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3,309,752

APPARATUS FOR PRODUCING SLUB YARN

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FIG. 1

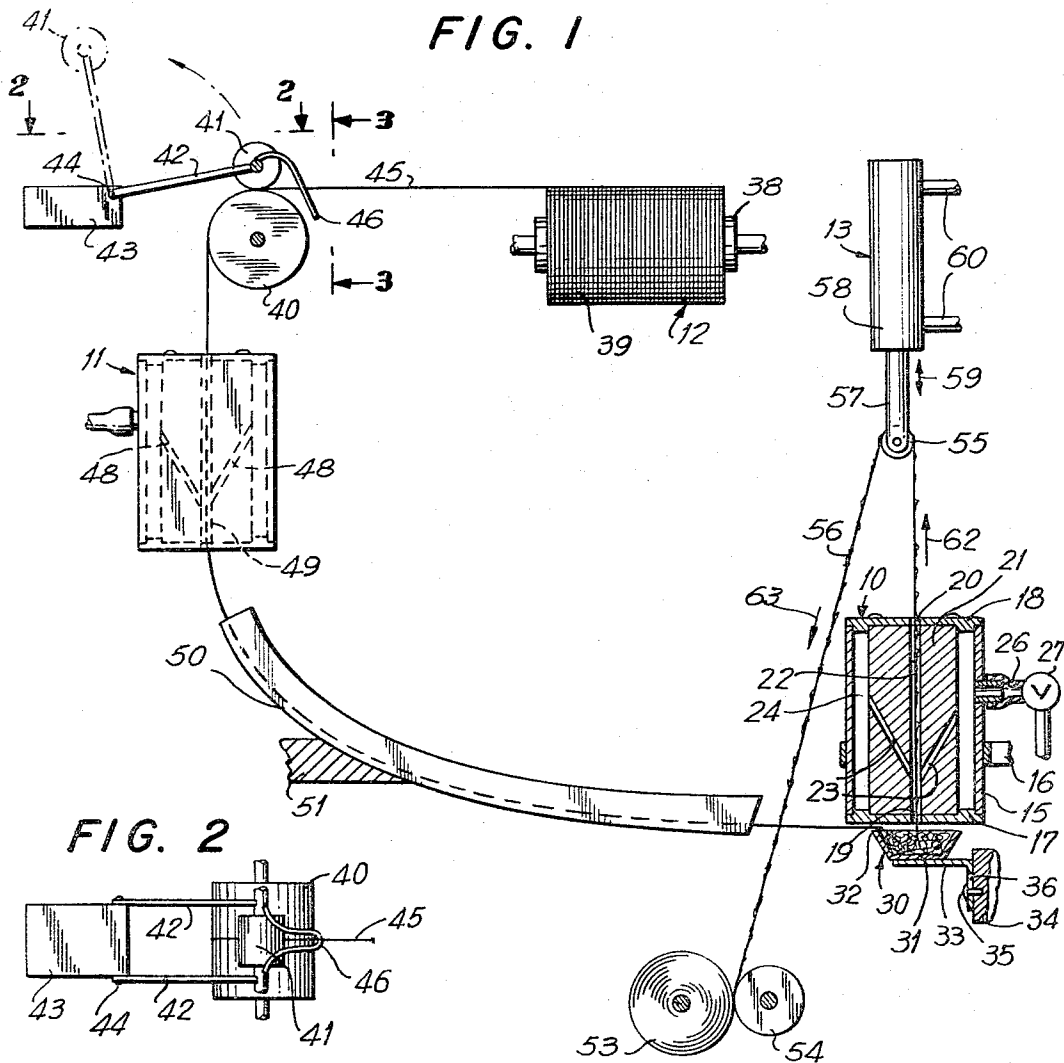


FIG. 2

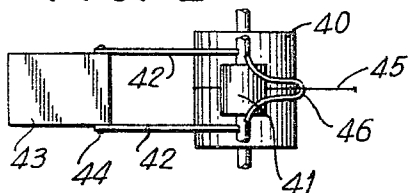
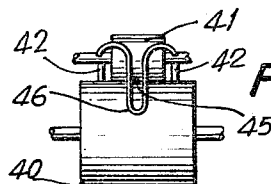


FIG. 4



FIG. 3



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APPARATUS FOR PRODUCING SLUB YARN
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This invention relates generally to treatment of yarn, and is especially concerned with improvements in method and apparatus for treating yarn by the formation of slubs or spaced yarn portions of greater denier than the remainder of the yarn.

This application is a continuation-in-part of my copending patent application Ser. No. 352,538 filed Mar. 17, 1964.

In the slubbing of yarn, it is highly advantageous to provide slubs at locations along the yarn which are randomly or irregularly spaced, to more accurately simulate in woven fabric the natural silks.

Accordingly, it is an important object of the present invention to provide yarn-slubbing apparatus which is capable of many variations in operation to produce slubs in a highly irregular or random spacing or accurate simulation in woven fabrics of natural silks.

