May 27, 1947. A. CAVEDON 2,421,010

METHOD OF AND APPARATUS FOR PRODUCING NUBBED YARNS

Filed May 31, 1941 2 Sheets-Sheet 1

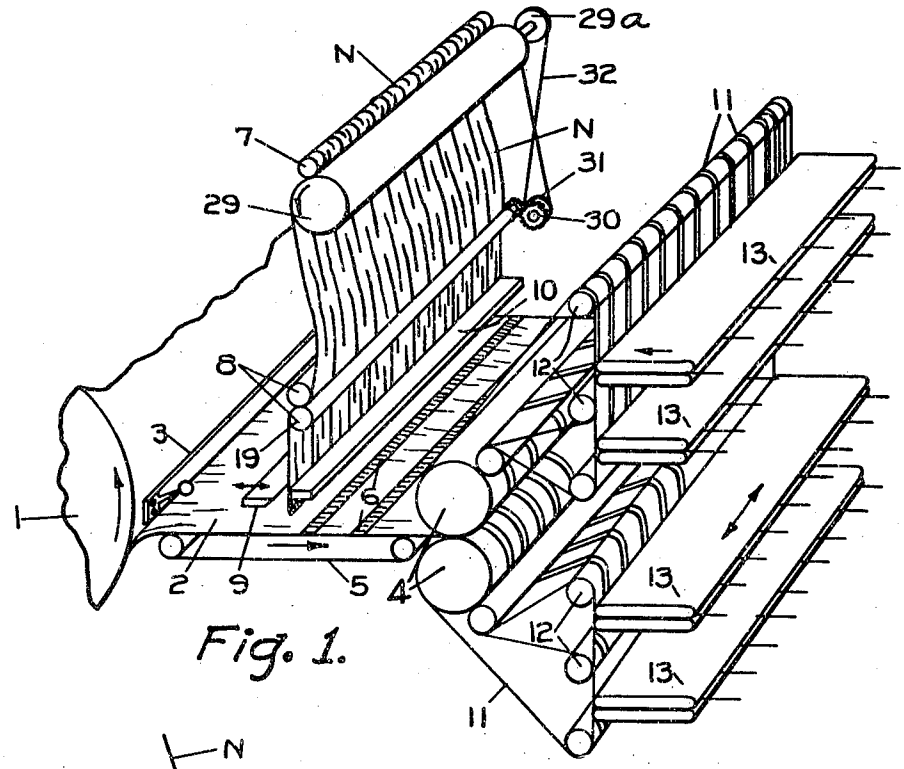


Fig. 1.

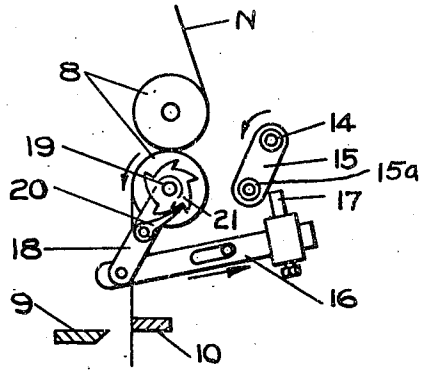


Fig. 4.

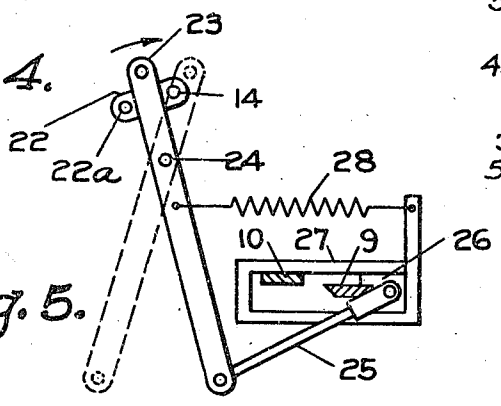


Fig. 5.

