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LIQUID APPLICATOR FOR YARN

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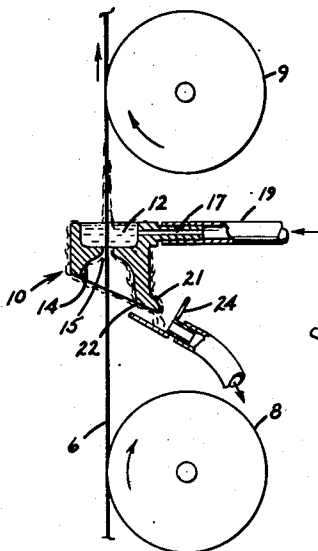


FIG. 1

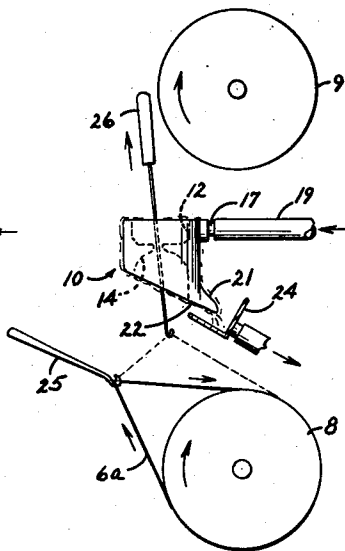


FIG. 2

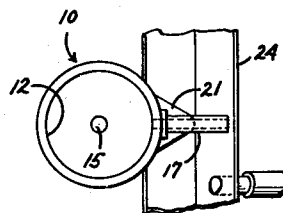


FIG. 3

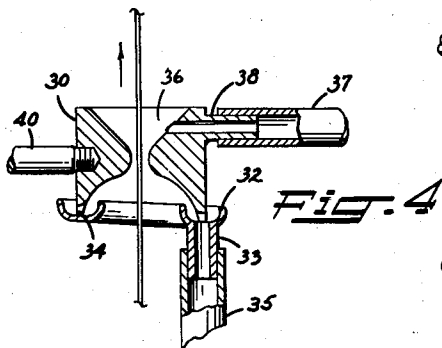


FIG. 4

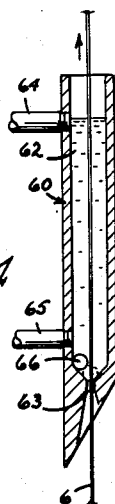


FIG. 6

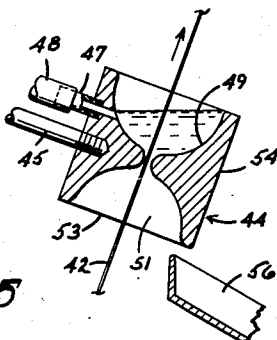


FIG. 5

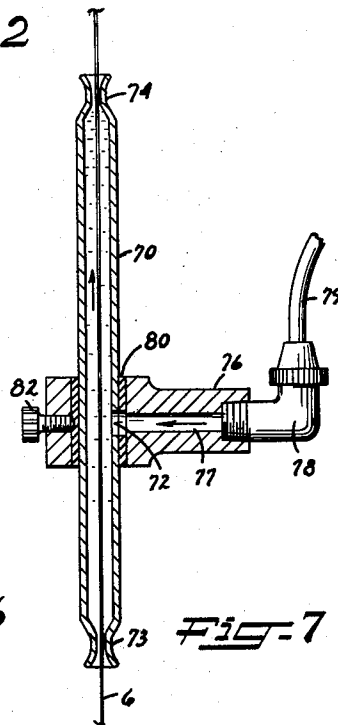


FIG. 7

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LIQUID APPLICATOR FOR YARN

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2 Claims. (Cl. 118—405)

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This invention relates to a device for applying a liquid to a running strand and particularly to a device which may be mounted along vertical or steeply inclined portions of the path of the strand at positions which occur between fixed guides, godets, or advancing reels for the strand. The strand may consist of filamentary material in the form of a single filament, a bundle of twisted or untwisted filaments, spun yarns, cords or the like.

It is an object of the invention to provide a device for which a liquid may be applied to the strand, and returned or reclaimed therefrom without substantial frictional contact of the strand with the device. It is also an object to provide an apparatus which totally surrounds a running strand with a body of liquid to obtain positive and uniform treatment thereof. It is another object to provide a liquid applicator of which the construction may be readily varied to obtain any desired depth of the liquid carried into contact with the strand by the applicator. Still another object is to provide such an applicator in the form of a simple, inexpensive unit which may be readily removed or installed in a desired position for applying a liquid to a strand. Further objects and advantages will be apparent from the following description of the invention and the drawing relating thereto in which

Fig. 1 is an elevation view in section of one embodiment of the invention;

Fig. 2 is an elevation of the apparatus of Fig. 1 illustrating a lacing procedure;

Fig. 3 is a plan view of the apparatus of Fig. 1;

Fig. 4 is an elevation in section of a modified apparatus;

Fig. 5 is an elevation in section of apparatus which may be used when the strand path is inclined;

Fig. 6 is an elevation in section illustrating another embodiment of the invention; and

Fig. 7 is an elevation in section of modified apparatus for applying liquid to a strand.