It is a further object of the present invention to provide apparatus for producing novelty effects in yarns, such as spaced slubs, in a rapid and highly efficient manner, for effecting substantial reduction in cost.

It is a further object of the present invention to provide yarn-slubbing apparatus having the advantageous characteristics mentioned in the preceding paragraphs, which is durable and extremely reliable in use, being substantially completely automatic in operation, and capable of an extremely long useful life.

The instant invention more particularly contemplates the provision of a novel means for feeding unslubbed yarn to a slubbing head for improved slubbing action, and a unique means for withdrawing slubbed yarn from the slubbing head, all for the purposes set forth above.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations and arrangements of elements and method steps, which will be exemplified in the method and construction hereinafter described, and of which the scope will be indicated by the appended claims.

In the drawings:

FIGURE 1 is an elevational view showing apparatus for slubbing yarn constructed in accordance with the teachings of the present invention;

FIGURE 2 is a partial horizontal view taken generally along the line 2—2 of FIGURE 1;

FIGURE 3 is a partial elevational view taken generally along the line 3—3 of FIGURE 1; and

FIGURE 4 is a fragmentary view of slubbed yarn produced in accordance with the teachings of the present invention, enlarged for clarity.

Referring now more particularly to the drawings, and specifically to FIGURE 1 thereof, a slubbing head is there generally designated 10, and unslubbed yarn is fed to a slubbing chamber or receptacle 30 by feeding means 11 from a source of yarn supply 12. Withdrawal means 13 is provided for removing slubbed yarn from the slubbing chamber 30, and through a slubbing nozzle or head 10.

The slubbing head or nozzle 10 may be generally similar to that disclosed in said copending patent application, including an outer open-ended cylinder 15 disposed generally vertically and fixedly secured by a suitable mount-

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ing bracket 16. The cylinder has its lower and upper ends closed by generally circular end members 17 and 18, respectively, having aligned central thru holes 19 and 20. Disposed in spaced relation concentrically within the cylindrical shell or outer wall 15 is a cylindrical inner member or block 21, being fixedly secured with its lower and upper ends engaged in conforming internal recesses of lower and upper end walls 17 and 18. The inner member of block 21 is formed with a central thru bore 22 in registry with the end holes 19 and 20; and, the member 21 is further formed with a plurality of oblique bores 23 extending downwardly and radially inwardly of the body 21. The spaced relation of outer shell 15 and inner body 21 defines therebetween an annular chamber 24 having its lower and upper ends closed by the lower and upper end walls 17 and 18. The oblique bores 23 have their upper, radially outer ends opening into chamber 24, and their lower radially inner ends opening into bore 22. Fluid-conduit means 26 is connected between the chamber 24 and a source of fluid under pressure, a valve 27 or other flow-control means being provided in the conduit means 26.

Beneath the lower end wall 17, generally centrally thereof, is located an upwardly facing cupped dish or receptacle, which defines the turbulence or slubbing chamber 30 as will appear presently. The receptacle, or chamber 30 may have a generally circular impervious bottom wall 31 and an upwardly flaring frusto-conical impervious side wall 32 extending peripherally about the bottom wall. Thus, the receptacle 30 has its upper side open, its lower side being closed by imperforate bottom wall 31, and its periphery being closed by imperforate circumferential wall 32. A mounting structure or bracket 33 may carry the upwardly facing receptacle 30 and mount the latter in position on a suitable support 34. Vertical adjustment of the receptacle 30 toward and away from the lower end wall 17 may be afforded by a fastener 35 in slot 36.

In use, air or other suitable fluid under pressure is conducted through conduit 26 to chamber 24 and thence downwardly through bores 23, the lower region of bore 22, aperture 19 and into receptacle 30 through the open upper side thereof.

The yarn-supply means 12 includes a rotatable supply roll 38, which may be freely rotatable, if desired, and carries a coiled supply of unslubbed yarn 39. A withdrawal roll 40 is rotatably mounted beyond one end of the supply roll 38, transversely thereof and may be driven by any suitable means, such as an electric motor. The take-off roll may be of steel or other suitable material. A friction roll 41, of polyurethane or other suitable frictional material, is arranged for cooperative rolling engagement with the take-off roll 40, and may be freely rotatably mounted on an arm 42. The mounting arm 42 extends from the friction roll 41 to a support member or base 43 where it is pivoted, as at 44. Thus, the friction roll 41 is swingable from its down position, illustrated in solid lines, resting on the take-off roll 40 and combining therewith to define a bite or nip for receiving therebetween an unslubbed yarn 45. The friction roll 41 may be swung away from the take-off roll 40 about its pivotal mounting 44 to the position shown in dot-and-dash outline. A yarn guide 46 may be carried by the arm 42, in the configuration of a generally U-shaped wire, for receiving therethrough and guiding the yarn 45 into the nip or bite of rolls 40 and 41.