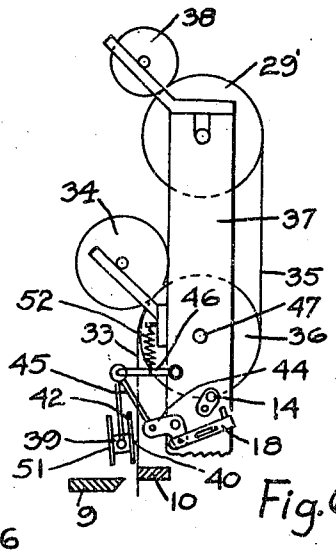


Fig. 6.

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METHOD OF AND APPARATUS FOR PRODUCING NUBBED YARNS

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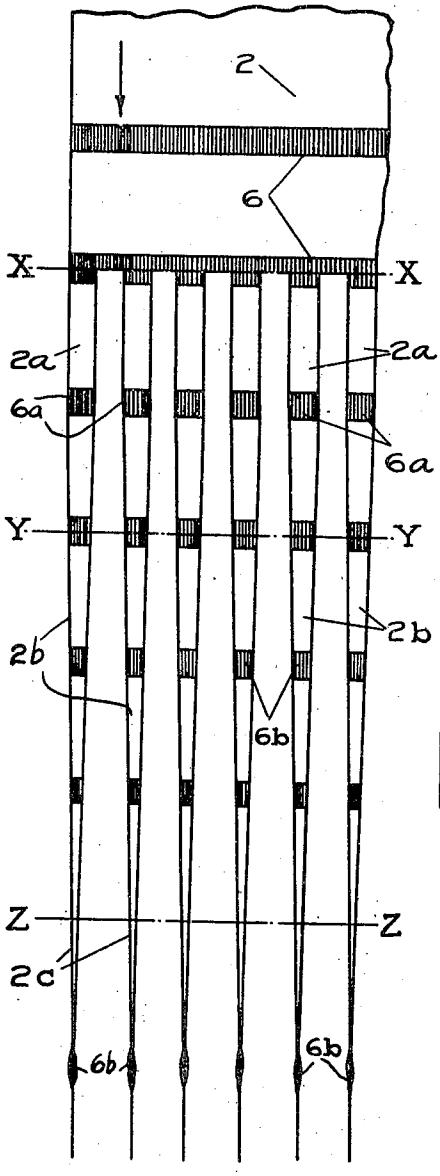


Fig. 2.

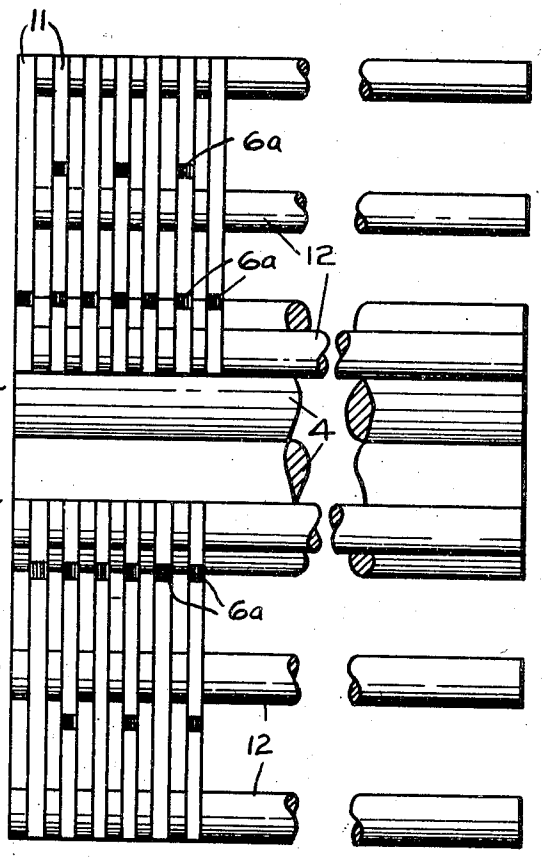


Fig. 3.

