(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 114 120**
**A2**

# (12) EUROPEAN PATENT APPLICATION

(21) Application number: **84300259.3**

(22) Date of filing: **17.01.84**

(51) Int. Cl.³: **D 03 D 15/00**

(30) Priority: **18.01.83 GB 8301318**

(43) Date of publication of application: **25.07.84 Bulletin 84/30**

(84) Designated Contracting States: **AT BE CH DE FR IT LI LU NL SE**

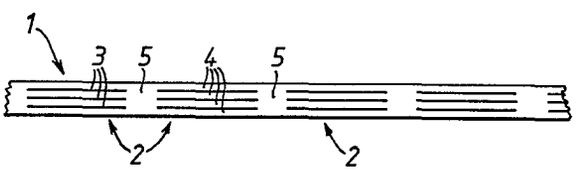
(71) Applicant: **SCOTT & FYFE LIMITED, Scotscraig Works, Tayport Fife DD6 9DQ Scotland (GB)**

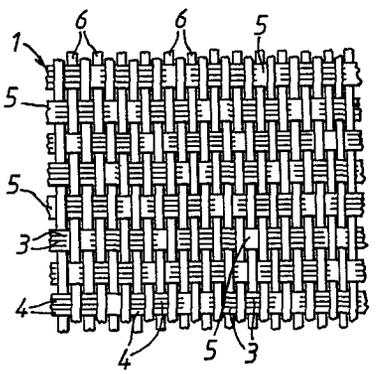
(72) Inventor: **Tough, William Hamish, Craig Bank 2 Provost Road, Tayport Fife Scotland (GB)**

(74) Representative: **Hustwitt, Philip Edward et al, Hustwitt & Co., Ludgate House 110 Fleet Street, London, EC4A 2AB (GB)**

## (54) Fabric material.

(57) A fabric material is woven from tapes of synthetic resinous material such as polypropylene and the set of tapes (1) used as weft tapes have a pattern of slits (3) formed in them before weaving, so that there are zones (2) in each tape (1) in the set where the tape (1) is sub-divided into several tapes (4) of lesser width. The woven fabric material is then stretched at a raised temperature by longitudinally stretching the warp tapes (6) and thus causing the slit tapes (1) to spread so that gaps are formed in the said zones (2) between the tapes (4) of lesser width. The woven fabric material is cooled in this stretched condition so that the final stretched woven fabric material obtained has a substantially greater area and a lesser overall thickness than the base woven fabric, i.e. the fabric before it was stretched.

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# FABRIC MATERIAL

The present invention relates to fabric material and particularly to woven fabric material including tapes of synthetic resinous material, for example polyamide, polyester, polypropylene, polyethylene.

Tapes of synthetic resinous material and woven fabric materials made from such tapes are stretchable. Methods of forming stretched fabric material including polypropylene tapes are described and claimed in our co-pending European Application No. 82.3036322.

The present invention is an alternative and improved method of forming a stretched woven fabric material.

According to the present invention there is provided a method of manufacturing a fabric material comprising the steps of forming a woven base fabric of warp and weft tapes of synthetic resinous material, either the warp or the weft tapes including a series of zones in which the tape is subdivided into a plurality of tapes of lesser width, raising the temperature of the woven fabric, applying tension to the woven fabric to stretch the other of the warp and weft tapes and simultaneously separate the tapes of lesser width in said zones to open gaps of limited length between the said tapes of lesser width, and thereafter cooling the stretched woven fabric in the stretched condition.

The cooled stretched product obtained by the method of the present invention contains gaps of limited length between the said tapes of lesser width. This stretched woven fabric thus has a substantially greater area than

the woven base fabric.

It is more convenient to stretch warp tapes of synthetic resinous material in a woven base fabric and it is therefore the weft tapes of the woven base fabric which preferably include the series of zones in which the tape is subdivided into a plurality of tapes of lesser width. These zones are separated from one another by portions of untreated weft tape the presence of which enables the weft tape to retain sufficient transverse rigidity to lie reasonably flat in the woven base fabric.