The feeding means includes an open-ended nozzle 11 for receiving therethrough the unslubbed yarn 45 from the take-off roll 40. The feeding nozzle 11 may be similar to the slubbing nozzle 10, including obliquely downwardly convergent bores 48 discharging to a central bore 49 receiving the yarn 45, and exiting from the lower end

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of the central bore. The yarn-feeding nozzle 11 may be arranged at an elevation above that of the slubbing nozzle 10 and spaced laterally from the latter. A yarn guide or trough 50 may extend arcuately from adjacent to the lower end of feed nozzle 11 to one side of receptacle 30, terminating generally horizontally to the receptacle, for receiving and guiding yarn from the feed nozzle. Any suitable support means, such as at 51 may be provided to maintain the yarn guide or trough 50 in position.

The slubbed-yarn-withdrawal means includes a rotary, driven take-up roll 53, driven by any suitable means, and a cooperating idler roll 54 frictionally engaging the take-up roll.

At a location generally directly over the slubbing nozzle 10 is provided an idler roll or slubbed-yarn support 55 about which extends the slubbed yarn 56 emerging from the upper end of slubbing nozzle 10. The slubbed-yarn support or roll 55 may be freely rotatably carried by one end of a piston rod 57 reciprocally mounted in a cylinder 58. In the illustrated embodiment the piston rod 57 and cylinder 58 extend generally vertically upward from the yarn support or roll 55, and the cylinder may be supported by any suitable means (not shown). However, the piston rod 57 is actuated, effecting vertical reciprocation thereof, as indicated by arrows 59. Piston actuation may be of any suitable type, say pneumatic, as through conduits 60.

In operation, actuation of the cylinder 58 may be effected by a programmed or timed actuating means, not shown, to effect any desired program of reciprocation of roll 55.

It will now be appreciated that the take-off roll 40 serves to remove unslubbed yarn 45 from coil 39, the rate of removal being controlled by the driven speed of rotation of take-off roll 40 when the friction roll 41 is down. The friction roll 41 may be raised, so that take-off action of the roll 40 against the yarn 45 is less positive, if desired. From the roll 40 the unslubbed yarn passes downward through the feeding nozzle 11 which exerts a pneumatic force to convey the yarn endwise downward into the upper end of sloping yarn guide or trough 50. The rate of fluid flow through nozzle 11 may be varied or constant, as desired, which conditions may be selectively combined with the feeding conditions of take-off roll 40 and friction roll 41 to achieve a variety of yarn-feeding actions.

From the lower end of nozzle 11 the yarn is blown into the guide or trough 50 and progresses therethrough, emerging from the lower end thereof laterally toward the receptacle 30 and into the interior of the receptacle. It is in the receptacle 30, by the turbulence of fluid emerging from bore 22 and aperture 19 downward into the receptacle that the slubbing is accomplished. An example of slubbed yarn is shown in FIGURE 4, illustrating the irregularly roughened and tangled condition thereof. In this roughened condition the slubbed yarn 56 is drawn upward through the bore 22 of slubbing nozzle 10 against the current of fluid pressure therein. The slubbed yarn passes in the direction of arrow 62 over roll 55 and thence in the direction of arrow 63 for winding or coiling about take-up roll 53. The take-up roll 53 may be driven at a constant speed, if desired, or at a variable speed, it being essential that the average circumferential speed of

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take-up roll 53 by appreciably less than that of take-off roll 40, to thereby provide for the material consumed in forming slubs.

While the above-discussed versatility in varying the yarn feed and take-up may be employed to impart a great variety of slubbing patterns to the slubbed yarn, of primary importance is the reciprocation of yarn guide 55 which may effect a variety of slubbing patterns by changing the rate of yarn withdrawal from the slubbing chamber 30.

From the foregoing it is seen that the present invention provides an apparatus for producing slubbed yarn which fully accomplishes its intended objects and is well adapted to meet practical conditions of manufacture, installation, maintenance and use.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. Apparatus for forming slubs in yarn comprising: a yarn supply, pneumatic means for blowing yarn from said supply under relatively light tension toward an open-top receptacle defining a turbulence chamber, means to guide said yarn into said receptacle, a slubbing nozzle directing air downwardly into said receptacle through the open top thereof, withdrawal means drawing slubbed yarn from said receptacle upwardly through said slubbing nozzle at a rate less than the rate of feed into said receptacle, means intermediate said slubbing nozzle and said withdrawal means for varying the rate of withdrawal of slubbed yarn from said receptacle to vary the frequency of slub formations, said intermediate means comprising a non-binding yarn guide for continuously guiding the yarn from said slubbing nozzle and means to reciprocate same.

2. Apparatus according to claim 2, wherein said reciprocating means is a pneumatic cylinder, and, further including a take-off roll for withdrawing yarn from said supply to control the rate of feed thereof, and, means to regulate the flow of air to said slubbing nozzle; whereby the size of the slub may be varied by variations in the rate of feed of yarn to said receptacle and in the flow of air to said slubbing nozzle, and, the frequency of the slub formations may be varied in any random or specific pattern by variations in the rate and frequency of reciprocation of said pneumatic cylinder.

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