



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

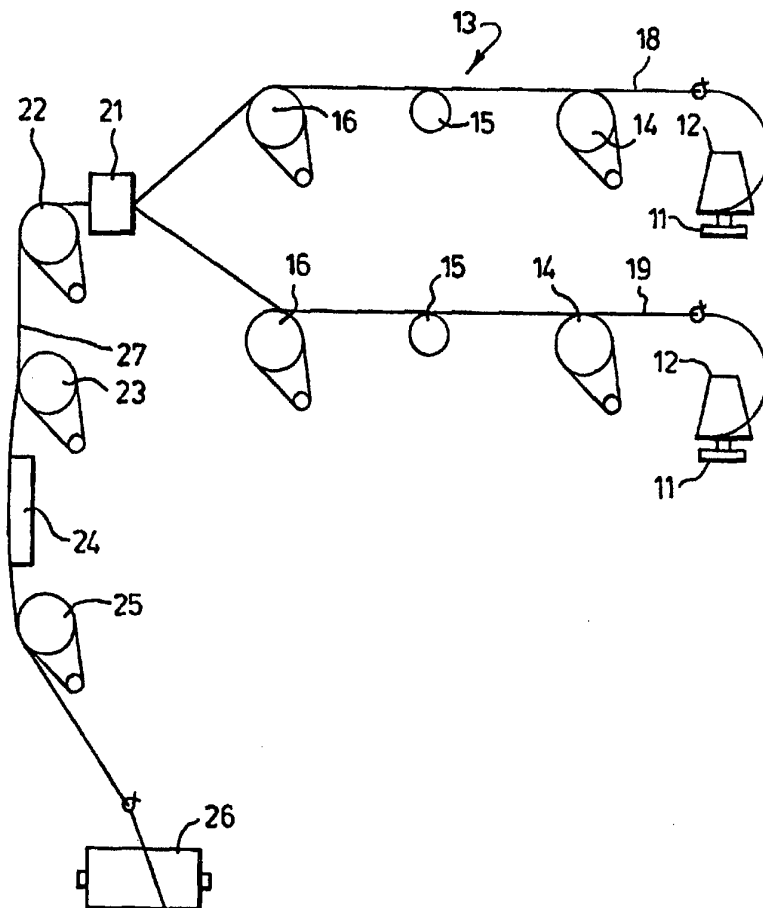
<p>(51) International Patent Classification ⁶ : D02G 1/18, 1/16, 3/46</p>	<p>A1</p>	<p>(11) International Publication Number: WO 95/14124 (43) International Publication Date: 26 May 1995 (26.05.95)</p>
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<p>(21) International Application Number: PCT/GB94/02455 (22) International Filing Date: 8 November 1994 (08.11.94) (30) Priority Data: 9323441.7 13 November 1993 (13.11.93) GB (71) Applicant (for all designated States except US): J. & P. COATS, LIMITED [GB/GB]; 155 St. Vincent Street, Glasgow G2 5PA (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): CURRAN, William, Wingate [GB/GB]; 16 Park Avenue, Paisley PA2 6HL (GB). AITKEN, John [GB/GB]; 17 Stanley Avenue, Paisley PA2 9LB (GB). (74) Agents: McNEIGHT, David, Leslie et al.; McNeight & Lawrence, Regent House, Heaton Lane, Stockport, Cheshire SK4 1BS (GB).</p>	<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, EE, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>
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(54) Title: METHOD FOR MAKING THREAD

(57) Abstract

There is disclosed a method for making a thread comprising: feeding at least two drawn, continuous filament starting yarns (18, 19), of which at least one is a multifilament yarn, together to an intermingling device (21) to form a single bulked thread of which the filaments of the starting yarns are intermingled and looped, and applying a bulk-reducing treatment (27), characterised in that the starting yarns are fed to the intermingling device with substantially equal overfeed.



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METHOD FOR MAKING THREAD

This invention relates to methods of making thread.