According to the preferred method of the present invention there is therefore provided a method of manufacturing a fabric material comprising the steps of forming a woven base fabric of warp and weft tapes of synthetic resinous material, the warp tapes being molecularly stretchable in the longitudinal direction and the weft tapes including a series of zones in which the weft tape is subdivided into a plurality of tapes of lesser width, the zones in said series each being separated from one another by an unsplit portion of weft tape, applying heat to raise the temperature of the woven fabric, applying tension to the woven fabric to stretch the warp tapes in the longitudinal direction and simultaneously separate the subdivided weft tapes in said zones to open gaps between the subdivided weft tapes of lesser width, which gaps are limited in length by the unsplit portions of weft tape, and thereafter cooling the stretched woven fabric to obtain a woven fabric of greater area than the originally formed woven base fabric.

The weft tape is advantageously formed with zones in each of which there is a plurality of parallel slits extending longitudinally in the tape with each set of slits in one zone separated from the adjacent similar zone by a portion of flat untreated tape extending substantially perpendicular to the length of the weft tape.

The slits which subdivide each zone in the weft tape are most conveniently formed by pretreating the weft tapes by passing them over the surface of a roller having thereon several rows of pins which penetrate the tape. The roller and the tape are advanced at speeds in a ratio of the order of 1.2 to 1.0 so that the pins form slits of desired length in the tape. Each row of pins thus produces a corresponding row of slits, and the length of the slits is selected such that the row of slits formed by each row of pins is spaced from the succeeding row of slits by an unsplit area or portion of the weft tape. In this portion the weft tape still has its full width.

There is thus obtained an intermittent slitting of the tapes which are subsequently used to form the weft elements in the woven base fabric.

As an alternative to the use of a pinned roller, the slits in the weft tapes can be formed using a roller with interrupted circumferential knife edges, the tape being passed over the roller surface at a speed approximately equal to the roller surface speed.

Conveniently the synthetic resinous material from which the tapes are formed is a polyolefin such as polyethylene or polypropylene.

The present invention will be further understood from the following description of a preferred embodiment thereof which is made by way of example with reference to the accompanying drawings in which:-

Figure 1 shows a plan view of a pretreated tape to be used in forming a woven base fabric,

Figure 2 shows a portion of a woven base fabric including tapes similar to the tape of Figure 1 as weft tapes, and

Figure 3 shows the portion of woven base fabric of Figure 2 after being subjected to a stretching treatment.

Referring to Figure 1 there is shown a tape 1 preferably of polypropylene which has therein a series of zones 2 in which the tape has a number of parallel slits 3 causing the tape 1 to be divided, in each of the zones, into several tapes 4 of lesser width.

Each of the zones 2 is separated from the adjacent zone in the series by an unsplit portion 5 which is a portion of tape of the full width of the tape before any slits were formed in it. The unsplit portions 5 of the tape extend transversely of the tape 1 and give the tape transverse rigidity to enable it to remain flat during weaving of the fabric without bunching together of the tapes 4 of lesser width.

The woven base fabric, which is illustrated in Figure 2, is formed using polypropylene tapes 1, i.e. tapes having the zones 2 containing the tapes 4 of lesser width separated by the slits 3, as the weft elements, and untreated polypropylene tapes 6 as the warp elements.

The woven base fabric of Figure 2 is passed through a heating zone, for example in contact with a heated surface, so as to raise the temperature of the fabric to a temperature at which the polypropylene tapes are readily extensible under tension. Advantageously the temperature is a temperature of the order of 160°C at which the polypropylene becomes softened. The woven fabric is tensioned longitudinally of the fabric so that the warp tapes 6 are molecularly stretched to approximately twice their original length. As the warp tapes 6 extend, so the frictional contact between the softened warp and weft tapes causes the subdivided tapes 4 of lesser width in the zones 2 in each weft tape 1 to be separated from one another. Each weft tape 1 thus becomes a series of four smaller tapes 4 united at intervals by the unsplit portions 5, as illustrated in Figure 3.

The unsplit portions 5 may in some circumstances be

caused to spread during the stretching of the warp tapes 6. Also the separation from one another of the tapes 4 of lesser width during the stretching of the warp tapes 6 may cause some of the slits 3 to be propagated lengthwise into some of the unsplit portions 5 of the weft tapes 1.

The separation of the four smaller tapes 4 illustrated in Figure 3 is prevented only where an occasional twist occurs in the weft tape 1 as indicated at 8 in that Figure.

