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Kodis

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[54] **YARN COATING DEVICE**

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[52] **U.S. Cl.** **118/62,** 118/325, 118/326

[51] **Int. Cl.** **B05c 5/00,** B05c 11/16

[58] **Field of Search** ..... 118/325, 326, 62; 68/205 R

[56] **References Cited**

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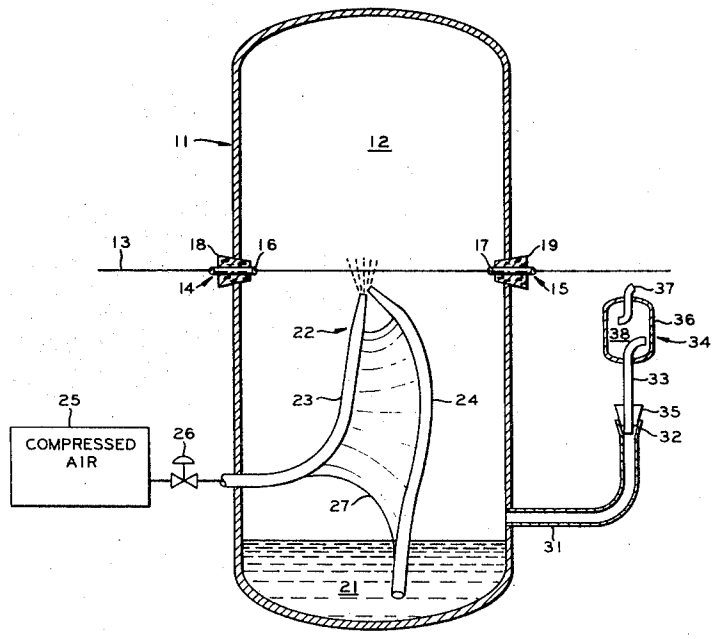
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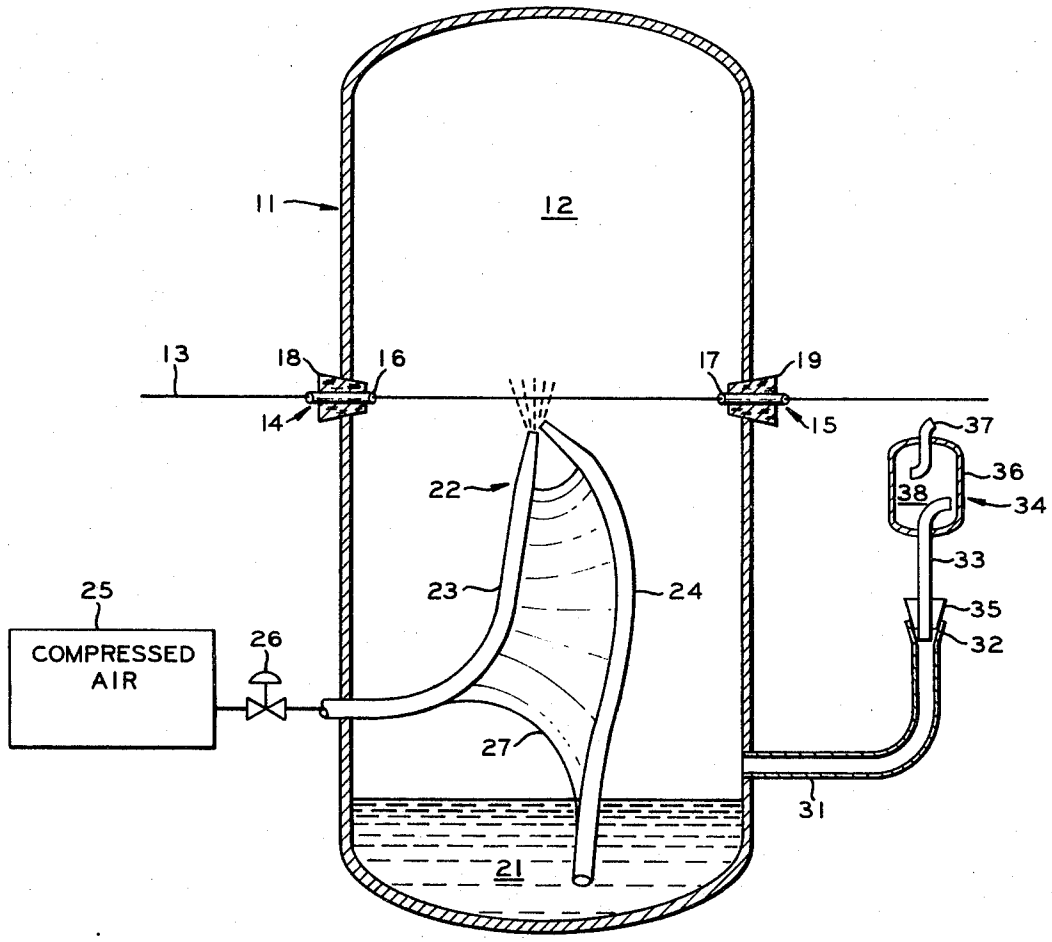
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[57] **ABSTRACT**

