion chamber and acts as a support for the whole assembly, said expansion chamber being sealingly closed at the ends of said tube against its outer surface.

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