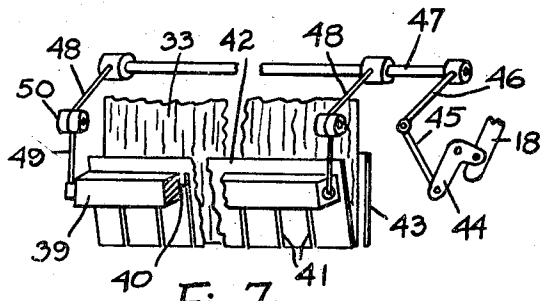


Fig. 7.

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METHOD OF AND APPARATUS FOR PRODUCING NUBBED YARNS

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Application May 31, 1941, Serial No. 395,988

3 Claims. (Cl. 19—145)

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The present invention relates to an improved method of and apparatus for producing soft nub or spot yarns, i. e., yarns having incorporated therein nubs or spots of fibrous material of different character or color, as contrasted to the yarns themselves.

Nubbed yarns have heretofore been produced by feeding soft or unspun nub material in the form of separate strands to a point adjacent the doffer of a finishing card, where the strands are cut to deposit separate nubs on the traveling web of carded fibres, before the web is acted upon by the usual dividing and condensing devices for formation into separate slivers. Thus, the nubs dropped onto the web become pressed into the same, and as the web is divided and condensed, the nubs finally become incorporated in the resulting yarns. Apparatus for feeding and cutting nubs from separate strands is described in my copending application, Serial No. 358,991, filed September 30, 1940, since issued as Patent No. 2,334,542 dated November 16, 1943.

While the above described apparatus for depositing separate nubs on a carded web is satisfactory for certain types of material, difficulties have been encountered in obtaining finished nubbed yarn of uniform quality, due to the tendency of the separately cut nubs to distribute themselves unevenly on the carded web. As a result, nubs will either be bunched along the yarns, without being firmly attached, or will be lacking altogether, due to loss of some of the loose nubs in the condensing operation.

The object of the present invention is to provide an improved method of and apparatus for producing nubbed yarns in such a manner as to completely overcome difficulties heretofore encountered in the production of such yarns, due to the inherent tendency of separate nubs to distribute themselves unevenly on the carded web. Briefly stated, the present invention resides in presenting the nub material to the carded web in the form of a continuous sheet or lap, wherein the fibres of the nub material are loosely connected in a thin web closely approximating the web of carded fibres that is to be formed into yarns. Coincidentally with the travel of the carded web from the doffer to the condenser, the continuous lap of nub material is fed and cut intermittently to deposit strips of such material transversely of the web and at regular intervals. These lap strips then travel with the web into the

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condenser, where both the web and the overlying lap strips are simultaneously subjected to a dividing and condensing action. The net result is the uniform division of the lap strips of nub material simultaneously with the web, so that when the condensed slivers of web and lap are subsequently twisted, the nub material becomes an integral part of the resulting yarns, appearing as spots at regular intervals therein.

The above and other advantageous features of the invention will hereinafter more fully appear from the following description considered in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic view in perspective, illustrating the principle of the invention.

Fig. 2 is a plan view, on an enlarged scale, illustrating the division of the web and lap strips into slivers for formation into yarn.

Fig. 3 is a view in elevation of the dividing rolls of the condenser, further illustrating the dividing action and resulting distribution of the nub material.

Figs. 4 and 5 are fragmentary views, illustrating the driving means for the lap feeding and cutting devices shown in Fig. 1.

Fig. 6 illustrates a modification in the manner of feeding the lap of nub material.

Fig. 7 is a fragmentary view, illustrating a portion of the parts of Fig. 6.

Referring to the drawings, a portion of the doffer of a finishing card is illustrated at 1, from which a web 2 of carded fibres is adapted to be stripped in the usual manner by a comb 3. After being stripped from the doffer 1, the web 2 passes to the dividing rolls 4 of a condenser, the operation of which serves to form slivers from the web for subsequent conversion into individual yarns in the usual manner. An apron 5 serves to support the web 2 in its passage between the doffer 1 and the dividing roll 4, and the present invention contemplates the provision of means to deposit continuous strips 6 of fibrous nub material upon the web 2, which strips extend transversely at regular intervals across the web, as indicated.