The stretched woven fabric shown in Figure 3 is cooled under tension in its stretched condition to obtain a final product corresponding closely in dimensions to the heated stretched woven fabric. The final stretched woven fabric therefore has gaps between the tapes 4 of lesser width.

When stretching of the woven base fabric is effected at temperatures at which the polypropylene becomes softened, bonding occurs between the stretched warp tapes and the various components of the weft tapes at their intersections so that the stretched fabric material is locked and has excellent dimensional stability.

The degree of bonding is controllable by appropriate adjustment of the levels of temperature and tension applied to the fabric, and by the length of time for which the fabric is exposed to the raised temperature.

The stretched fabric material obtained by the method described has approximately twice the area of the original woven base fabric and is composed of warp tapes of approximately half the count of the warp tapes used in forming the original woven base fabric. For example a warp tape 6 of 44 tex used in the original woven base fabric is reduced to approximately 22 tex, and a fabric having warp tapes of such lower count is produced more cheaply by the method of the present invention than it can be produced by weaving an original fabric from warp of

that lower count.

The tenacity of the stretched fabric as measured in grammes/dtex is increased as compared with the original woven base fabric.

The stretched woven fabric obtained by the method of this invention has weft tapes with an increased effective width, as compared with the original woven base fabric.

CLAIMS:

1. A method of manufacturing a fabric material comprising the steps of forming a woven base fabric of warp and weft tapes of synthetic resinous material, raising the temperature of the woven fabric, applying tension to the woven fabric to stretch the woven fabric by stretching either the warp tapes or the weft tapes, and thereafter cooling the stretched woven fabric in the stretched condition, characterised in that either the warp tapes or the weft tapes include a series of zones (2) in which the tape (1) is subdivided into a plurality of tapes (4) of lesser width, and in that the tension applied to the woven fabric is applied to stretch the other of the warp and weft tapes and simultaneously separate the tapes (4) of lesser width in said zones (2) to open gaps of limited length between the said tapes (4) of lesser width.

2. A method as claimed in Claim 1, characterised in that the warp tapes (6) are molecularly stretchable in the longitudinal direction and the weft tapes (1) include the said series of zones (2) in which the tape (1) is subdivided into a plurality of tapes (4) of lesser width, and in that the zones (2) in said series are each separated from one another by an unsplit portion (5) of weft tape.

3. A method according to Claim 1 or Claim 2, characterised in that the woven fabric is raised to a temperature at which the synthetic resinous material softens.

4. A method according to any one of the preceding claims, characterised in that there is bonding at the intersections of the warp tapes (6) and the weft tapes (1).

5. A method according to any one of the preceding claims, characterised in that the synthetic resinous

material is a polyolefin.

6. A method according to any one of the preceding claims, characterised in that slits (3) are formed in the weft tapes (1) prior to weaving the woven base fabric by passing the tapes over the surface of a pinned roller.

