



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB96/01211</p> <p>(22) International Filing Date: 20 May 1996 (20.05.96)</p> <p>(30) Priority Data: 9510092.1 18 May 1995 (18.05.95) GB</p> <p>(71) Applicant (for all designated States except US): BWC TEXTILES LIMITED [GB/GB]; Upperlands, Maghera BT46 5RZ, County Londonderry (GB).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): CLARK, William, Stephen, Patrick [GB/GB]; Upperlands, Maghera BT46 5RZ, County Londonderry (GB).</p> <p>(74) Agent: EARNSHAW, Geoffrey, Mark; 240 Upper Newtownards Road, Belfast BT4 3EU (GB).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, 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).</p> <p><b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: REINFORCED FABRICS</p> <p>(57) Abstract</p> <p>A reinforced fabric comprising one or more layers of fabric material backed by or sandwiching one or more yarn-based scrims wherein the or each scrim is a non-woven scrim is described. Non-woven scrims are stronger in the plane of the fabric and more simple to manufacture than woven scrims. Such fabrics are suitable for use as filtering felts. A process for preparing reinforced fabrics is also described. The scrim(s) for the process may be made on-line.</p>		

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## REINFORCED FABRICS

This invention relates to reinforced fabrics, particularly but not exclusively felts including filtering felts, and a process for preparing reinforced fabrics.

Reinforced fabrics are those fabrics which include some form of reinforcing to strengthen them. They are usually non-woven fabrics, such as  
5 carpets, interlinings, felts and some clothes. One particular example is filtering felt for the filtration of gases, liquids and small particles. Filtering felt usually comprises two layers of fleece needled onto each side of a scrim, the scrim being a basecloth of woven yarns (hereinafter referred to as a "woven scrim").

10 According to one aspect of the present invention, there is provided a reinforced fabric comprising one or more layers of fabric material backed by or sandwiching one or more yarn-based scrims, wherein the or each scrim is a non-woven scrim.

The use of a non-woven scrim provides at least two advantages over a  
15 woven scrim. Firstly, because yarns are stronger under tension when wholly or substantially straight, as opposed to being in a woven configuration, a fabric having a non-woven scrim is stronger in the plane of the fabric than a fabric having a woven scrim using the same yarns for each scrim. If the same strength or dimensional stability is required for each fabric, the non-woven  
20 scrim can therefore use thinner or fewer yarns per metre, thus also saving on the amount of yarn required.

The second advantage is the simplification in the manufacture of scrims. Weaving any material at an industrial production rate requires large weaving

looms, and is time consuming. In contrast, a non-woven scrim merely requires the overlaying of one series of yarns across another series of yarns, etc. The scrim need not even be bonded if created on-line.

It is pointed out that non-woven scrim for electret webs and made from short and/or randomly formed fibres that are glued, needled or thermo-bonded together are known from e.g. WO 93/16783. However, the use of short and/or randomly formed fibres still requires preparation and organisation and some form of bonding together. The term "non-woven scrim" as used otherwise herein defines a scrim formed from yarns of 'continuous' or 'elongated' fibres or filaments that are arranged into a regular structure, such as a 'network'.

Non-woven scrim provide the same degree of dimensional stability to the finished fabric as woven scrim because the standard methods of conjoining fabric material and scrim together, e.g. needlepunching, thermal bonding or pressing, provide the same high degree of fastening therebetween.

Non-woven scrim may be prepared by any process comprising the overlaying of one series of yarns across another series of yarns. Further crosslayers of yarns are added where necessary or desired. The yarns may be pressed or glued together, or the scrim can be used in a non-bonded or loose state as the conjoining action will fasten all the fabric material and scrim layers together. The number of yarns per metre in the non-woven scrim could be similar to the number used in a woven scrim, eg. 6/7 threads per centimetre.

The number of layers of fabric material and the number of non-woven scrim (each sandwiched between two layers of fabric material) used or required depends upon the fabric being made. For filtering felt, there are usually two layers of fabric material and one sandwiched scrim.

