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

(11) **EP 2 206 812 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
14.07.2010 Bulletin 2010/28

(21) Application number: **08830836.6**

(22) Date of filing: **15.09.2008**

(51) Int Cl.:
D02G 3/12 *(2006.01)* ***D02G 3/36*** *(2006.01)*

(86) International application number:
PCT/ES2008/000591

(87) International publication number:
WO 2009/034212 (19.03.2009 Gazette 2009/12)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(30) Priority: **14.09.2007 ES 200702449**

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(54) THREAD FOR CLOTH ABLE TO ATTENUATE, AND INSULATE FROM, ELECTROMAGNETIC WAVES

(57) The thread for cloth able to attenuate, and insulate from, electromagnetic waves consists of an aluminium core (or another material in the absence of aluminium) (1) and a cover (3) based on plaited threads (2) and consisting of natural or synthetic textile material. Said thread is used to make cloths, with the purpose of protecting a person and other elements from the radiation caused by radiofrequency (electromagnetic waves) and for producing all types of wearing apparel, such as civil, military and industrial, as well as industrial cloths that may benefit from the above-mentioned characteristics.

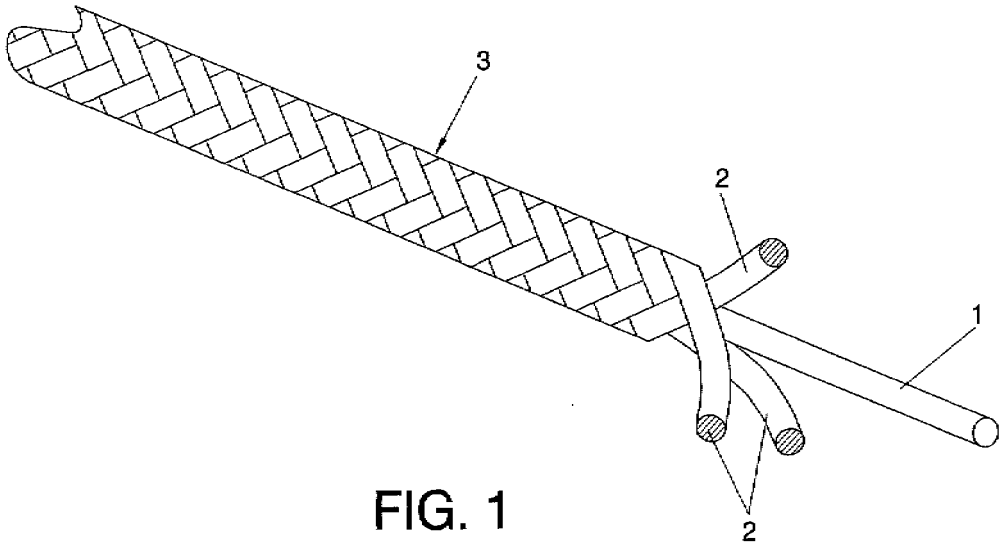

FIG. 1

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Description

OBJECT OF THE INVENTION

[0001] The present invention, as described in this specification, is referred to a thread for cloth able to attenuate, and insulate from, electromagnetic waves, preferably and fundamentally applicable in producing wearing apparel, such as civil, military and industrial, as well as for coverings with the purpose of attenuating and insulating electromagnetic waves.

[0002] The object of the invention is to create a thread to make a cloth allowing attenuating and insulating a person, among others, from the radiation caused by radiofrequency and to which they are subjected daily.

BACKGROUND OF THE INVENTION

[0003] As it is known, due to the technological development, humans are subjected daily to constant electromagnetic radiation due to the radiofrequency waves created by mobile telephony, domestic appliances, scanners, radars, repeaters of all types of signals, safety devices, frequency inhibitors, alarms, satellites, overhead and underground power lines, etc., i.e. any radio waves emitter, either by its own motivation, or by emissions that accompany its operation, producing as a first effect a heating of the elements being traversed due to the energy dispersion thereof, as it is the case of the human body, and which has brought about social unrest due to all types of possible illnesses, in addition to the physical and psychic alterations that they can produce.

[0004] It is not known if there exist cloths that can protect or palliate in part the above-mentioned effects on people, although it is known that there exist refractory elements or components based on aluminum compounds and mixture as a covering of textile threads with certain layers, fundamentally intended to palliate heat sources, to increase the hardness or physical resistance in materials, anti-penetration, etc.