FIG. 1

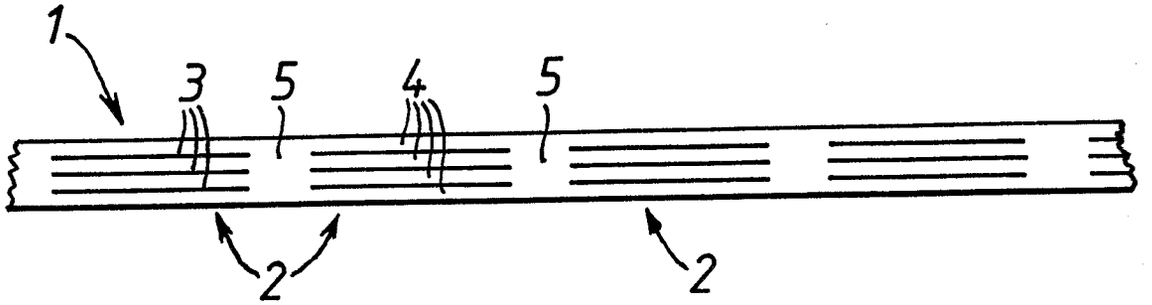
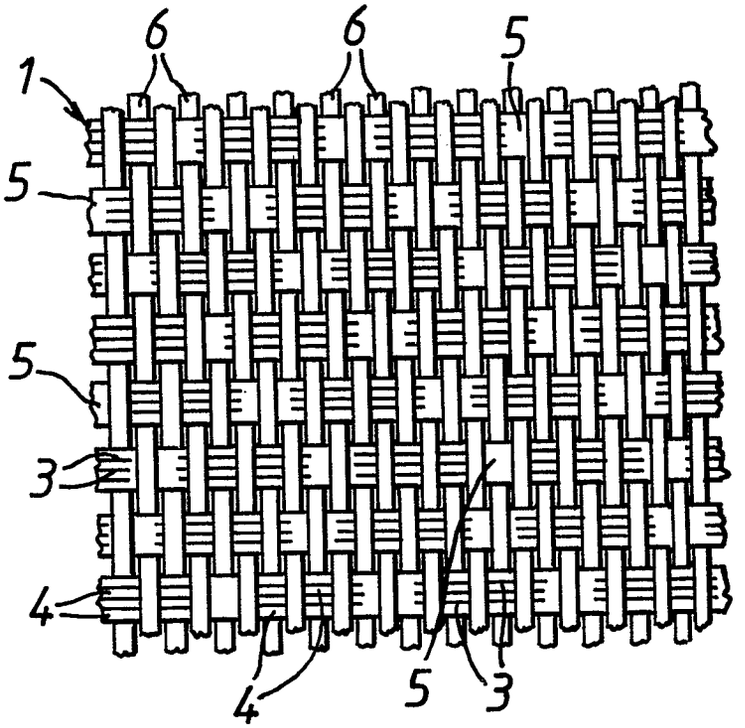



FIG. 2



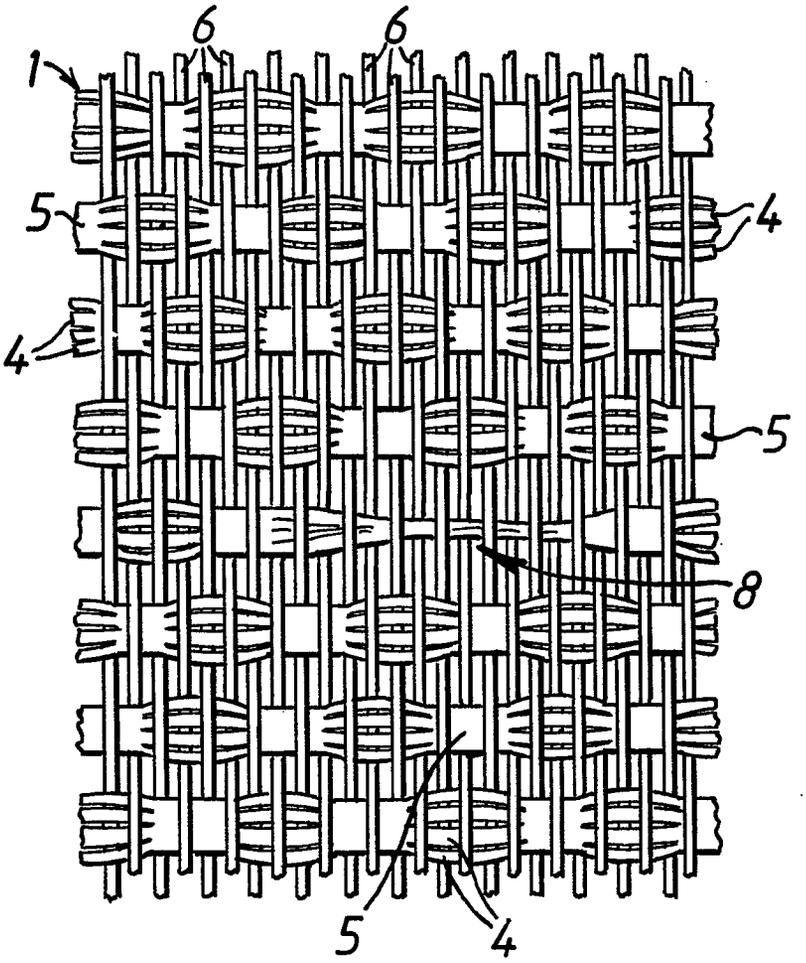



FIG.3