A supply of nub material is indicated at N, as being in the form of a continuous sheet or lap wound on a roll 7. The lap is composed of fibrous material of different color or character from the fibres composing the web 2, with the lap fibres in relatively loose relation approximating the

condition and arrangement of the fibres constituting the web 2. The lap sheet N extends downwarly between feed rolls 8, and then between the relatively movable blades 9 and 10 of a cutting device. The blades 9 and 10 are located a short distance above the web apron 5, and the rolls 8 are adapted to intermittently feed predetermined amounts of lap between the blades when the latter are open, as shown. Following each lap feed, the blade 9 is reciprocated, as indicated by the arrows, to cut off a continuous lap strip 6, which falls upon the traveling web 2 of carded fibres.

As a result of the intermittent feeding and cutting of the lap, the strips 6 will be laid at intervals on the traveling web 2, in advance of its entry between the dividing rolls 4 of the condensing device. The essential elements of the condensing device are indicated diagrammatically in Fig. 1, as consisting of several sets of tapes 11 adapted to pass around guide rolls 12, with the tapes 11 being adapted to convey the divided fibres to a plurality of pairs of condensing aprons 13.

Referring now to Fig. 2, it is evident that as the web 2, with the lap strips 6 extending transversely thereof enters between the rolls 4, the tapes 11 will divide the web longitudinally. Furthermore, as each strip 6 enters between the rolls 4, the strip will be divided in the same manner, the axis of such division being indicated at *x—x* in Fig. 2. As the tapes 11 carrying the divided fibres pass to the several rolls 12, it is evident that each band of divided web fibres 2*a* will carry separate groups 6*a* of lap fibres, as divided from the lap strips 6. These groups 6*a* of lap fibres will be absolutely uniform length and width, and will be spaced along the bands 2*a* at regular intervals, as determined by the frequency of the lap feed and cutting with relation to the rate of travel of the carded web 2. It is evident from a consideration of Fig. 3, that the arrangement of the groups 6*a* of lap fibres, will be absolutely uniform and symmetrical as the several sets of tapes 11 carry the bands 2*a* between the condensing aprons 13.

As indicated by the arrows in Fig. 1, the aprons 13 are driven in unison, accompanied by relative reciprocatory movement, so that each band of divided web fibres 2*a* is condensed into a continuous sliver 2*b*. This condensing action also takes place at intervals on the groups 6*a* of lap fibres, which become integrally united with the web fibres 2*a* at regular intervals, due to the fact that both the web and lap fibres extend in substantial parallel relation. The condensing action is indicated *at y—y* in Fig. 2, from which it is evident that the individual slivers 2*b* will have the same appearance as regards the incorporation of the groups of lap fibres 6*a*, as have the bands 2*a*. Therefore, when the slivers 2*b* are twisted, as indicated at *z—z* in Fig. 2, the finished yarns 2*c* will exhibit nubs 6*b* at regular intervals, which nubs, while slightly larger than the finished yarns, will nevertheless form integral parts of the yarns, due to the dividing and condensing action previously described. That is to say, it will be practically impossible to separate the nubs 6*b* from the final yarns 2*c*, due to the interlocking of fibres that follows from dividing and condensing the lap strips 6, simultaneously with the carded web 2.

As a result of the practice of my invention, it is possible to produce finished yarns providing uniformly spaced nubs composed of almost any type of fibrous material that can be formed into a continuous sheet or lap. The excellent results that have been obtained are due largely to the fact that there is no initial condensation of the nub material, such as occurs when the material is formed into individual strands, in advance of being cut into short lengths and deposited as ready-formed nubs more or less at random on the moving web of carded fibres. In other words, the spots which appear in finished yarns resulting from the practice of the present invention, never really exist as separate nubs, such as might be cut from continuous strands, but on the contrary, are merely groups of fibres in web form intimately related with the fibres of the carded web by the dividing, condensing and final spinning operations.