The fabric material and non-woven scrim may be made of any suitable starting materials, whether natural or synthetic. The term 'fabric material' as

used herein includes any woven or non-woven material, including fleeces, cloths, suede, pile, etc. Fleeces for filtering felts can be for example 3 d'tex polyester fibres. For scrims for filtering felts, polyester yarns can be used of e.g. 1100 d'tex.

5           The reinforced fabric of the present invention may be prepared using known procedures and techniques, wherein the non-woven scrim replaces the heretofore woven scrim. The fabric is particularly suitable for use as a needle or technical felt, especially a filtering felt

          According to a second aspect of the present invention, there is provided  
10 a process for preparing a reinforced fabric comprising one or more layers of fabric material backed by or sandwiching one or more non-woven scrims, wherein the or each layer of fabric material is conjoined with the or each scrim.

          Preferably, the process of the present invention includes forming the  
15 scrim(s) on-line. The scrim(s) may be formed in a manner similar to that shown in GB 2231344A. That is, the warp yarns of the scrim are fed out longitudinally, whilst the weft yarns are laid transversely thereon (along with further layers of warp or weft yarns as desired). However, rather than bonding the yarns together as required in GB 2231344A (for subsequent transportation to their place of usage), the cross-laid yarns can be fed directly into e.g. a  
20 needlepuncher along with the layers of fabric as part of the present process. The weight of the yarns and layers of fabric materials keep the yarns in position prior to punching. The reinforcement provided by the scrim(s) is therefore still present in the fabric prepared, although the fibres of the fabric materials are mostly conjoined with each other (through the scrim(s)) rather than to the  
25 scrim(s) themselves.

          Preparation of the scrim(s) on-line allows for simplified manufacture. Any new or change in width and construction of scrim required for the

preparation of a different fabric can be made on-line by simple adjustment of the yarn feeds, rather than needing to have all the different types of prepared scrim in stock, and needing to feed in the new scrim(s). Moreover, the cost of buying only the yarns required rather than prepared scrims can be as much as  
5 25% less, creating a significant saving in the overall cost of the fabric.

The layer(s) of fabric material and scrim(s) may be conjoined using any of the usual methods including needlepunching, thermal bonding or pressing.

Embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawings in which:-

10 Fig. 1 is a section of a woven scrim of the prior art;

Fig. 2 is a section of a non-woven scrim for use in the present invention;

and

Fig. 3 is a schematic side view of an overall flow diagram for the process for preparation of a filtering felt according to the present invention.

15 Referring to the drawings, Fig. 1 shows a section of a woven scrim 2 as heretofore used, e.g. in the production of filtering felt. Fig. 2 shows a section of a non-woven scrim 4 for use in preparing a reinforced fabric according to the present invention. The non-woven scrim 4 comprises one length of warp yarns 6 and a series of cross-laid weft yarns 8.

20 Fig. 3 is an overall flow diagram for the production of a polyester filtering felt 10. The flow diagram is simplified. A non-woven scrim 4 made from polyester yarns is prepared on-line. The cross-layering of the yarns may be prepared by a process described in GB 2231344A. However, the yarns of the scrim are not bonded, but held in position by their weight and the weight of the  
25 fleeces 16 being layered therewith. The yarns are not therefore distorted before being punched despite being non-bonded.

The scrim 4 is fed into a first needleloom 14 along with polyester fleeces 16 introduced thereover and thereunder. The three layers are needlepunched and pressed together. The resultant felt 18 is introduced into a second needleloom 20 for further needlepunching and pressing. This produces a filtering felt 10 (collected on a drum 22) of increased strength and similar dimensional stability compared with a filtering felt having a woven scrim made of the same yarns.

Variations and modifications can be made without departing from the scope of the invention described above.

## CLAIMS

1. A reinforced fabric comprising one or more layers of fabric material backed by or sandwiching one or more yarn-based scrims, wherein the or  
5 each scrim is a non-woven scrim.
2. A fabric as claimed in Claim 1 wherein the or each layer of fabric material and the or each scrim are needlepunched, thermal bonded or pressed together.  
10
3. A fabric as claimed in Claim 1 or Claim 2 wherein the yarns of the or each scrim are prebonded together.
4. A fabric as claimed in Claim 1 or Claim 2 wherein the yarns of the or  
15 each scrim are not prebonded together.
5. A fabric as claimed in any one of Claims 1 to 4 wherein the number of yarns per metre in the or each scrim wholly or substantially corresponds with the number used in prior art woven scrims.  
20
6. A fabric as claimed in any one of the preceding Claims comprising two layers of fabric material and one sandwiched scrim.
7. A fabric as claimed in any one of the preceding Claims for use as a  
25 filtering felt.