Yarn is passed through a chamber having a reservoir of a liquid addendum in the lower portion thereof below the yarn. An aspirator draws liquid from the reservoir and sprays the withdrawn liquid onto the yarn. Excess liquid returns to the reservoir. A liquid trap on the gas exhaust minimizes loss of liquid.

8 Claims, 1 Drawing Figure





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YARN COATING DEVICE

This invention relates to a device for applying a liquid addendum to a yarn. In a specific aspect the invention relates to a new and improved device for lubricating yarns. In another aspect the invention relates to the application of a liquid treating agent to a continuous length of strand material.

Although it is known to utilize an atomizer to spray liquid addendum onto fibers, such techniques have generally been considered messy and wasteful. It is an object of the present invention to provide a new and improved device for applying liquid addendum onto a traveling continuous length of yarn. It is an object of the invention to minimize, if not eliminate, the loss of liquid addendum in a spraying operation. Another object of the invention is to provide for uniform application of liquid addendum to individual filaments of a multiple filament yarn.

Other objects, aspects and advantages of the invention will be apparent from a study of the specification, the drawing and the appended claims to the invention.

In the drawing, the single FIGURE is an elevational view in cross section of a device in accordance with the present invention.

Housing **11** forms a generally cylindrical chamber **12** through which the yarn **13** is passed by way of yarn inlet **14** and yarn outlet **15**. Inlet **14** and outlet **15** can be in the form of ceramic or plastic tubes **16** and **17** extending through corks **18** and **19**, respectively, positioned in openings in opposite walls of the housing **11**. The inner diameter of tubes **16** and **17** is only slightly larger than the diameter of the yarn being processed, to minimize the flow or air through the tubes **16** and **17**. Other forms of yarn guides can be employed as the yarn inlet and yarn outlet, for example, holes can be drilled in the walls of the housing **11** of a size corresponding to the size of the yarn to be processed. However, the corks **18** and **19** and tubes **16** and **17** have the advantage of being readily replaceable when it is desired to change the denier of the yarn being processed. Although not shown in the drawing, housing **11** can be formed of two parts with the dividing line being along the plane of the yarn path to permit rapid stringup as well as to aid in the construction of the device.

