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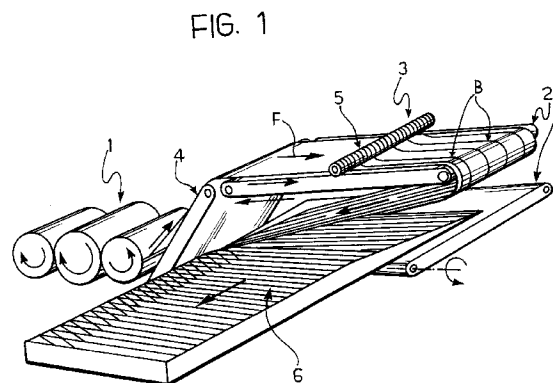
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54 **Non woven fabric and process for its production.**

57 The nonwoven textile is produced by a method which provides for the fibres and the filaments to be combined, starting from the step in which the elementary webs of the nonwoven textile are formed, and for them (the fibres and filaments) to be mixed intimately by conventional technical methods for consolidating the fibrous matting. The considerable variability of the percentages of the fibres and filaments in the mixture and of their polymeric nature means that the method can provide textiles with a high degree of versatility as regards their physical and mechanical characteristics and their durability, whilst keeping the mass per unit area of the textiles and the general technical parameters of the consolidating method unchanged.



The present invention relates to a nonwoven material produced by mechanical or thermal technical processes with the use, as the starting material, of a controlled mixture of fibres and continuous filaments of synthetic or natural polymers.

In recent decades, nonwoven textiles have become well established in various economic sectors.

The wide variety of specific fields and conditions of use result in a need for a product of a single type which can vary greatly from a functional point of view so that it can be produced in a versatile manner, according to the user's technical requirements.

Patent literature relating to nonwoven textiles formed by combinations of fibres and continuous filaments describes various mechanical, chemical and thermal methods of combining fibres and filaments and consolidating the fibrous matting. These include:

- the connection of one or more layers of nonwoven fibrous textiles to one or more layers of nonwoven textiles of continuous filaments by needling (e.g. DE 3741-681-A) or to one filamentary layer by stitching the layers together (e.g. DE 3313-681-A),
- the use of continuous filaments to reinforce and consolidate fibrous matting made of cut fibres by stitching methods (so-called knitted, bonded, non-woven textiles),
- the conferring of dimensional stability to a material made of continuous filaments, usually a fabric or a mesh, by the addition of fibres which seal the intersections of the filaments (e.g. US 4695-500-A), and
- the formation of composite textiles from fibres and synthetic textile filaments with mineral or vegetable fibres loose or in preconsolidated layers, starting with a semi-finished textile substrate, generally of continuous filaments (e.g. US 4808-467-A; DE 3605-830-A).

Unlike all these methods, the invention provides a material in which the continuous filaments are inserted intimately in the mass of fibrous matting as it is formed gradually in the carding and folding process.

The subject of the invention is a nonwoven textile and a method of producing it as defined in the following claims.

The filaments are inserted by means of devices, which are preferably mechanical and, conveniently, are disposed in the technical step which precedes the formation of the fibrous matting so as to ensure that the filaments are distributed uniformly throughout both its area and its thickness.

The production method is illustrated by way of non-limiting example in the following drawings.

In Figure 1, a carding machine, schematically indicated 1, supplies a fibrous web 4 to a folding device 2. A supply device 3, carrying reels 5 of filaments B, is associated with the folding device 2. The filaments B are fed continuously onto the fibrous web

4 as it advances in the direction indicated by the arrow F so that a mat 6 of fibres and filaments is formed during the folding and is then subjected to known consolidating steps, not shown.

