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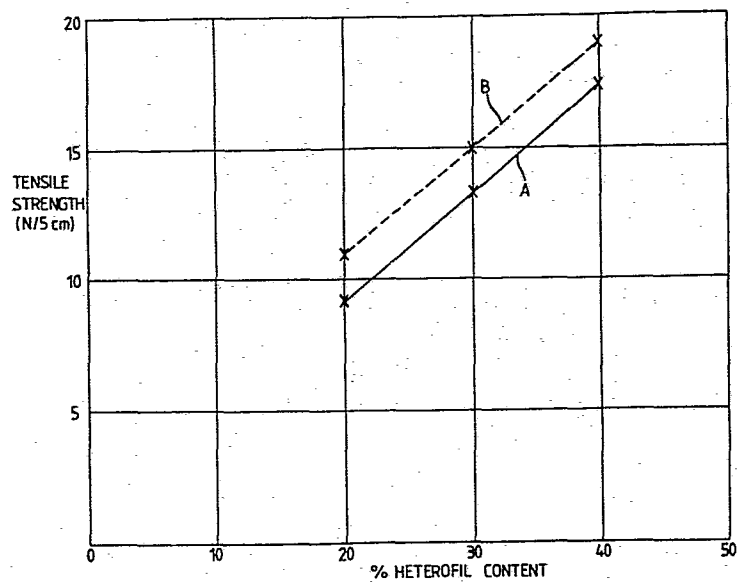
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54 **Method of blending homofilament and heterofilament staple fibres, a blend produced thereby and a bonded web produced from such blend.**

57 A method of blending homofilament and heterofilament fibres together by forming a continuous composite tow from a plurality of the homofilaments and a plurality of the heterofilaments, drawing the tow and cutting the drawn tow to form a blend of staple fibres; a mixed blend of staple fibres produced by the method and a bonded, non-woven web produced from such a mixed blend of staple fibres.

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METHOD OF BLENDING HOMOFILAMENT AND HETEROFILAMENT STAPLE FIBRES,
A BLEND PRODUCED THEREBY AND A BONDED WEB PRODUCED FROM SUCH
BLEND

5 This invention relates to a method for producing a blend of homofilament and heterofilament fibres, such fibres usually being destined for use in the production of non-woven webs by a carding process.

The efficiency of blending of homofilament and heterofilament fibres has an important bearing on the eventual
10 properties of a non-woven web made from such fibres.

In general the blending of such fibres, in a staple form, is carried out as a first stage in a carding process. Usually the staple fibres themselves are produced by drawing a tow of either continuous heterofilaments or continuous homofilaments,
15 subjecting the drawn tow to a crimping operation and chopping the tow into a convenient staple length.

We have now found that advantages can be achieved by blending the fibres by a novel process independent of the carding process.

20 According to the present invention we provide a method of blending homofilament and heterofilament fibres together comprising forming a continuous composite tow from a plurality of the homofilaments and a plurality of the heterofilaments, drawing the tow and cutting the drawn tow to form a blend of staple fibres.

25 We also provide a mixed blend of staple fibres containing both homofilament fibres and heterofilament fibres produced by the above method.

Methods for the production of tows from a large number, usually several hundred, filaments are well known in the art.
30 The filaments are produced by melt extrusion of the molten polymer through a multiorifice spinneret and groups of filaments from a number of spinnerets are combined into a tow. The tow used in the method of the invention is formed in a similar manner with one or more of the spinnerets producing one or more groups of
35 heterofilaments and one or more of the spinnerets producing one or more groups of homofilaments.

The method of the invention is particularly suited to the blending of homofilaments of polymers based on terephthalic acid, the best known representative being polyethylene terephthalate, and heterofilaments having a core of a polymer based on terephthalic acid, for example polyethylene terephthalate, and a sheath of a polymer such as polyethylene isophthalate/polyethylene terephthalate copolymer.

We have found that blends useful in the production of non-woven webs can be produced by the method of the invention using a composite tow containing from 5% to 95% of homofilaments of polyethylene terephthalate and containing from 95% to 5% of heterofilaments having a core of polyethylene terephthalate and a sheath of polyethylene isophthalate/polyethylene terephthalate copolymer. Such blends in staple form, can be readily converted into a non-woven web by a carding process, optionally followed by cross-lapping or by an air laying process.

The composite tow may be drawn by any suitable process which produces a drawn tow of high uniformity even though both homofilaments and heterofilaments are present in the tow.

A suitable process is described in the Specification of UK Patent No 1 362 793.

In 1 362 793 is described a process in which the tow is passed around the peripheries of a plurality of feed rolls in series and a plurality of draw rolls in series, the latter rotating at a higher peripheral speed and treating the tow in contact with at least some of the feed rolls with water at a temperature above ambient temperature and substantially completing the drawing at the temperature of the water before the tow leaves the last feed roll.