A reservoir **21** of liquid addendum is positioned in the lower portion of chamber **12**. An aspirator nozzle **22** is positioned within chamber **12** and comprises a first tube **23** and a second tube **24**. Tube **23** extends through a wall of housing **11** to a source **25** of compressed air or other suitable aspirating gas. Tube **24** extends downwardly into the reservoir **21** to supply liquid addendum to the nozzle **22**. Tubes **23** and **24** can be connected by a plate or web **27** for mechanical support. Nozzle **23** is positioned below the yarn path and is directed upwardly at the yarn **13** as it passes between inlet **14** and outlet **15** to cause at least a portion of the droplets of aspirated liquid to contact the yarn. In a presently preferred embodiment of the invention the nozzle **22** can be positioned adjacent the yarn path to cause a separation of the filaments of a multiple filament yarn to permit application of the liquid addendum to the individual filaments. A valve **26** can be operatively positioned in conduit **23** exterior to housing **11** to provide for adjustment of the rate of flow of air through the nozzle and thus the amount of liquid sprayed onto the yarn.

Conduit **31** has one end in communication with housing **11** at a point below the yarn path and above the level of the reservoir **21** of liquid addendum in the lower portion of chamber **12**. The other end of tube **31** is flared to serve as a funnel **32** for the addition of liquid addendum to the reservoir. The lower end of inlet tube **33** of a liquid trap **34** is centered in a cork **35** which is releasably positioned in the flared end of conduit **23**. The upper end of tube **33** extends upwardly into the enclosed chamber **38** of tank **36** and then curves laterally outwardly in an approximately 90° bend. An outlet conduit **37** extends downwardly into chamber **38** and then curves approximately 90° in the direction opposite that of the bend of conduit **33**.

When elements **33–37** are in the position illustrated in the drawing, they serve as a liquid trap to recover any entrained liquid addendum in the spent aspirating air being vented from chamber **12**. The trapped liquid droplets accumulate in chamber **38** as a body until the level thereof reaches the outlet opening of conduit **33**, at which time the excess liquid drains downwardly through conduits **33** and **31** to the reservoir **21**. Similarly those droplets of liquid addendum in the spray from nozzle **22** which do not contact the yarn either fall back into reservoir **21** or coalesce on the inside walls of housing **11** and drain back into reservoir **21**. Thus the mess usually associated with sprays is eliminated and the loss of liquid addendum is minimized.

The housing **11** can be fabricated out of any suitable material including glass, metal and plastics. However, it is presently preferred that at least a portion of the housing be transparent to permit visual observation of the level of the reservoir **21**. The term liquid addendum includes any known liquid treating agent or liquid suspension of finely divided particulate material. The invention is useful for applying lubricants, sizings, conditioning agents, and finishing agents. The term yarn includes single or multiple continuous filament yarns and tows, staple yarns and rovings, yarns containing a blend of staple fibers and continuous filaments, and the like. The filaments can be natural fibers and/or synthetic fibers. The device of the present invention is particularly applicable to any melt spinnable synthetic organic thermoplastic polymer, for example, polyamides, polyesters, polyhydrocarbons such as polyethylene and polypropylene, polyurethanes, polyureas, vinyl polymers such as polyvinyl chloride, polyvinylidene chloride, and copolymers thereof, acrylic polymers such as polyacrylonitrile when sufficiently plasticized to render it fusible, copolymers of acrylonitrile, halogenated hydrocarbons such as polychlorotrifluoroethylene, polyacetals, polyanhydrides, polyoxymethylenes, polyformals, polyethers, polythioethers, polysulfides, polythioesters, polysulfones, polythioureas, polythioamides, polysulfonamides, polyimides, and polytriazoles. The preferred group of polyamides comprises such polymers as poly(hexamethyleneadipamide), poly(hexamethylene sebacamide), poly(epsiloncaproamide), and the copolymers thereof. Among the polyesters that may be mentioned, besides poly(ethylene terephthalate), are the corresponding copolymers containing sebacic acid, adipic acid, isophthalic acid as well as the polyesters containing recurrent units derived from glycols with more than two carbons in the chain, e.g., diethylene glycol, butylene glycol, decamethylene glycol and trans-bis-1,4-(hydroxymethyl)cyclohexane.