The devices which supply the filaments may be arranged as shown in Figure 2A, Figure 2B or Figure 2C, that is:

- Figure 2A - for inserting the filaments longitudinally of the folding device (so that the filaments are arranged transverse the fibrous mass of matting), with reels which are movable according to the arrow F1,
- Figure 2B - for inserting the filaments transverse the folding device (so that the filaments are arranged obliquely in the fibrous mass of matting), with reels which are movable according to the arrow F2;
- Figure 2C - for inserting the filaments in spirals longitudinally of (or transverse) the folding device (so that the filaments are arranged in spirals in the fibrous mass of matting) with reels which are movable according to the arrow F3.

The final product produced by such a method of mixing can fully satisfy various users' requirements in the sense that simply by varying the percentages of the basic components - the fibres and the filaments - used in the mixing of the starting textiles, the product can be transformed from a weak, deformable material into a strong material with low deformability or, if a variation in the nature of the polymers used is also adopted, into a material with controlled degradability.

This can all be achieved whilst the physical and dimensional characteristics (the weight, thickness, etc.) of the product remain unchanged either permanently or temporarily, according to the intended use of the material.

The fibres A may be selected from:

- A1 - fibres of a single polymer, that is: a synthetic chemical polymer, a synthetic natural polymer, a natural vegetable polymer, or a natural animal polymer;
- A2 - a controlled mixture of fibres of various synthetic or natural polymers or combinations thereof.

The components both of type A1 and of type A2 may be of a single denier or may be mixtures of fibres of various deniers.

The filaments B may be:

- B1 - monofilaments of synthetic chemical polymers with a denier at least 5 times greater than that of the finest fibres constituting the component A;
- B2 - parallel multifilaments of synthetic chemical polymers with an overall denier at least 10 times greater than that of the finest fibres constituting the component A;
- B3 - twisted multifilament threads of synthetic chemical or synthetic natural polymers, or of

natural fibres with an overall denier at least 10 times greater than that of the finest fibres constituting the component A.

The mixtures of the components A and B may include:

- one component of type A plus one component of type B;
- one component of type B plus a combination of two or all three components of type B.

The components A and B may be mixed so as to be oriented in one or both production directions (longitudinally and transversely) or in a disordered manner which takes no account of the production direction, but the distribution of the components A and B per unit area must in any case be uniform.

The percentages of the components A and B in the mixture of the product must be at least 15% of the final mass per unit area for the type A components and at least 1% for the type B components, that is, from 15% A + 85% B to 99% A + 1% B.

The mixture of the components A and B may be consolidated by mechanical or thermal means. After the nonwoven fabric with continuous filaments has been produced, the product may undergo further mechanical, chemical or thermal treatments, according to the user's requirements, or may undergo a further operative step if it is to be used as a component part of a composite or special material.

No further operation or treatment after the initial consolidating process should reduce the physical-mechanical characteristics of the initial product by more than 50%.

Claims

1. A nonwoven textile formed by an intimate mixture of fibres and continuous filaments produced by a method including the combination of the fibres and the filaments during the technical step in which the elementary webs of the nonwoven textile are formed and the intimate mixing thereof by conventional, preferably mechanical, methods.

2. A nonwoven textile according to Claim 1, in which at least 15% of the final mass per unit area of the product is composed of fibres selected from:

- A1 - fibres with a single denier or a mixture of various deniers of a single synthetic chemical polymer, synthetic natural polymer, natural vegetable polymer, or natural animal polymer,
- A2 - fibres of a single denier or various deniers of a controlled mixture of various synthetic or natural polymers or combinations thereof, and

a minimum of 1% of at least one of the following

three filamentary elements:

- B1 - monofilaments of synthetic chemical polymers with a denier at least 5 times greater than that of the finest fibres constituting the type A component,
- B2 - parallel multifilaments of synthetic chemical polymers with an overall denier at least 10 times greater than that of the finest fibres constituting the type A component,
- B3 - twisted multifilament threads of synthetic, chemical polymers or natural polymers or of natural fibres with an overall denier at least 10 times greater than that of the finest fibres constituting component A.