As previously pointed out, apparatus for feeding and cutting nub material as individual strands is described in my aforesaid copending application, Serial No. 358,991, and for purposes of illustration, a similar mechanism is utilized for feeding and cutting the lap of nub material, as utilized in accordance with the present invention. As best shown in Fig. 4, a shaft 14 rotatably driven from any suitable source of power, extends across the apparatus above the knife blade 10 and carries at one end a crank 15, having a roll 15*a* adapted to impart a reciprocatory movement to a slide 16, carrying an actuator 17. The opposite end of the slide 16 carries a pawl arm 18 turnable on a shaft 19 carrying the lower feed roll 8. A pawl 20 engages a ratchet wheel 21, turnable with the shaft 19, so that reciprocatory movement of the slide 16 by the crank 15 imparts intermittent rotative movement of the feed rolls 8, which are geared together for rotation in unison.

The shaft 14, as viewed from the opposite side in Fig. 5, carries a second crank 22, having a pin 22*a* adapted to actuate one end of a lever 23, pivoted at 24. The opposite end of the lever 23 is connected by a link 25 to a cross bar 26 horizontally movable in a guideway 27. A similar guideway is provided at the opposite side of the apparatus, and the movable blade 9 is supported by the bar 26. Consequently, each revolution of the drive shaft 14 is adapted to impart a horizontal movement to the knife blade 9 with respect to the stationary blade 10, with the blade 9 being returned to its open position by a spring 28 acting on the lever 23.

The cranks 15 and 22 are mounted on the drive shaft 14 in such angular relation that the feed rolls 8 are turned through a predetermined angle while the knife blades 9 and 10 are held open, to feed a predetermined length of the nub lap N downwardly between the blades, as indicated in Fig. 1. This feeding of the lap is followed by movement of the blade 9 as the shaft 14 completes its revolution, thereby causing a continuous lap strip 6 to be severed and deposited upon the moving carded web 2. The lap is shown as having been fed, in Fig. 1, with the knife blade 9 about to operate, so that the lap strip 6 previously cut has already been moved away from beneath the stationary blade 10 to the extent shown.

In order to prevent the relatively loose fibres of the lap N being subjected to any pulling strain, a drum 29, which freely supports the lap roll 7 on its periphery, is adapted to be intermittently driven in unison with the feed rolls 8. To this end, the lower feed roll 8 is connected by gearing 30 to a pulley 31, which is in turn connected by a belt 32 to a pulley 29*a* on the drum 29. The ratio of the gearing 30 and pulleys 29*a* and 31 is such that any point on the periphery

of the drum 29 moves through substantially the same distance that the lap is fed between the knife blades by a single feeding movement of the rolls 8.

Referring now to Figs. 6 and 7, there is shown a modified arrangement for handling a lap composed of the fibres of an extremely fragile light material such as rabbit's hair, which tends to separate easily. In this arrangement, the lap 33 is wound on a roll 34 in overlying relation to a continuous web 35, of paper or other suitable material, having a much greater tensile strength than the lap 33. The paper web 35 therefore separates overlying layers of the lap to prevent sticking between layers, and both layers carried by the roll 34 bear on the periphery of a drum 36 mounted to rotate freely between spaced frame members 37.

The lap 33 passes downwardly from the drum 36 directly between the knife blades 9 and 10, and it is to be noted that the relatively fragile lap has only a very short distance to travel. The paper web 35, which is in direct contact with the drum 36, passes around the drum and upwardly to a drum 29', which is adapted to be intermittently driven from a ratchet shaft 19' in the same manner as the drum 29 of Fig. 1 is driven from the lower feed roll shaft 19. A take-up roll 38 bears freely on the periphery of the drum 29', around which roll 38 the paper web 35 is wound as the drum 29' turns. Therefore, intermittent turning of the drum 29' will serve to unwind the paper web from the roll 34, and thereby feed the lap 33 downwardly for operation upon by the knife blades, without imparting any tension to the lap such as would separate its fibres.

In order to positively hold a predetermined amount of lap 33 between the knife blades coincidentally with operation of the feed drum 29' to draw off the paper web 35, a combing device is provided, which is best shown in Fig. 7. This device comprises a bar 39 extending the width of the lap 33, and providing a number of teeth 40. The teeth 40 extend through slots 41 provided in a plate 42 spaced from a second plate 43, with the lap 33 passing between the plates, which terminate just above the stationary knife blade 10.