[0005] In this regard, the British GB 1387299 and American US 37954524 patents can be cited, although said patents deal with heat refractory components which are not focused on cloths for producing wearing apparel, and their applications are industrial in nature and of course there is no specific reference to the creation of a specific thread in the sense of the object of the patent of invention the granting of which is intended.

DESCRIPTION OF THE INVENTION

[0006] The thread for cloth able to attenuate, and insulate from, electromagnetic waves that is referred to, is designed to prepare cloths that may be utilized to prepare wearing apparel or industrial cloths allowing to insulate, partially or totally, the user or object from the radiations to which they are subjected nowadays, as a consequence of the electrical and electronic technologies utilized for multiple purposes in the society.

[0007] Specifically, the thread for cloth able to attenuate, and insulate from, electromagnetic waves of the invention is **characterized in that** it consists of an aluminum core (or another material in the absence of aluminum, having the same characteristics at the level of attenuation and insulation from electromagnetic waves) and a covering made of any of the following matters: cotton, silk, viscose, viscose FR (flame retardant), acrylic, modacrylic, wool, wool Fr melamine, polypropylene, polyethylene, ultra-high molecular weight polyethylene (UHMWPE), low density polyethylene (LDPE), high density polyethylene (HDPE), high density polyethylene (HDPE) polyamide, polyamide HT, fire-resistant polyamide, polyester, polyester HT, fire resistant polyester, polyester copolymers, aromatic polyamides (meta-aramids and para-aramids) and copolymers

[0008] (copolyaramides) thereof, polyacrylonitriles, polybenzimidazole (PBI), polyphenylene 2,6-henzobisoxazole (PBO), polyphenylene terephthalamide (PPTA), polyvinyls, polyimide (PI) polyetherimide, polyamide-imide (PAI), poly-meta-phenylene isophthalamide (MPD-I), carbon fiber or thread, and all their combinations and mixtures, wherein the aluminum core (or another material in the absence of aluminum) will have a section according to the covering thickness, said core can even consist of aluminum mixed with other materials, as long as the attenuation and insulation characteristics are maintained with respect to electromagnetic waves. The aluminum can also be totally or partially covered with carbon fiber or thread.

[0009] On the other hand, the covering of the mentioned matters will be based on plaited and/or twisted sub-threads, being able to utilize as covering any other type of natural or synthetic yarn, commercially available, currently or in the future.

[0010] In the same way, it should be noted that the plaited thread end (plaited sub-threads) and/or twisted thread end, making up the covering of the aluminum core (or another material in the absence of aluminum), can be a monofilament or multi-filament, and intervening in numbers of 1, 2, 3, 4 or 5 in order to form the covering in each case, wherein said thread end may be single or multi-stranded; and in case of it being two thread ends, these will be crossed, plaited or twisted.

[0011] The arrangement of the thread obtained in the cloth will always form a grid with vertical and horizontal segments, thus securing the attenuation of the vertically and horizontally polarized waves.

[0012] Regarding the cloth warp, two normal threads can alternate with the threads of the invention, all as a function of the wavelengths to be attenuated, which is a function of the separation between the threads.

[0013] Definitively, the thread for cloth able to attenuate and insulate from, electromagnetic waves, object of the invention, is based on adhering by any physical or chemical procedure, a covering over an aluminum core (or another material in the absence of aluminum), where-

in the covering may be made of any fiber type, including, for example, carbon fiber or thread, allowing the finished spinning to cross or twist, creating weft and warp in order to finally configure a cloth which allows the preparation of wearing apparel or industrial cloths, which can make it possible to partially or totally insulate the user or element from the electromagnetic radiation caused by radiofrequency to which they are subjected constantly, as discussed in the section "background of the invention", and thus solving, or at least largely palliating, the exposition to said electromagnetic waves and thus to the consequences or possible consequences thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] In order to complement the description to be carried out below and with the object of facilitating a better understanding of the characteristics of the invention, a series of drawings are attached to the present specification in which the innovations and advantages of the thread for cloth able to attenuate, and insulate from, electromagnetic waves, object of the invention, will be more easily understood.

Figure 1.- Shows a perspective view of a portion of a thread for cloth able to attenuate, and insulate from, electromagnetic waves, with an aluminum core (or another material in the absence of aluminum) and a covering made of, for example, three plaited sub-threads.