In general before the drawn tow is chopped into staple fibre it is subjected to a further treatment which serves to impart a crimp to the individual fibres in the tow. Conveniently this is achieved as a last stage in the drawing operation by use of a standard stuffer box crimper.

One advantage of the described method of blending



is that it allows full utilisation of the draw frame. Full utilisation of the draw frame requires an optimum tow size. Hitherto, in the production of staple fibre for blending by carding, such a size may not be achieved with an unblended tow.

5 However the composite tow used in the method of the invention is of much greater size allowing full utilisation of the frame.

Another, and a probably more important advantage, is that, because more effective blending is achieved, webs of much superior strength can be produced.

10 The invention will now be described by way of the following examples:-

COMPARATIVE EXAMPLES

15 Staple fibre was produced from 67/33 core/sheath heterofilament fibre having a polyethylene terephthalate core and a 20 mole % polyethylene isophthalate/polyethylene terephthalate copolymer sheath by forming a tow from a plurality of filaments, drawing the tow by the process described in UK Patent No 1 362 793 with a subsequent stuffer box crimping operation and cutting the drawn crimped tow by means of a Lummus cutter into staple of 38mm 20 length and 1.7 decitex. In a similar manner staple fibre was produced from polyethylene terephthalate homofilament fibre. The staple had a length of 38 mm and a decitex of 1.7.

Various blends of the heterofilament fibres and homofilament fibres were formed at carding and in each case a ca 25 gsm 25 non-woven web was produced. The webs were point bonded with a chequerboard pattern on a Ramisch calender at a temperature of 195°C and a pressure of 5 tonnes at a speed of 3 metres/min.

The tensile strength (wet) of each bonded web was measured in the machine direction and in the cross machine direction. 30 The overall fabric strength normalised to 25 gsm was calculated from these measurements. A graph A of overall fabric strength against percentage of heterofilaments in the fabric was prepared from the results obtained.

EXAMPLES ACCORDING TO THE INVENTION

35 A plurality of continuous heterofilaments were blended



with a plurality of continuous polyethylene terephthalate homofilaments to form a composite tow of filaments.

5 Various blends of heterofilament fibres and homofilament fibres were prepared so that a number of composite tows were produced.

The tows were drawn by the process described in UK Patent No 1 362 793, with a subsequent stuffer box crimping operation and cut into staple by a Lummas cutter. The staple had a length of 38 mm. The homofilaments were of 2.0 decitex and
10 the heterofilaments of 2.1 decitex.

The staple fibre blends were converted into ca 25 gsm webs by the same carding process as was used in the COMPARATIVE EXAMPLES.

15 The webs were subsequently point bonded with the same chequerboard pattern as was used in the COMPARATIVE EXAMPLES on a Ramisch calender at a temperature of 195°C and a pressure of 5 tonnes at a speed of 3 metres/min.

The tensile strength (wet) of each bonded web was measured in the machine direction and in the cross machine
20 direction. The overall fabric strength normalised to 25 gsm was calculated from these measurements.

A graph B of overall fabric strength against percentage of heterofilaments in the fabric was prepared from the results obtained.

25 It is thought that the superior properties results from blending the fibres on a drawframe rather than in the carding process. This is contrary to what might have been expected purely from a comparison of the constituents of the web because all of the staple fibre used in the COMPARATIVE
30 EXAMPLES was of smaller decitex than the staple fibre used in the invention Example and one would have expected, because of the larger number of fibres per unit weight of web in the COMPARATIVE EXAMPLES, that the webs in the COMPARATIVE EXAMPLES would have had superior strength to those in the INVENTION EXAMPLES.