Briefly, the invention comprises a device for applying a liquid to a strand having a vertical or steeply inclined passageway extending through it which is constricted intermediately of its ends to provide an upper portion and a lower portion which are above and below respectively of an aperture through the constriction of sufficient size to permit substantially frictionless passage of the running strand proceeding in an upward direction. The liquid supply duct is positioned to feed liquid into an upper portion of the passageway. An open top conduit is positioned to receive liquid overflowing from the upper portion of the

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passageway and the liquid passing through the aperture to the lower portion.

Fig. 1 illustrates a liquid applicator according to the invention positioned along the path of a running strand 6 as it passes between two rotatable members 8 and 9 which are merely illustrative and may represent thread advancing rolls, godets, nip rolls, or simple stationary guides. The applicator 10 is generally annular in shape as illustrated in the plan view of Fig. 3. It has an upper recess 12 and a lower recess 14 extending inwardly toward each other from the ends of the body of the applicator. The recesses are connected by an aperture 15 through which a strand 6 passes without any substantial contact with the applicator. The aperture may be of any size providing ample clearance for the strand 6 but preferably has a diameter of sufficient size, e. g. $\frac{1}{8}$ of an inch, so that a lacing hook may be inserted therethrough. A nipple 17 extends through the wall of the device into the upper recess. A liquid supply tube 19 is secured to the portion of the nipple 17 extending away from the body of the device and is used to supply a liquid to the applicator to effect a desired treatment of the strand 6. If desired, the nipple 17 and the tube 19 may be used, as shown, to support the applicator. An edge 22 comprising an end-surface of the body is formed by the junction of the outer surface of the body and the surface of the lower recess 14 and slopes downwardly at a substantial angle with the horizontal for conducting liquid onto the body extension or lip 21. The sloping edge 22 collects liquid which overflows the recess 12 and passes down the outer surface of the body of the applicator as well as other liquid which passes through the aperture 15 and drains downwardly along the surface defining the recess 14. A collecting trough 24 is positioned below the extension 21 to receive the liquid which drops therefrom.

Fig. 2 illustrates the manner in which the apparatus of Fig. 1 may be laced. Assuming the reels 8 and 9 to be rotating, the strand 6a may be pulled from the surface of the reel 8 by a hook 25 into a position or path such as illustrated from which it may be reached and seized by another hook 26 passed downwardly through the aperture 15. The hook 25 should then be disengaged from the strand which is then quickly pulled up through the applicator with the hook 26 and into contact with the reel 9. For this reason, the lower recess 14 of the applicator is joined with the aperture 15 in a smoothly curved surface such as suggested in the construction of an hour-glass so that the hook used for lacing the apparatus may be

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rapidly pulled through the applicator without the possibility of its being caught.

Fig. 4 illustrates a modified device according to the invention in which an hour-glass shaped passageway extends through the body section 30. An annular liquid-collector 32 is secured to the lower rim of the body section to provide positive collection of liquid which flows downwardly over the outer and inner surfaces of the body section. A plurality of openings 34 extending through the lower rim of the body section 30 permit communication of liquid between the annular regions within the collector separated by the body section rim. Collector 32 has a tubular extension 33 for channeling liquid into a tube 35 secured thereto so that the liquid may be led away from the liquid-treating region without being discharged over other apparatus or coming into contact with the running strand at less advanced positions along its path. Liquid is introduced into the upper enlarged section 36 of the passageway through a duct 37 connected with a tubular extension 38 of the body section. The assembled applicator of Fig. 2 may be supported as shown by a member 40 in threaded relationship with the body section 30.

Fig. 5 illustrates the use of the invention in one of its simplest embodiments which may be used when a thread 42 is passed along an inclined path. The applicator of Fig. 5 comprises a simple annulus 44 of entirely symmetrical proportions which is drilled and threaded to receive a threaded end of a support member 45 and a nipple 47 for connecting the upper portion 49 of the hour-glass shaped passageway 51 to a supply tube 48. Liquid readily drains from the body section along the inclined lower rim 53 and the exterior surface 54 into a receiver 55. The surface 54 conducts the overflow from the upper enlarged portion of the passageway and comprises, in general, a portion of the outer surface of the annular body 44 which is lowest because of the inclination of the body. The rim 53 defines the junction of the surface of the lower portion of the hour-glass shaped passageway with the outer surface of the annulus including the surface 54. This surface is preferably free of any projections such as the support member 45 or the nipple 47 which might interfere with the passage of the liquid into the receiver 55. Members attached to the annulus 44 preferably extend from some portion of its outer surface over which the liquid does not flow, such as an exterior surface portion which is opposite to that of 54 and higher with respect thereto.