The device of the present invention can be employed for applying finishes in the spinning process just prior to the take-up winder, but is advantageously utilized between the feed packages and the processing machine, such as a knitting machine. Thus the yarn can be processed while the finish is still wet.

Reasonable variations and modifications are possible within the scope of the foregoing disclosure, the drawing and the appended claims to the invention.

What is claimed is:

1. A yarn treating device comprising means defining a chamber; a yarn inlet in one wall of said chamber and a yarn outlet in an opposite wall of said chamber; means for providing a reservoir of a liquid addendum in a lower portion of said chamber below said yarn inlet and said yarn outlet; an aspirating nozzle positioned in said chamber adjacent the yarn path between said yarn inlet and said yarn outlet and having an aspirating gas inlet tube and and aspirated liquid inlet tube; said aspirated liquid inlet tube extending downwardly into said reservoir of liquid addendum to supply liquid addendum to said nozzle; means for supplying an aspirating gas to said aspirating gas inlet tube; said aspirating nozzle being directed to cause at least a portion of the aspirated liquid to contact a yarn passing from said yarn inlet to said yarn outlet while any excess aspirated liquid returns to said reservoir; and means for venting the spent aspirating gas from said chamber comprising a liquid trap having a gas inlet conduit and a gas exhaust, a vent and fill conduit having one end thereof communicating with said chamber at a point below said yarn path and above said reservoir, and means for releasably connecting said gas inlet conduit to the other end of said vent and fill conduit whereby said gas inlet conduit can be disconnected for the purpose of adding liquid addendum to said reservoir through said vent and fill conduit; said chamber being enclosed except for said yarn inlet, said yarn outlet, said means for venting, and said means for supplying an aspirating gas.

2. A yarn treating device comprising means defining a chamber; a yarn inlet in one wall of said chamber and a yarn outlet in an opposite wall of said chamber; means for providing a reservoir of a liquid addendum in a lower portion of said chamber below said yarn inlet and said yarn outlet; an aspirating nozzle positioned in said chamber adjacent the yarn path between said yarn inlet and said yarn outlet and having an aspirating gas inlet tube and an aspirated liquid inlet tube; said aspirated liquid inlet tube extending downwardly into said reservoir of liquid addendum to supply liquid addendum to said nozzle; means for supplying an aspirating gas to said aspirating gas inlet tube; said aspirating nozzle being directed to cause at least a portion of the aspirated liquid to contact a yarn passing from said yarn inlet to said yarn outlet while any excess aspirated liquid returns to said reservoir; means for venting the spent aspirating gas from said chamber; said nozzle being positioned adjacent said yarn path and directed at said yarn path so that the nozzle exhaust causes the separation of the filaments of a multiple filament yarn to enable the liquid to be applied to each filament.

3. A device in accordance with claim 2 further comprising a liquid trap in said means for venting to recover substantially all of the entrained liquid from the gas being vented.

4. A device in accordance with claim 2 wherein said nozzle is positioned below said yarn path and is directed upwardly at said yarn path to provide a spray of droplets of liquid through which the yarn passes.

5. A device in accordance with claim 2 wherein said chamber is enclosed except for said yarn inlet, said yarn outlet, said means for venting, and said means for supplying an aspirating gas.

6. A device in accordance with claim 5 wherein said means for venting comprises a liquid trap having a gas inlet conduit and a gas exhaust, a vent and fill conduit having one end thereof communicating with said chamber at a point below said yarn path and above said reservoir, and means for releasably connecting said gas inlet conduit to the other end of said vent and fill conduit whereby said gas inlet conduit can be disconnected for the purpose of adding liquid addendum to said reservoir through said vent and fill conduit.

7. A device in accordance with claim 6 wherein at least a portion of said means defining a chamber is transparent so that the level of liquid in said reservoir can be visually observed.

8. A device in accordance with claim 7 further comprising means for adjusting the rate of flow of aspirating gas to said nozzle.

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