EP-0 057 583 discloses a method for making a textile strand involving differentially overfeeding two separate filamentous strands to a jet device which commingles and interlaces and forms loops in the filaments of the strands and then subjecting the commingled strand to a heating step in which loops formed by the jet are pulled and in so doing tighten any entanglements present as a result of the jet treatment and thus consolidate the strand. A "twistless" sewing thread can be produced in this way, "twistless" implying not that the thread is without twist, because twist can always be added, but rather that the thread has been produced without the need for twisting which is implicit in the production of sewing thread from staple fibre such as cotton.

In addition to the savings produced by avoiding the need to insert high twist levels, the method of EP-0 057 583 allows the use of low cost starting materials in the form of partially oriented yarn (POY) for instance of polyester that are in plentiful supply, in order to produce high-value sewing threads, for example. The sewing threads thereby produced have excellent properties in sewing.

The method of EP-O 057 583 involves feeding at least two strands to an intermingling device (in the form of a texturing jet) at different rates of overfeed so that loops form on the strands thus creating an intermingled textured yarn which is subsequently heat treated to eliminate the bulkiness of the yarn.

It has now been found that the method of EP-0 057 583 can be modified to yield further cost savings and/or other advantages over the prior art methods of sewing

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thread production, which modifications will also be useful in connection with other yarns that can be produced by the process of EP-0 057 583 and indeed in extending the range of yarns which can be produced using that method.

The invention comprises a method for making a thread comprising :

feeding at least two drawn, continuous filament starting yarns, of which at least one is a multifilament yarn, together to an inter mingling device to form a single bulked thread of which the filaments of the starting yarns are intermingled and looped, and applying a bulk-reducing treatment to the bulked thread, characterised in that the starting yarns are fed to the intermingling device with substantially equal overfeed.

The starting yarns may comprise yarns having substantially different behaviour under heat and/or tension treatment and may, as in EP-0 057 583, comprise a "core" yarn and an "effect" yarn, the core being present to provide the strength and stability of the finished thread and the effect yarn being present to bind the filaments together. The core yarn will then comprise a major proportion of the thread and is desirably a high tenacity yarn. Again in accordance with EP-0 057 583, the high tenacity yarn (at least) may be produced by overdrawing a POY.

Depending on the linear density and/or tenacity of the required thread, further savings and improvements can be made by starting with two identical yarns - this will result in a saving on inventory costs, since only one yarn need to be stocked, and it will almost always be more economical to make a thread out of two identical starting yarns than out of two dissimilar yarns. Depending, again, on the properties required in the thread, it may be possible to treat the two yarns identically or differentially. If they have identical treatment, the distinction between core and effect disappears, of course, or each can be regarded as an effect yarn for the other, binding its filaments together as a result of the

bulk-reducing treatment, and each can be regarded as a core, contributing strength to the thread. Again, the POY threads can be overdrawn to provide increased strength over the same yarn when normally processed, for example, for making textured knitting yarn.

Identical starting yarns may however be differentially treated en route to the intermingling device, as by differential drawing for example. Thus one POY which would have a normal draw ratio of 1.7:1 could be drawn with a draw ratio of 2.2:1 and the other with a draw ratio of 1.85:1; the latter would then behave more as an effect yarn, binding in the filaments of the more overdrawn core yarn, the latter contributing more to the overall tenacity of the finished thread. Another differential effect could be produced by cold drawing one starting yarn and hot drawing the other.

In any event, the drawing can be a continuous operation, effected en route to the intermingling device, for either or both starting yarns, or, if found more convenient, in a separate operation so that at least one of the starting yarns is drawn yarn from package.

The bulk reducing treatment may comprise a tension-applying treatment, which may comprise an underfeeding operation, which may be effected without heat. Or, as described in EP-0 057 583, the tension applying treatment may comprise a heat treatment generating a tension in an overfeeding (down to zero overfeed) operation or adding to tension in an underfeeding operation. The heat may be applied by a hot roller (which may be a roller of an underfeeding or overfeeding arrangement) or between under or overfeeding rollers, as by a hot plate or hot air heater.

