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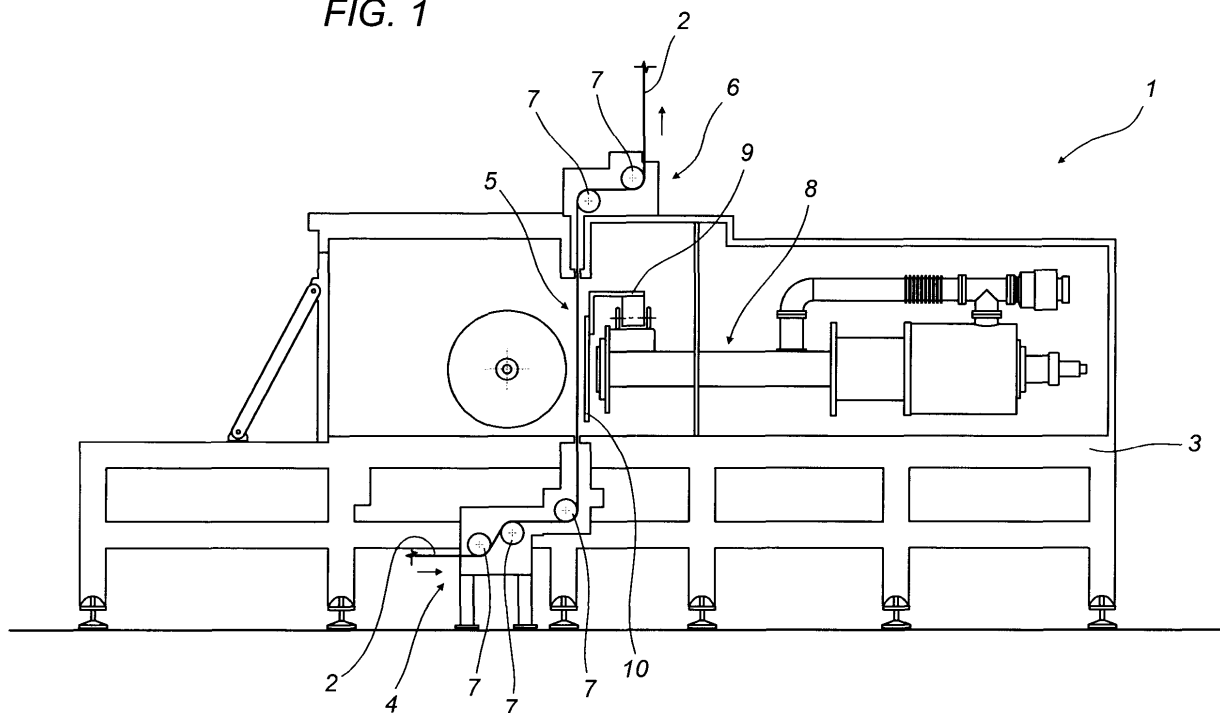
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(54) **Fabric finishing process and plant**

(57) A process and plant for finishing fabric (2), in particular denim type fabric, whereby areas of the fabric (2), selected according to a certain decorative motif, are

subjected to electron bombardment (EB) to locally increase the ability of the fabric (2) to become more faded or abraded.

FIG. 1



Description

[0001] This invention concerns a fabric finishing process and plant.

[0002] Preferably, but not exclusively, the process and plant according to the invention are suitable for processing a denim type fabric (jeans).

[0003] As is known, denim type fabrics fade easily as a result of wear and washing, in a more or less uniform way. The different shades of colour of the faded fabric give the items of clothing made from denim a particular and personalized appearance which is highly appreciated by the market. Many items of clothing made from denim are therefore very often faded artificially with washing and abrasion operations carried out by the textile industries, thanks to the use of techniques which generally foresee the use of chemical substances.

[0004] With the known techniques it is possible to obtain a substantially uniform degree of fading, but also a patchy type fading with small or large patch areas or more or less intense fading. These two esthetic variations are, however, limited with respect to the greater variety which the market demands; furthermore, the effect obtained is a basic fading, already present in the new item of clothing, which often predominates over the subsequent fading that occurs as a result of subsequent wear and tear and washing.

[0005] The aim of this invention is to provide a finishing process for fabric, in particular for denim type fabric, which makes it possible to obtain a number of esthetic variations of fading that take place during the use of the product.