3. A nonwoven textile according to Claims 1 and 2, characterised in that its components are mixed intimately so as to be oriented in the production directions (longitudinally and transversely).

4. A nonwoven textile according to Claims 1 and 2, characterised in that its components are mixed intimately in a disordered manner in relation to the production directions.

5. A nonwoven textile according to Claims 1-4, consolidated by mechanical or thermal means.

6. A nonwoven textile according to Claims 1-5 which, after the initial consolidation, undergoes a chemical or thermal finishing treatment or another type of treatment in order to be used as a component of a composite or special product.

7. A method of producing a nonwoven textile by the carding of fibres in order to form a continuous web of the fibres and the folding of the web to form a fibrous matting, characterised in that during the folding of the web, a plurality of filaments or threads is inserted on each fold and, after the formation of the matting, the fibres and filaments and/or threads are mixed intimately by needling to consolidate the matting.

FIG. 1

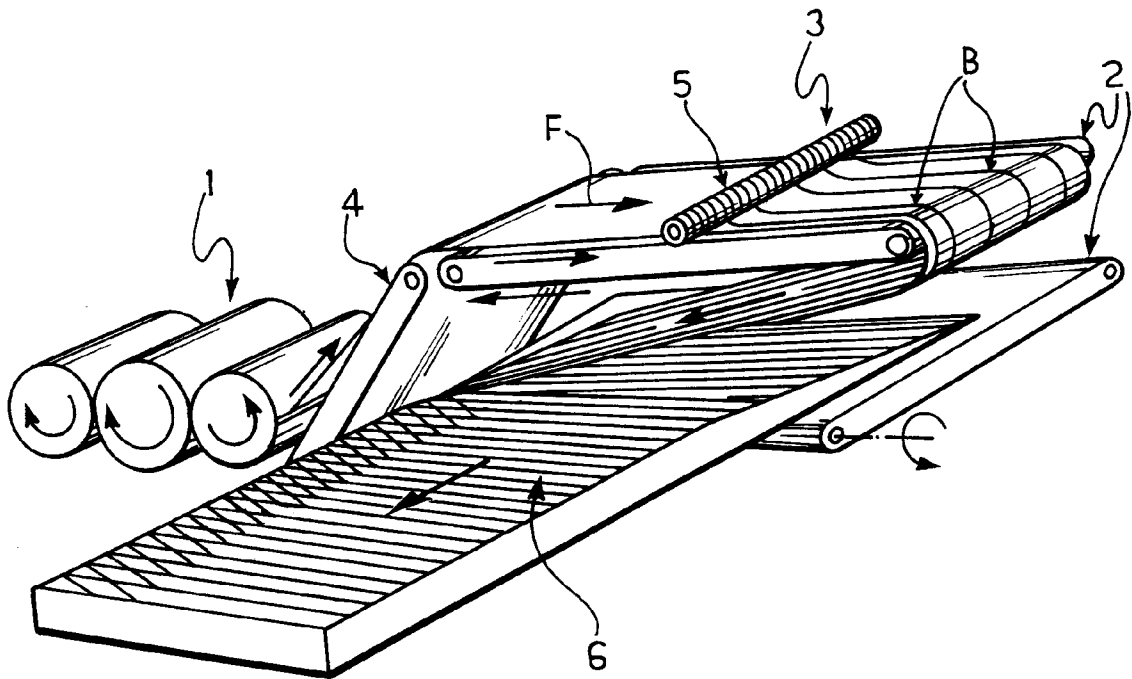


FIG. 2a

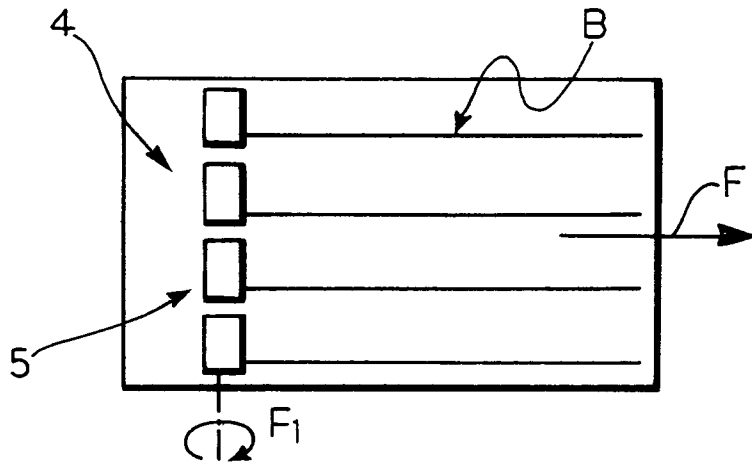


FIG. 2b

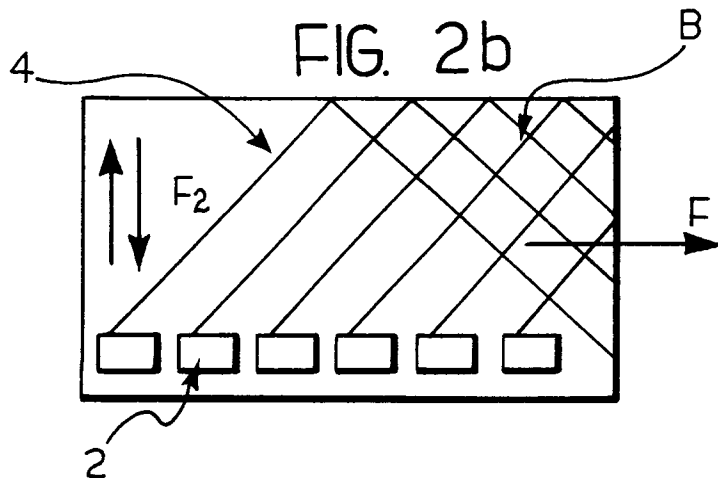
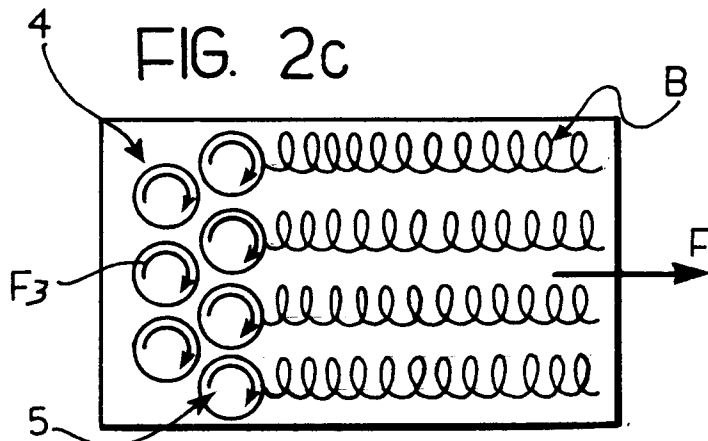


FIG. 2c





European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 91 12 1776

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-3 615 989 (RONALD L. DEPOE) * the whole document * ---	1,7	D04H5/02 D04H5/08
X	US-A-4 170 676 (JAMES H. THOMAS) * the whole document * ---	1,7	
X	LU-A-71 980 (N V BEKAERT) * the whole document * ---	1,7	
X	US-A-3 816 231 (PRESTON F.) * claims 1-6; figures 1,2 * ---	1	
A	---	2-6	
X	FR-A-2 015 394 (ROBINSON & SONS) * the whole document * ---	1	
A	---	2-6	
A	EP-A-0 409 993 (ASAHI KASEI) * claims * ---	2,5,6	
A	EP-A-0 390 755 (SAVAL S. R. L.) -----		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D04H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01 APRIL 1992	Examiner DURAND F. C.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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