Figure 2.- Shows a perspective view of a portion of a thread for cloth able to attenuate, and insulate from, electromagnetic waves, with an aluminum core (or another material in the absence of aluminum) and a covering made of, for example, four plaited sub-threads.

Figure 3.- Shows a perspective view of a portion of a thread for cloth able to attenuate, and insulate from, electromagnetic waves, with an aluminum core (or another material in the absence of aluminum) and a covering made of, for example, five plaited sub-threads.

Figure 4.- Shows a perspective view of a portion of thread with a covering formed by a single thread end or helicoidally rolled sub-thread over the aluminum core.

Figure 5.- Shows another perspective view of a portion of thread with two thread ends or sub-threads of covering arranged in crisscrossed manner over the aluminum core.

Figure 6.- Shows a detail of the grid formed by the arrangement of the thread of the Invention in the cloth.

Figure 7. - Shows a detail of a cloth warp formed by the alternation of the normal threads with the threads of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] As it can be seen in the mentioned figures, and namely in figure 1, the thread for cloth able to attenuate, and insulate from, electromagnetic waves, object of the invention, of an aluminum core 1 (or another material in the absence of aluminum), formed by a filament of appropriate section and a covering based on plaited sub-threads 2 made of the aforementioned matters. In said figure 1, three plaited sub-threads 2 can be observed Constituting the covering 3 of the aluminum core 1.

[0016] However, figure 2 shows an aluminum core 1' (or another material in the absence of aluminum) with a covering 3' formed by four plaited sub-threads 2'.

[0017] Figure 3 shows an aluminum corc 1" (or another material in the absence of aluminum), with a covering 3" formed by five plaited sub-threads 2".

[0018] In any case, the aluminum core 1 or 1' or I", (or another material in the absence of aluminum), instead of being made of a pure aluminum filament, it can consist of a mixture with other metallic materials, as long as these do not exceed 50% of the total core composition, hallowing to obtain cloths with the maximum performance.

[0019] On the other hand, the plaited threads 2 or 2' or 2" can be single or multi-stranded, and instead of being made of cotton, silk, viscose, viscose FR (flame retardant), acrylic, modacrylic, wool, wool Fr melamine, polypropylene, polyethylene, ultra-high molecular weight polyethylene (UHMWPE), low density polyethylene (LDPE), high density polyethylene (HDPE), high density polyethylene (HDPE) polyamide, polyamide HT, fire-resistant polyamide, polyester, polyester HT, fire-resistant polyester, polyester copolymers, aromatic polyamides (meta-aramids and para-aramids) and their copolymers (copolyaramides), polyacrylonitriles, polybenzimidazole (PBI), polyphenylene 2,6-benzobisoxazole (PBO), polyphenylene terephthalamide (PPTA), polyvinyls, polyimide (PI) polyetherimide, polyamide-imide (PAI), poly-metaphenylene isophthalamide (MPD-I) and all their combinations and mixtures, can also consist of other textile materials, i.e. any other type of spinning, both natural and synthetic, not mentioned above.

[0020] In figure 4, a thread is shown wherein the corresponding covering 3 " ' of the aluminum core 1 " ' consists of only one thread end or helicoidally rolled sub-thread 2"' which may be single or multi-stranded.

[0021] In figure 5, a thread is shown wherein the corresponding covering 3"" of the aluminum core 1"" consist of two thread ends or sub-threads 2"", crossed or twisted, made of only one filament or multi-filament.

[0022] When making the corresponding cloth, the arrangement of the thread will always form a grid with vertical segments 4 and horizontal segments 4', as shown in figure 6, such that that grid arrangement ensures the attenuation of the polarized waves vertically and horizontally.

[0023] In relation to the cloth warp, it may be formed by normal threads 5-5' alternated with the threads 4-4'

of the invention, depending on the wavelengths to attenuate, which depends on the separation between the threads 4-4'.

Claims

1. Thread for cloth able to attenuate, and insulate from electromagnetic waves that, being envisaged to allow the preparation of cloths preferably intended for producing wearing apparel in order to protect the user from the radiation caused by radiofrequency (electromagnetic waves), is **characterized in that** it comprises an aluminum core (or another material in the absence of aluminum) (1 or 1' or 1" or 1"' and 1"") and a covering (3 or 3' or 3" or 3 " ' or 3"") made of plaited sub-threads (2 or 2' or 2" or 2"') of a textile, natural or and synthetic material.