[0006] Another aim of the invention is to provide a finishing process for fabric, in particular for denim type fabric, which allows tearing or fraying of the fabric during its use, accentuated in the areas irradiated with electrons (EB).

[0007] A further aim of the invention concerns the setting up of a process (EB) and the relative finishing plant for fabric, in particular denim type fabric, which makes it possible to obtain an unlimited or almost unlimited number of esthetic variations (fading and/or abrasion).

[0008] Yet another aim of the invention is the definition and setting up of the finishing process for fabric, in particular denim type fabric, which allows any form of personalization of the finishing treatment. According to the invention, a fabric finishing process is provided according to what is disclosed in claim 1 or in any other claim depending directly or indirectly on claim 1.

[0009] According to the invention, a fabric finishing plant is provided according to what is disclosed in claim 10 or in any other claim depending directly or indirectly on claim 10.

[0010] According to the invention, a treated fabric is also obtained, having the characteristics present in claim 17 or in any other claim depending directly or indirectly on claim 17.

[0011] The invention will now be described as a non-

binding example with reference to the accompanying drawings in which:

- figure 1 is a schematic view of one embodiment of the finishing plant according to the invention; and
- figures 2 and 3 each show a respective sample of denim type fabric produced in the plant in figure 1.

[0012] In figure 1, the reference number 1 identifies a finishing plant of a denim type fabric 2, a sample of which is shown in figure 2, or, according to a decorative finish variation, in figure 3.

[0013] The plant 1 comprises a support frame 3, an input station 4 of the fabric 2, a processing station 5 of the fabric 2, an output station 6 of the fabric 2 and a plurality of conveyer rollers 7, supported by the frame 3 and designed to infeed the fabric 2, in the form of a continuous roll, between the stations 4 and 6 and through the station 5. In particular, the rollers 7 are arranged to create labyrinth areas in which the fabric 2 is fed through the station 5 along a vertical or substantially vertical conveyer plane. According to another embodiment of the plant, the fabric processing area can also be horizontal or inclined, without changing the result of the process.

[0014] In correspondence with the station 5, the plant 1 carries out irradiation of the fabric 2 with a beam of electrons, by means of the action of the electron source 8. The bombardment of the fabric 2, with a beam of electrons, can be limited to portions of the fabric, using "patterned" templates or mobile screens that protect the fabric from the electron bombardment. According to a preferred non-binding embodiment, the source 8 functions with a current between 0.2 mA and 30mA, in certain cases with currents higher than 30mA, and with a voltage between 60 KV and 300 KV, which in some cases can exceed 300 KV due to procedural requirements.

[0015] Between the source 8 and the fabric 2, a template 10, designed to select only certain predetermined area of the fabric 2 to be subjected to irradiation, is mounted on the frame 3 by means of a power-driven bracket 9. For this purpose, the template 10 is a screening template with a certain pattern cut into it.

[0016] Figures 2 and 3 show two decorative motifs 11 printed on the fabric 2, which can be chosen to order by the customer. Creating a decorative motif 11 with a pattern cut into the template 10 produces a bombardment on the fabric 2 bordered by the empty spaces in the template 10. The template 10 can also be held stationary or moved transversally with respect to the fabric infeed direction, during the electron bombardment, to achieve different finishing results (patterns, trail effects, etc.).

[0017] The effect of the electron bombardment does not immediately fade the fabric 2, but gives the bombarded areas the ability to fade subsequently, as a result of wear and tear and/or washing. For this reason the decorative patterns 11 obtained with electron bombardment have the particular features of being invisible on the fabric 2 when it is new, and of becoming increasingly more vis-

ible as a result of wear and tear and/or washing of the fabric 2. More in general, the portion of the fabric 2 subjected to irradiation is indistinguishable from the rest of the fabric 2 when it is new (not washed), while it becomes increasingly distinguishable as a result of wear and tear and/or washing of the fabric 2.

[0018] Particular washing additives can be sold together with the fabric 2, or with the items made from the fabric 2, to further enhance the decorative motifs 11 against the background and/or to speed up the process whereby they gradually become more visible against the background.

[0019] The plant 1 functions by submitting at least one portion of the fabric 2, in the station 5, to EB irradiation designed to locally modify, in particular to increase, the ability of the fabric 2 to fade.

