ABSTRACT OF THE DISCLOSURE

In apparatus for the continuous application of liquid to a plurality of moving bundles of continuous filaments, of the kind comprising a treatment roll, a reservoir for the liquid to be applied into, which the treatment roll dips, and guide means for guiding the filament bundles into contact with the peripheral surface of the roll, said treatment roll has its peripheral surface divided into a plurality of cylindrical sections of substantially equal axial length, and said guide means is arranged to guide each bundle of filaments to a different one of said cylindrical sections.

This invention relates to apparatus for the continuous application of a liquid to a plurality of moving bundles of continuous filaments.

Liquids such as lubricants or finishes, for example an emulsion of lubricating oil and water, may be applied to bundles of textile filaments by causing the filament bundles to impinge in approximately tangential relationship on a treatment roll, the surface of which is wetted with the liquid to be applied. In some applications, where, for example, a number of spinnerets are grouped together, it is convenient to treat all the bundles of filaments from one group of spinnerets on one treatment roll. Thus, for example, in the melt spinning of filaments of such polymers as nylon a plurality of bundles may be cooled, treated if necessary with steam, and lubricated with a suitable textile lubricant composition on such a treatment roll.

It has been found that when three or more such bundles of filaments are treated with a liquid on the surface of a single roll, the outer pair of bundles of filaments pick up substantially more liquid than the inner bundle of bundles of filaments.

According to the invention, apparatus for the continuous application of a liquid to a plurality of moving bundles of continuous filaments comprises a treatment roll, the peripheral surface of which is divided into a plurality of cylindrical sections of substantially equal axial length, a reservoir for the liquid to be applied into which the treatment roll dips, guide means to ensure presentation of each bundle of filaments to the surface of a different one of the cylindrical sections of the treatment roll, and wind up means for the bundles of filaments.

A treatment roll which is suitable for use in this invention may be, for example, of glass, ceramic, or carbordurum or alumina bonded with synthetic resin or other suitable bonding material, or it may be a metal roll coated with another material, such as a ceramic. It must in any case have a surface which is readily wettable by the liquid which is to be applied. Division of the peripheral surface of the treatment roll into a plurality of cylindrical sections may be effected, for example, by providing grooves or cuts in the peripheral surface or by applying to the peripheral surface at the appropriate circumferential lines, a composition which resists wetting by the liquid which is to be applied. Alternatively, of course, the treatment roll can be made by assembling together a plurality of suitably sized cylindrical sections, separated by suitable distance pieces. It will be understood that the various sections are to be of substantially equal axial length, and while some slight tolerance of inequality may be permitted, the purpose is to ensure by the equality of the width of the sections that the amount of liquid supplied to each bundle of filaments is the same. If desired the treatment roll may have two outer cylindrical sections which need not be of equal size, divided in the same way from the next inner cylindrical sections. These outer cylindrical sections will not be used for the application of liquid to the bundles of filaments, but will ensure that any damage to the edges of the treatment roll does not result in irregular application of liquid.

Apparatus in accordance with the invention may comprise more than one of said treatment rolls each with its associated reservoir containing liquid which is to be applied to the filament bundles.

The invention will now be described in greater detail, by way of example, with reference to the accompanying drawing, in which:

FIGURE 1 is a schematic side elevation of apparatus in accordance with the invention,

FIGURE 2 is a plan of the apparatus of FIGURE 1, and

FIGURE 3 is a partly sectional plan of a modified form of the treatment roll of apparatus according to the invention.

Referring to FIGURES 1 and 2, the apparatus illustrated is intended for the application of textile lubricants to bundles of continuous polyamide filaments. It will be assumed that the filaments are melt spun from four spinnerets (not shown) to provide four filament bundles 1, 2, 3 and 4. These bundles, after cooling and/or steaming as desired, are led between pairs of guides 5 and 6 on the surface of a treatment roll, generally designated by the numeral 6. The roll 6 comprises four equal cylindrical sections 7, 8, 9 and 10 on to the peripheral surfaces of which the filament bundles 1, 2, 3 and 4, respectively impinge. The treatment roll 6 dips into a reservoir 11 containing a liquid textile lubricant and the roll is rotated at such a speed as to provide the correct amount of liquid on the filaments. The textile lubricant is supplied to the reservoir 11 through a pipe 12. After this treatment the filament bundles are led between further pairs of guides 13 and 19 and impinge upon the separately cylindrical sections 14, 15, 16 and 17 of a second treatment roll, generally designated by the numeral 18. The treatment roll 18 dips into a reservoir 19 containing a liquid textile lubricant and the roll is rotated at such a speed as to provide the correct amount of liquid on the filaments. The textile lubricant, which is supplied to the reservoir 19 by a pipe 20, may, or may not, be of the same composition as the liquid in the reservoir 11. After the treatment the filament bundles 1, 2, 3 and 4 are wound into separate cakes on bobbins 21, 22, 23 and 24, respectively, after passage over pairs of godets 25, 26, 27 and 28, respectively.