8. A process for preparing a reinforced fabric comprising one or more layers of fabric material backed by or sandwiching one or more non-woven scrims, wherein the or each layer of fabric material is conjoined with the or each scrim.

5

9. A process as claimed in Claim 8 wherein the or each scrim is prepared on-line.

10. A process as claimed in Claim 9 wherein the yarns of the or each scrim are not prebonded prior to being conjoined with the layer(s) of fabric material.

10

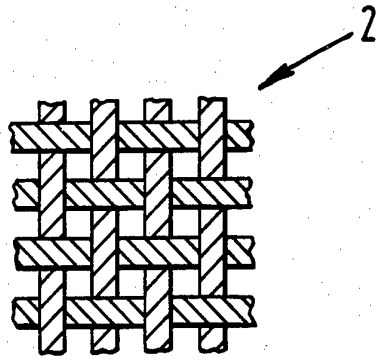
11. A process as claimed in any one of Claims 8 to 10 wherein the or each layer of fabric material and the or each scrim are conjoined by needlepunching, thermal bonding or pressing.

15

12. A reinforced fabric having one or more scrims substantially as herein described with reference to Fig. 2.

13. A process for preparing a reinforced fabric substantially as herein described with reference to Fig. 3.

20



PRIOR ART  
FIG. 1

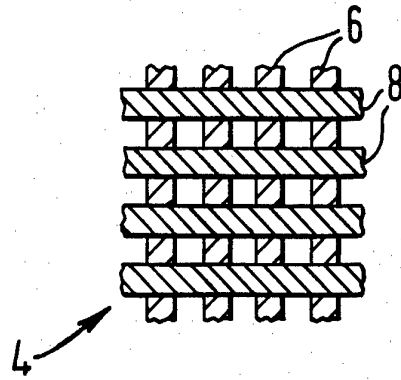


FIG. 2

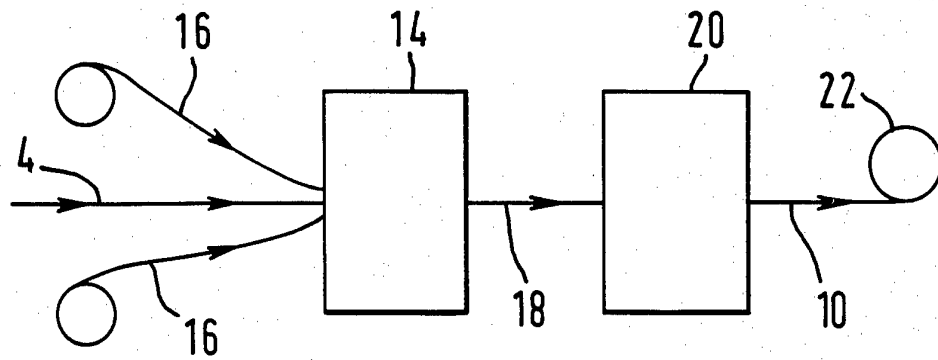


FIG. 3

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 96/01211

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 6 D04H13/00

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 D04H

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.
X	DE,A,15 60 778 (FIRMA CARL FREUDENBERG) 4 December 1969 see the whole document ---	1,2,5-11
X	US,A,4 522 863 (KECK DANIEL H ET AL) 11 June 1985 see column 1, line 56 - column 4, line 49 ---	1-6,12, 13
X	EP,A,0 482 918 (AMOCO CORP) 29 April 1992 see page 4, line 23 - page 6, line 17 -----	1,2,4-6

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Patent family members are listed in annex.

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Date of the actual completion of the international search

10 September 1996

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US-A-4522863	11-06-85	AU-A- 4373885 DE-A- 3516247 GB-A- 2160475 JP-A- 61012332	02-01-86 02-01-86 24-12-85 20-01-86
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