[0020] The areas of the fabric 2 irradiated with electrons are selected on the basis of the chosen decorative motif 11. To obtain the decorative motif 11, the fabric 2 is bombarded through the screening template 10, so that the electrons strike the fabric 2 through the cuts, while the electrons strike the template 10 in the uncut areas. The electrons which strike the template 10 are repelled, or their energy is attenuated to the point that, even if they reach the fabric 2, they are unable to chemically and/or physically modify the structure of the fabric 2.

[0021] It is appropriate to point out that the fabric 2 is preferably, but not exclusively, a denim type fabric, since many other non-denim type fabrics can be treated with EB bombardment to achieve fading as a result of wear and tear and/or washing, and are thus equally suitable for gradually appearing decorative motifs 11.

[0022] It should also be pointed out that the process described above with reference to the plant 1 can be used to treat the fabric of a product already made up, for example an item of clothing. In other words, according to a variation, in station 5 the decorative motifs 11 can be printed on finished products instead of on a continuous roll of fabric to be subsequently used in the product creation lines.

Claims

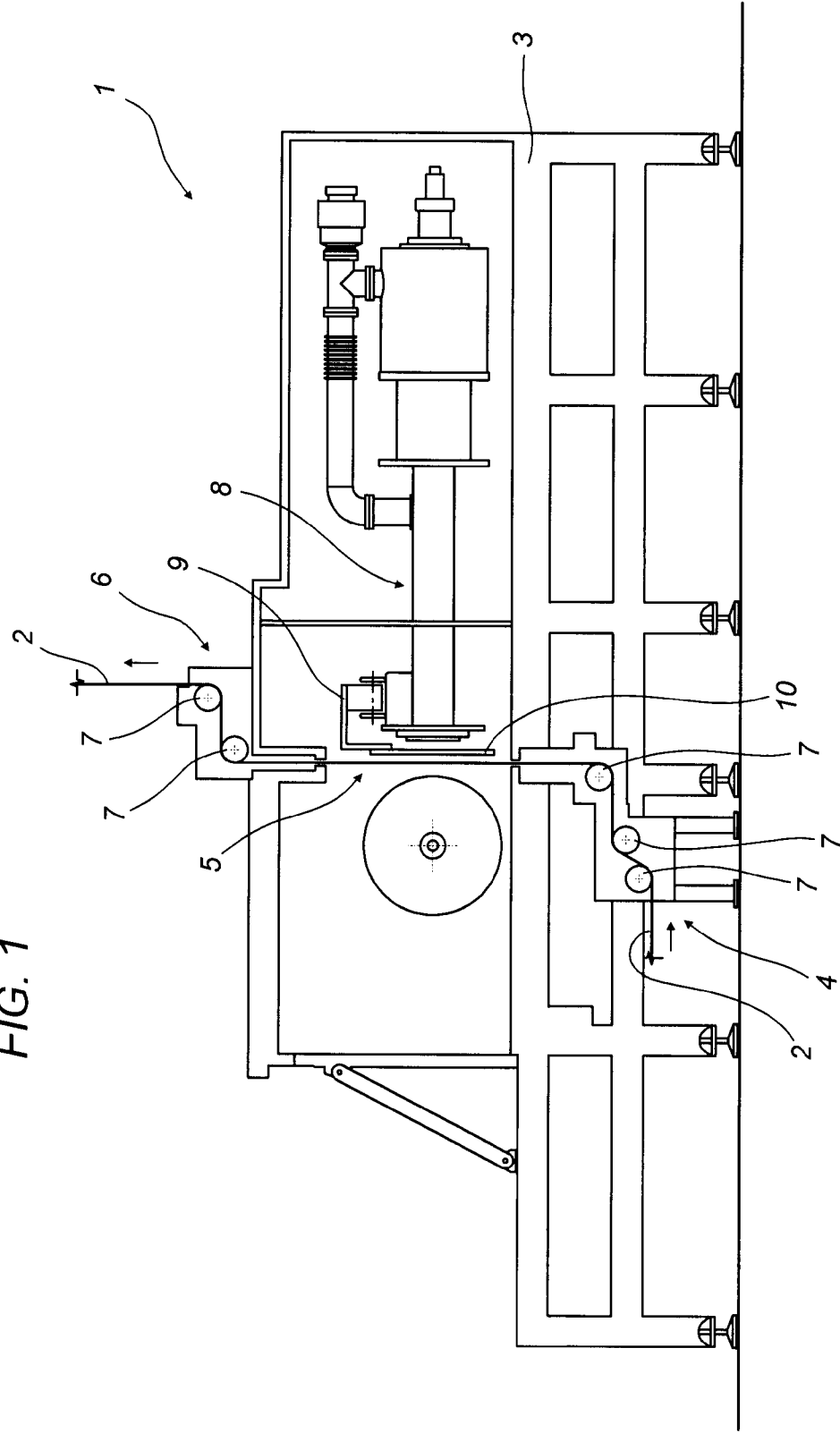
1. A fabric finishing process, **characterised in that** it comprises the step of subjecting at least one portion of fabric (2) to irradiation designed to locally modify the ability of the fabric (2) to fade.
2. The process according to claim 1, **characterised in that** the irradiation step consists of irradiation with electrons designed to locally modify the ability of the fabric (2) to fade with respect to the non-treated areas.
3. The process according to claim 1, wherein the irradiation is designed to locally increase the ability of the fabric (2) to fade.