Fig. 6 illustrates an applicator 60 of modified design within the scope of the present invention. This applicator comprises an elongated upper section which may be constructed to any length to obtain any depth desired in the body of the liquid contained in the upper recess or chamber 62 as defined by the distance between the aperture 63 and a liquid outlet tube 64. Since in applicators of elongated upper section of this type, appreciable liquid head will be produced at the aperture 63, considerable loss of liquid is likely to occur during periods such as when liquid is being circulated through the applicator prior to lacing the strand therethrough. The chamber 62 receives liquid through feed tube 65.

To prevent excessive loss of the liquid and the contamination which might occur by liquid running from the applicator down a stationary strand into other strand treating equipment, a small ball 66 of larger diameter than the aperture 63 is provided in the upper recess 62 of the applicator. This ball is preferably of a density slightly greater

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than the liquid circulated through the applicator so that when the strand is running, the ball is easily deflected by the strand; normally the ball, though not buoyant in the liquid, will be carried by the current to the upper surface of the liquid adjacent its outlet tube 64. When the strand is not running or no strand is passing through the applicator, the ball assumes a position over the aperture 63 and prevents the draining of liquid therefrom. Such a ball may be readily used in the other applicators herein described.

Fig. 7 illustrates still another embodiment of the invention comprising a tube 76 through which the running strand 6 may be passed. An aperture 72 permits the introduction of a liquid into the tube through a clamp-on fitting 75 having a passageway 77 contiguous with the aperture 72 and the bore of an L fitting 73 which connects the fitting 76 and a supply tube 79. The bore of the fitting 76 through which the tube 70 extends has a diameter sufficiently larger than that of the tube to accommodate a sleeve 80 of resilient material such as a soft or rubber-like vulcanizate. The sleeve 80 is provided with an aperture in alignment with the aperture 72 of the tube 70 and the passageway 77 of the fitting. A satisfactory seal is obtained between the fitting and the tube by tightening a screw 82 in threaded relationship with the fitting against the sleeve 80.

The end-portions 73 and 74 of the tube 70 are constricted to control the discharge of fluid from the tube. As shown, the strand passes in an upward direction through the tube. With proper control of the pressure in the liquid being supplied to the tube 70, the drag of the strand on the liquid will overcome any tendency of the liquid to pass from the tube through the constricted portion 73. The constriction of the tube at 74 effects substantial stripping of liquid from the strand as it leaves the tube, otherwise, the strand will drag a substantial volume of liquid from the tube in proportion to the rapidity of strand advancement. The constricted tube portion 74 may be necked to provide the minimum practicable diameter permitting lacing of the tube and passage of the strand without appreciable friction. The amount of liquid carried from the tube may in this manner be greatly reduced for any given rate of strand advancement. However, with the strand-discharging end of the tube 70 narrowly constricted as at 74, a considerable quantity of liquid will be dragged from the tube at rapid rates of strand advancement. The liquid carried from the tube may be separated from the strand by means such as centrifugal separation, i. e. by leading the strand around a godet (not shown).

Such an apparatus as described with respect to Fig. 7 is very useful in applying a hot liquid to a strand to effect a heating thereof. If a succeeding treatment of the strand is to be essentially a liquid treatment, the heat treatment may in many situations be advantageously administered by supplying a heated liquid of the type to be used in the subsequent liquid treatment. A liquid treatment such as contemplated might be conducted by storing a section of the running strand on a thread-advancing reel and spraying the liquid onto the reel. As an example of one way in which the device of Fig. 7 may be used, a liquid treatment such as suggested above might be preceded by a yarn-stretching operation which is facilitated by heating the yarn. The tube 70 in this situation would be placed so that the yarn passes through it while passing between stretching godets.

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While preferred embodiments of the invention have been shown and described, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Apparatus for applying liquid to a running strand while it passes along a steeply inclined to vertical path, the apparatus comprising a body having surfaces which define a pair of recesses extending inwardly from the opposite ends of the body, the body having a passageway for connecting the nearer portions of the recesses and an outer liquid-conducting surface extending between and joining with the surfaces defining the recesses, means for feeding a liquid into one of the recesses, said surface defining the other recess being flared as it extends away from the passageway and joining with the outer surface of the body to form an edge at the end of the body, and means for supporting the body with the first-named recess disposed above the passageway and the other recess with said edge extending at an inclination between a vertical and horizontal direction.

2. Apparatus for applying liquid to a running strand while it passes along a steeply inclined to vertical path, the apparatus comprising a body having generally coaxial surfaces which define a pair of recesses extending inwardly from opposite ends of the body, the body having a generally

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coaxial passageway for connecting the nearer portions of the recesses and an outer liquid-conducting surface extending between and joining with the surfaces defining the recesses, means for feeding the liquid into one of the recesses, the surface defining the other recess being tapered outwardly with respect to the axis away from the passageway and joining with the outer surface of the body to form an edge at the end of the body, said edge extending at an inclination with a normal and a parallel to said axis, and means for supporting the body with the recess for receiving liquid from the forwarding means disposed above the other recess, the path of the running strand extending through the passageway, and the edge extending at an inclination between a vertical and horizontal direction.

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