Methods for making threads according to the invention will now be described with reference to the accompanying drawing, in which the single Figure is a diagrammatic illustration of an apparatus for producing thread.

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The apparatus illustrated in the Figure comprises supports 11 for a pair of yarn supply packages 12 and for each support 11 a drawing arrangement 13 comprising a first godet 14, a heatable draw pin 15 and a second, heatable godet 16.

The two starting yarns 18,19 are fed to an air jet intermingling device 21 such as a Heberlein T300 series or a Du Pont Mk XV jet.

The intermingled, bulked thread is withdrawn from the jet 21 by a godet 22 and passes to a heatable godet 23, thence over a plate heater 24 (for which a hot air tube heater or other such device could be substituted) to a final godet 25, which forwards it to a wind-up package 26.

It is to be understood that the arrangement thus described is a comprehensive arrangement, individual items of which may be by-passed (and, in an industrial operation, therefore, omitted altogether to simplify the machinery and keep its capital cost as low as possible) or, in the case of heatable components such as draw pins and godets, left unheated (so that, again, for an industrial operation, an unheated version of the component would be used).

Further, it should be understood that suitable drive means will be used allowing the various rolling components to be driven at any desired speed (though again such provision for variable speed need not be carried through to an industrial machine intended to make one specification of thread only) and suitable temperature control means will be available for the heated components.

The apparatus facilitates various methods of thread production within the scope of the invention, namely by feeding at least two drawn, continuous filament starting

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yarns 18,19 together to the intermingling device 21 to form a single bulked thread 27 of which the filaments of the starting yarns 18,19 are intermingled and looped, and applying, between godets 22 and 25, a bulk-reducing treatment to the thread 27, the starting yarns 18,19 being fed to the intermingling device 21 with substantially equal overfeed. This latter requirement is effected by the godets 16 before the jet 21 running at equal feed speeds, greater than the speed of the godet 22 downstream of the jet 21.

A typical overfeed here could be from about 4.5% to about 30%, being the percentage excess of speed of the godets 16 over that of godet 21. The excess yarn fed into the air jet 21 is accommodated in loops in the filaments of the bulked thread 27, and the amount of overfeed will be determined in accordance with the properties of the jet 21 and the desired properties of the finished thread.

The concept of the core and effect yarn components described in EP-0 057 583 may be maintained by selecting two different threads as starting yarns.

Two typical yarns may be a core yarn drawn from a 312 F48 POY polyester yarn and an effect yarn drawn from an 80 F 24 such yarn. It is possible to have three or more starting yarns, of course, and one starting yarn could even be a monofilament, though when there are only two yarns it is unlikely that if one of them were indeed a monofilament the resulting thread would be useful for many end purposes.

A 312 F 48 POY polyester yarn would be drawn in the drawing arrangement 13 at a draw ratio higher than the normal draw ratio for such yarn. Such a yarn would have a normal draw ratio of about 1.7:1, but it is possible to overdraw such yarn for example at a ratio of 2.2:1 resulting in a high tenacity yarn.

The 80 F 24 effect yarn could be overdrawn to a lesser extent, say to a ratio of 1.83:1, rather than the 1.7:1 which would be normal.

As already mentioned, the starting yarns 18,19 can comprise identical yarns, which may be differentially treated en route to the air jet 21. For example, identical yarns with a normal draw ratio of 1.7:1 could be used, one being overdrawn at a ratio of 2.2:1, the other at a ratio of 1.83:1. Or one may be hot drawn, the other cold drawn. They may, however, be treated identically in all respects, as by being drawn at a ratio of 2.14:1, and fed at an overfeed of 10% to the jet 21.