4. The process according to claim 1, 2 or 3, wherein only selected areas of the portion of fabric (2) are subjected to irradiation.
5. The process according to claim 4, wherein these areas are selected according to a certain decorative motif (11).
6. The process according to claim 5, wherein the irradiation strikes the portion of fabric (2) through a screening template (10) wherein a certain pattern is cut.
7. The process according to claim 6, wherein the screening template (10) and/or the portion of fabric (2) move during exposure of the portion of fabric (2) to the irradiation.
8. The process according to any of the foregoing claims from 1 to 7, wherein the irradiation is carried out by bombarding the portion of fabric (2) with a beam of electrons emitted by a respective source (8).
9. The process according to claim 8, wherein the beam of electrons is emitted by the source (8) with a current between 0.2 mA and 30mA.
10. The process according to claim 8 or 9, wherein the beam of electrons is emitted by the source (8) with a voltage between 60 KV and 300 KV.
11. A fabric finishing plant, **characterised in that** it comprises means to subject at least one portion of fabric (2) to irradiation designed to locally modify the ability of the fabric (2) to fade.
12. The plant according to claim 11, **characterised in that** it comprises selection means (10) to select only certain areas of the portion of fabric (2) to be subjected to the irradiation.
13. The plant according to claim 12, **characterised in that** the selection means (10) comprise a screening template (10) wherein a certain pattern is cut.
14. The plant according to claim 13, **characterised in that** it comprises movement means (7, 9) to move the screening template (10) and/or the portion of fabric (2) during exposure of the portion of fabric (2) to irradiation.
15. The plant according to any of the foregoing claims from 11 to 14, **characterised in that** the means for subjecting at least one portion of fabric (2) to the irradiation comprise a source (8) of a beam of electrons designed to bombard the portion of fabric (2).
16. The plant according to claim 15, wherein the source

(8) functions with a current intensity between 0.2 mA and 30mA.

17. The plant according to claim 15, **characterised in that** the source (8) functions with a greater intensity of 30 mA. 5
18. The plant according to claim 15 or 16, wherein the source (8) functions with a voltage between 60 KV and 300 KV. 10
19. The plant according to claim 15 or 16, wherein the source (8) functions with a voltage higher than 300 KV. 15
20. A fabric processed in a finishing plant, in particular denim type fabric and possibly being part of a finished product, **characterised in that** at least one portion of the fabric (2) has been subjected to irradiation designed to locally modify the ability of the fabric (2) to fade. 20
21. The fabric according to claim 20, wherein only selected areas of the portion of fabric (2) have been subjected to the irradiation. 25
22. The fabric according to claim 21, wherein the areas are selected according to a certain decorative motif (11). 30
23. The fabric according to claim 22, wherein the decorative motif (11) can be chosen to order by the customer. 35
24. The fabric according to claim 22 or 23, wherein the decorative motif (11) is invisible on the fabric (2) when the fabric (2) is new, while it becomes increasingly more visible as a result of wear and tear and/or washing of the fabric (2). 40
25. The fabric according to claim 20, wherein the portion subjected to irradiation is indistinguishable from the rest of the fabric (2) when the fabric (2) is new, while it becomes increasingly more distinguishable as a result of wear and tear and/or washing of the fabric (2). 45
26. The fabric according to any of the foregoing claims from 20 to 25, wherein the radiation is carried out by bombarding the portion of fabric (2) with a beam of electrons emitted by a respective source (8). 50
27. An item of clothing made from a fabric (2) according to any of the foregoing claims from 20 to 26. 55