The treatment roll 6, which may be made, for example, of ceramic material, is shown as being made from a single cylindrical roll, the sections 7, 8, 9 and 10 being defined by circumferential grooves 29 formed in the surface of the roll. In the treatment roll 18 the cylindrical roll sections 14, 15, 16 and 17 are separate and spaced from each other by distance pieces in the form of discs 30 having a diameter which is smaller than the diameter of the roll sections 14-17. Each of the rolls 6 and 18 comprises a shaft 31 which is rotatably mounted in bearings 32 secured to the associated reservoir 11 or 19. The shafts 31 are rotated by any suitable drive means (not shown).

Each of the rolls 6 and 18 also comprises cylindrical end sections 33 separated from the adjacent sections 7.
and 10 (or 14 and 17) to protect the ends of these latter sections from damage.

FIGURE 3 shows a modified form of treatment roll, generally designated by the numeral 34, which is intended for applying liquid to five bundles of filaments. This roll has its peripheral surface divided into five cylindrical sections 35, 36, 37, 38 and 39 by narrow circumferential strips 40 of a composition which resists wetting by the liquid into which the roll dips. For example, the strips 40 may be thin strips of a silicone coating composition. Alternatively, the strips 40 may be formed by the peripheral surface of distance pieces 41 formed of a material such as polytetrafluoroethylene.

FIGURE 3 also shows how the treatment roll 34 may be formed from cylindrical core members 42, made for example of metal, which have their peripheral surfaces coated with a layer 43 of a composition which is readily wettable by the liquid into which the roll dips, for example a coating of ceramic material.

By the use of the above described apparatus liquid can be applied substantially uniformly to each of the filament bundles.

What we claim is:

1. Apparatus for the continuous application of liquid to a plurality of moving bundles of continuous filaments comprising an integral treatment roll, the peripheral surface of which is divided into a plurality of cylindrical contact sections of substantially equal axial length, a reservoir for the liquid to be applied into which the treatment roll dips, guide means to ensure presentation of each bundle of filaments to the surface of a different one of the cylindrical contact sections of the treatment roll, and wind up means for the bundles of filaments.

2. Apparatus as claimed in claim 1, in which at least a surface layer of each of said cylindrical contact sections is made of a material which is readily wettable by the liquid which is to be applied.

3. Apparatus as claimed in claim 2, in which said readily wettable material is selected from the group consisting of glass, ceramic, bonded carborundum and bonded alumina.

4. Apparatus as claimed in claim 1, in which the division of the peripheral surface of the treatment roll into a plurality of cylindrical sections is effected by providing circumferential grooves in the peripheral surface of the roll.

5. Apparatus as claimed in claim 1, in which the division of the peripheral surface of the treatment roll into a plurality of cylindrical sections is effected by applying to the peripheral surface of the roll circumferential strips of a composition which resists wetting by the liquid which is to be applied.

6. Apparatus as claimed in claim 5, in which said composition is a silicone.

7. Apparatus as claimed in claim 1, in which the treatment roll comprises a plurality of substantially identical roll sections separated by suitable distance pieces.

8. Apparatus as claimed in claim 7, in which said distance pieces are discs having a diameter which is smaller than the diameter of the roll sections.

9. Apparatus as claimed in claim 7, in which the distance pieces are discs of a material which resists wetting by the liquid which is to be applied.

10. Apparatus as claimed in claim 9, in which the distance pieces are made of polytetrafluoroethylene.

11. Apparatus as claimed in claim 1, in which the treatment roll comprises two outer cylindrical guard sections in addition to said plurality of cylindrical contact sections.

12. Apparatus as claimed in claim 1, comprising at least one additional treatment roll each with its associated reservoir for liquid to be applied to the bundles of filaments, the peripheral surface of the or each additional treatment roll being divided into a plurality of cylindrical sections substantially equal axial length, and further guide means to ensure presentation of each bundle of filaments to the surface of a different one of the cylindrical sections of the or each additional treatment roll.

13. Apparatus for the continuous application of liquid to a plurality of moving bundles of continuous filaments which comprises a rotatable shaft, a treatment roll fixed to said shaft, said roll comprising a plurality of contact sections, a reservoir for treating liquid, said roll being mounted to dip into said reservoir, guide means for directing a separate filament bundle to each of said sections and wind up means for said filament bundles.

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WALTER A. SCHEEL, Primary Examiner
ROBERT C. SMITH, Assistant Examiner