The post-jet treatment is aimed at eliminating or reducing the bulk produced by the air jet 21 whilst retaining the intermingled structure that brought about their bulk, essentially reducing the size of the filament loops so that the thread becomes an essentially unbulked thread which is cohesive in the sense that its filaments do not tend to fly apart and which to all intents and purposes can be used as spun thread (after such finishing treatments as are appropriate, which may include the application of a lubricant and the insertion of twist, the latter being required for some purposes at a much lower level than for conventionally spun thread, rather as a means of helping to maintain an essentially circular cross-section when the thread is running over an edge or surface as in sewing).

The bulk-reducing treatment may comprise the application of heat as by hot godet 23 and/or hot plate 24 while the thread 27 is overfed or underfed between the godets 22 and 23 or 23 and 25, the heat causing the filaments of the thread to be tensioned by their tendency to shrink and in so doing reducing the size of any loops projecting from the thread and tightening in the filaments which, as effect yarn, are wrapped around the core yarn filaments binding them together.

As mentioned, variations can be made to the method and to the apparatus for the production of specific types of thread, starting from different raw materials. In particular, sewing threads having excellent properties both as to tenacity and as to low occurrence of breaks in normal and multidirectional sewing can be produced at a substantially lower cost than spun threads conventionally used for sewing.

CLAIMS

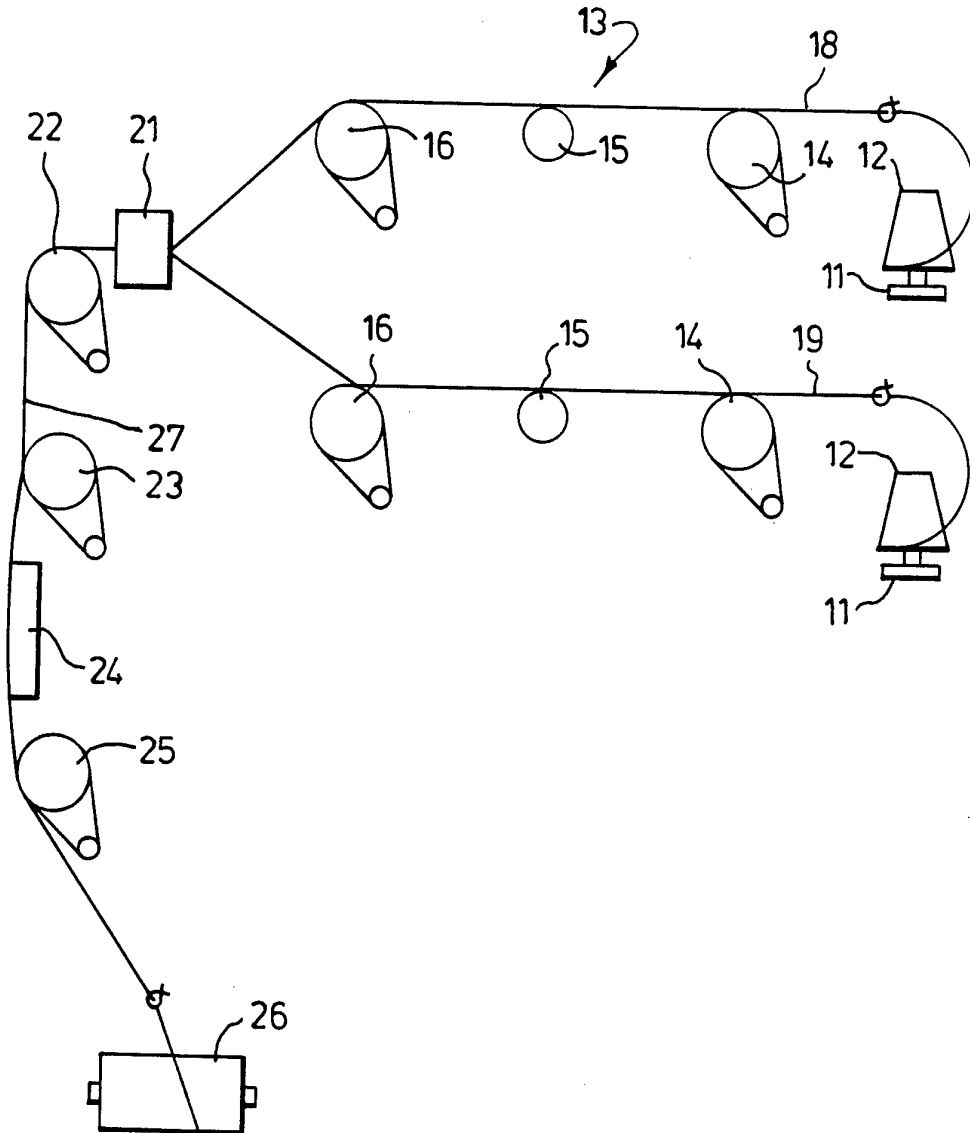
1. A method for making a thread comprising : feeding at least two drawn, continuous filament starting yarns, of which at least one is a multifilament yarn, together to an intermingling device to form a single bulked thread of which the filaments of the starting yarns are intermingled and looped, and applying a bulk-reducing treatment to the bulked thread, characterised in that the starting yarns are fed to the intermingling device with substantially equal overfeed.
2. A method according to claim 1, in which the starting threads comprise threads having substantially different behaviour under heat and/or tension treatment.
3. A method according to claim 1 or claim 2, in which the starting threads comprise a "core" thread and an "effect" thread.
4. A method according to claim 3, in which the core thread comprises a major proportion of the thread.
5. A method according to claim 4, in which the core thread is a high tenacity thread.
6. A method according to claim 5, in which the high tenacity thread comprises an overdrawn thread.