FIG. 1



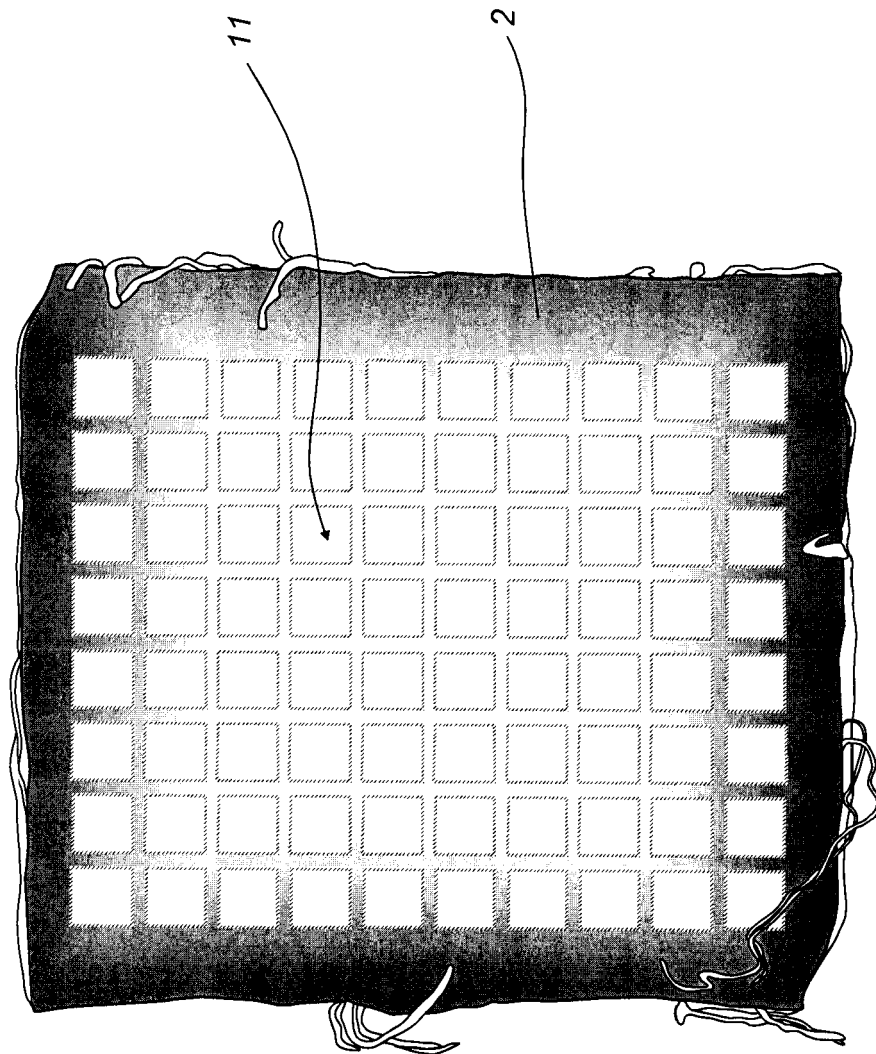


FIG. 2

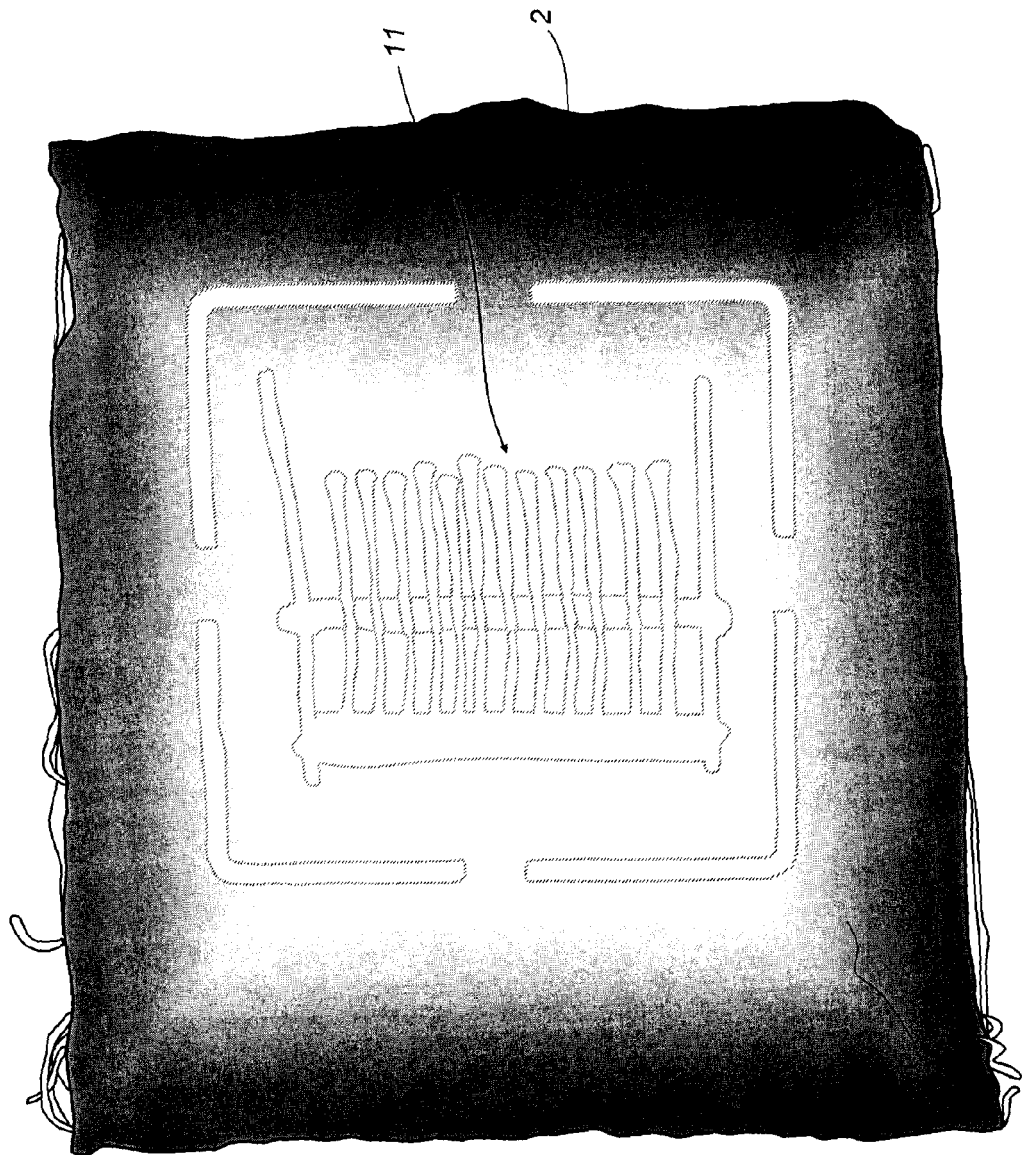


FIG. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 1 561 383 A (TEXTILTECH FORSCH) 20 February 1980 (1980-02-20) * page 1, line 11 - page 2, line 76; claim 1; example 1 * -----	1-3,8, 11,15, 20,26,27	INV. D06B11/00
X	US 4 140 607 A (KREISELMEIER HANS-GERT ET AL) 20 February 1979 (1979-02-20) * abstract; claim 1 * -----	1-3,8, 11,15, 20,26,27	
X	US 5 567 207 A (LOCKMAN WILLIAM J [US] ET AL) 22 October 1996 (1996-10-22) * the whole document * -----	1,11,20, 27	
X	US 6 252 196 B1 (COSTIN DARRYL [US] ET AL) 26 June 2001 (2001-06-26) * the whole document * -----	1,11,20, 27	
X	WO 00/13805 A (STRAUSS LEVI & CO [US]) 16 March 2000 (2000-03-16) * the whole document * -----	1,11,20, 27	TECHNICAL FIELDS SEARCHED (IPC) D06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 January 2007	Examiner Bichi, Marco
CATEGORY OF CITED DOCUMENTS 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 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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 12 2985

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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29-01-2007

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