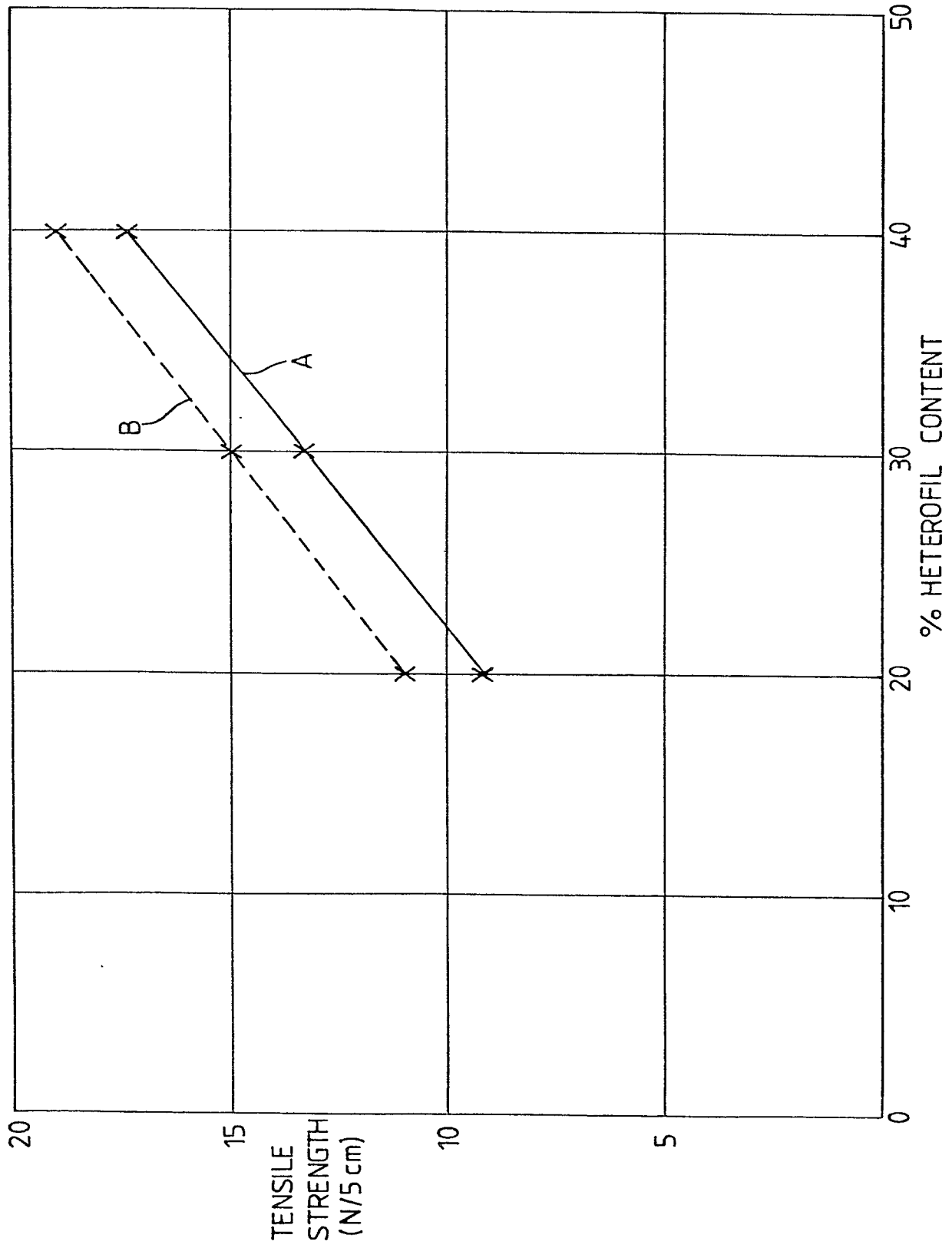
CLAIMS

1. A method of blending homofilament and heterofilament fibres together characterised by forming a continuous composite tow from a plurality of the homofilaments and a plurality of the heterofilaments, drawing the tow and cutting the drawn tow to form a blend of staple fibres.
2. A method as claimed in Claim 1 characterised by a composite tow of homofilaments of polyethylene terephthalate and heterofilaments having a core of polyethylene terephthalate and a sheath of a copolymer of polyethylene isophthalate and polyethylene terephthalate.
3. A method as claimed in Claim 2 characterised in that the composite tow contains from 5% to 95% of the homofilaments and from 95% to 5% of the heterofilaments.
4. A method as claimed in any one of the preceding Claims characterised in that the drawn tow is subjected to a treatment which imparts a crimp to the individual fibres in the tow.
5. A mixed blend of staple fibres containing both homofilament and heterofilament fibres produced by a method as claimed in any one of Claims 1 to 4.
6. A bonded, non-woven web produced from a mixed blend of staple fibres as claimed in Claim 5.

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| DOCUMENTS CONSIDERED TO BE RELEVANT | | | CLASSIFICATION OF THE APPLICATION (Int. Cl. ³) |
|---|--|-------------------|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | |
| X | <p>GB - A - 1 035 908 (BRITISH NYLON SPINNERS LTD.)</p> <p>* Page 2, lines 35-49 and 69-81; page 4, lines 26-37; page 6, lines 69-86; claims 1,25 and 31; figures 1C and 2 *</p> <p>--</p> | 1,4,5,6 | D 01 G 1/06 D 04 H 1/54 D 01 F 8/14 D 01 D 5/34 |
| | <p>FR - A - 2 261 356 (E.I. DU PONT DE NEMOURS AND COMP.)</p> <p>* Claims 2,4,7; figures 1-3 *</p> <p>--</p> | 2,3,5 | |
| A | FR - A - 1 581 284 (E.I. DU PONT) | | TECHNICAL FIELDS SEARCHED (Int. Cl. ³) D 01 D D 01 G D 01 F D 04 H D 02 G |
| A | DE - A - 1 510 195 (BIENZ, E) | | |
| <p>-----</p> | | | |
| <p>The present search report has been drawn up for all claims</p> | | | CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons &: member of the same patent family, corresponding document |
| Place of search | Date of completion of the search | Examiner | |
| The Hague | 05-03-1981 | MUNZER | |