7. A method according to any one of claims 1 to 6, in which the effect thread has a lower heat shrinkage than the core thread.
8. A method according to any one of claims 3 to 7, in which the core thread has a lower extensibility under load than the effect thread.
9. A method according to claim 1, in which the starting threads comprise two identical threads.
10. A method according to any one of claims 1 to 9, in which at least one of the starting threads is drawn continuously with its being fed to the intermingling device.
11. A method according to any one of claims 1 to 10, in which the bulk-reducing treatment comprises a tension applying treatment.
12. A method according to claim 11, in which the tension-applying treatment comprises an underfeeding operation.
13. A method according to claim 11, in which the tension-applying treatment comprises a heat treatment generating a tension in an overfeeding (up to zero overfeed) operation or adding to tension in an under feeding operation.
14. A method according to claim 13, in which heat is applied by a hot roller.

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15. A method according to claim 14, in which the hot roller is a roller of an underfeeding or overfeeding arrangement.

16. A method according to any one of claims 13 to 15, in which heat is applied between under- or over-feeding rollers.



INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 94/02455

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 D02G1/18 D02G1/16 D02G3/46		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 6 D02G		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 119 044 (ENTERPRISE MACHINE & DEVELOPMENT CORPORATION) 19 September 1984 see page 9, line 1, paragraph 2 - page 11, line 4 ---	1, 3, 4, 9-13
A	GB,A,2 166 168 (AMERICAN & EFIRD MILLS INC) 30 April 1986 see page 1, line 43 - page 3, line 34 ---	1-4, 10, 11, 13-16
A	EP,A,0 057 583 (J & P COATS, LIMITED.) 11 August 1982 cited in the application see page 3, line 28 - page 8, line 34 ---	1, 2
A	EP,A,0 037 118 (TEIJIN LIMITED) 7 October 1981 see page 7, line 8 - page 17, line 17 ---	1-4, 6, 7, 10, 15, 16
	-/--	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
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Date of the actual completion of the international search 15 March 1995		Date of mailing of the international search report 31. 03. 95
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016		Authorized officer V Beurden-Hopkins, S

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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