The plate 42 is inclined from the vertical, so that the movement of the bar 39, as guided by the plate, causes the teeth 40 to be entirely withdrawn from the web 33, with the bar in its upper position. However, as the bar 39 moves downwardly, the teeth 40 penetrate the web slightly, so as to hold the web adjacent the knife blade 10 at the end of the web feeding movement, thereby insuring that a strip of uniform width will be cut from the fragile web by operation of the knife blades.

Reciprocatory movement is adapted to be imparted to the bar 39 by means of an extension 44 provided on the pawl arm 18, which receives an oscillatory movement from the drive shaft 14, as previously described with reference to Fig. 4. The extension 44 is connected by a link 45 to an arm 46 turnable with a shaft 47, rotatably mounted between the frame members 37. The shaft 47 also carries spaced arms 48 inside the frame members 37, with the free ends of the arms 48 connected to the bar 39 by rods 49 and swivel joints 50. The joints 50 permit relative pivotal movement between the rods 49 and the arms 48 as the bar 39 moves up and down. Therefore, each turning movement of the feed drum 29' through the ratcheting device is accompanied by downward movement of the bar 39, with a guide

51 parallel to the plate 42 serving to swing the teeth 40 inwardly enough to engage the lap 33 at the end of the feeding movement. On the return non-feeding stroke of the pawl arm 18, a spring 52 serves to move the bar 39 upwardly, accompanied by withdrawal of the teeth 41 from the lap. Thus, each revolution of the drive shaft 14 is accompanied by indirect feeding of the lap by unrolling of the paper web, and holding of the lap adjacent the knife blades by the comb bar 39 at the end of a feed, prior to operation of the knife blades.

From the foregoing, it is apparent that by the present invention, there is provided an improved method of and apparatus for the production of nubbed or spotted yarn, characterized by the feeding of the nub material as a continuous sheet or lap, from which strips are cut for deposit at regular intervals on the moving web of carded fibres to be subsequently divided into slivers coincidentally with the web itself.

I claim:

1. Apparatus for producing spotted yarns comprising in combination means for conveying a web of carded fibres in a substantially horizontal plane from a doffer, with the carded fibres extending generally in the direction of movement of said web, means for supporting a supply of fibrous nub material in lap sheet form, adjacent to said web, means for cutting continuous strips from said lap and depositing said strips at regular intervals directly upon said moving carded web, with the strip fibres approximating the arrangement and condition of the underlying web fibres, and means for dividing and condensing said lap strips simultaneously with said carded web to produce spotted yarns, each having equal portions of said strips incorporated therein at regular intervals.

2. The improvement in the manufacture of spotted or nubbed yarns which consists in continuously conveying a web or carded fibres in a substantially horizontal plane between a doffer and a dividing and condensing apparatus, with the fibres of said carded web extending substantially in the direction of movement of said web, intermittently feeding a continuous sheet of fibrous nub material downwardly in the direction of said carded web to a point just above said web, cutting transversely across said nub sheet in the intervals between the feeding thereof to deposit continuous strips, as cut from said sheet, in uniformly spaced relation across said moving web of carded fibres, with the fibres of each strip approximating the arrangement and condition of the underlying fibres of the carded web, and finally dividing and condensing said nub strips simultaneously with said carded web to produce spotted yarns each having equal portions of said strips incorporated therein at regular intervals.

3. Apparatus for the production of yarn, comprising in combination means for conveying a web of carded fibres in a substantially horizontal plane between a doffer and a dividing and condensing apparatus, with the fibres of said carded web extending generally in the direction of movement of said web, means for supporting a supply of fibrous nub material in continuous sheet form, above said web, means for intermittently feeding said sheet of nub material to a point just above said carded web, and means for cutting continuous strips from said sheet in the intervals between feeding thereof, to deposit separate strips in uniformly spaced parallel relation transversely across said moving web of carded fibres, and with

the fibres of said strips approximating the arrangment and condition of the underlying fibres of the carded web.

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