2. Thread for cloth able to attenuate, and insulate from electromagnetic waves, according to claim 1, **characterized in that** the aluminum core (1, or 1' or 1" or 1"' or 1" ") (or another material in the absence of aluminum) consist of a mixture of aluminum and other metallic materials.

3. Thread for cloth able to attenuate, and insulate from, electromagnetic waves, according to claim 1, **characterized in that** the sub-thread or sub-threads (2 or 2' or 2" or 2"' or 2 "') forming the covering (3 or 3' or 3 " or 3"' or 3" ") are single.

4. Thread for cloth able to attenuate, and insulate from electromagnetic waves, according to claim 1, **characterized in that** the sub-thread or sub-threads (2 or 2' or 2" or 2"' or 2"') forming the covering (3 or 3' or 3 " or 3"' or 3"") are multi-stranded.

5. Thread for cloth able to attenuate and insulate from electromagnetic waves, according to claims 1, **characterized in that** the plaited sub-threads (2 or 2' or 2" or 2"' or 2"") of the covering (3, or 3' or 3" or 3"' or 3"") are made of cotton, silk, viscose, viscose FR (flame retardant), acrylic, modacrylic, wool, wool Fr melamine, polypropylene, polyethylene, ultra-high molecular weight polyethylene (UHMWPE), low density polyethylene (LOPE), high density polyethylene (HDPE), high density polyethylene (HDPE) polyamide, polyamide HT, fire-resistant polyamide, polyester, polyester HT, fire-resistant polyester, polyester copolymers, aromatic polyamides (meta-aramids and para-aramids) and their copolymers (copolyaramides), polyacrylonitriles, polybenzimidazole (PBI), polyphenylene 2,6-benzobisoxazole (PBO), polyphenylene terephthalamide (PPTA), polyvinyls, polyimide (PI) polyetherimade, polyamide-imide (PAI), poly-meta-phenylene isophthalamide (MPD-I), and all their combinations and mixtures.

6. Thread for cloth able to attenuate, and insulate from electromagnetic waves, according to claim 1, **characterized in that** is totally or partially covered by carbon fiber or thread.

7. Thread for cloth able to attenuate, and insulate from electromagnetic waves, according to claim 1, **characterized in that** the sub-threads of the covering are twisted.

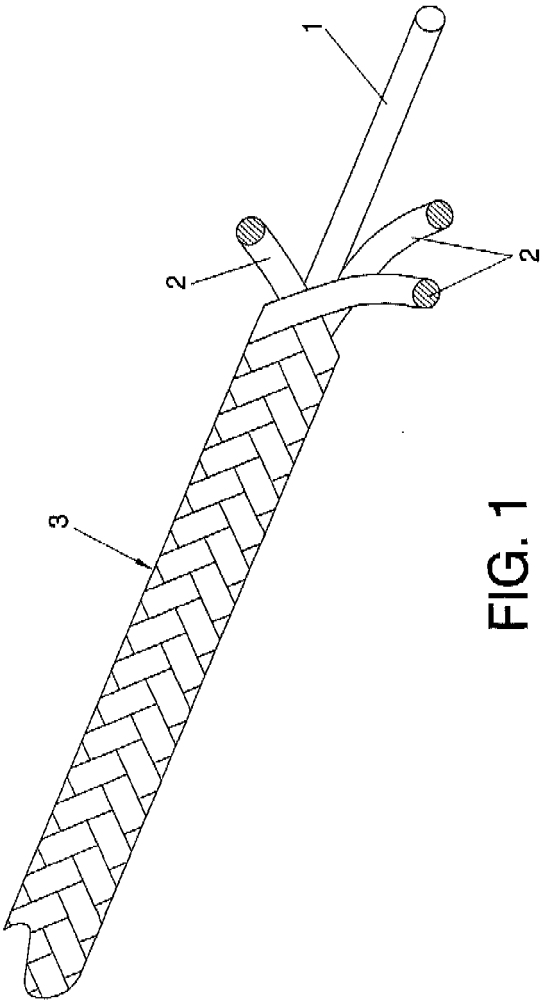

FIG. 1

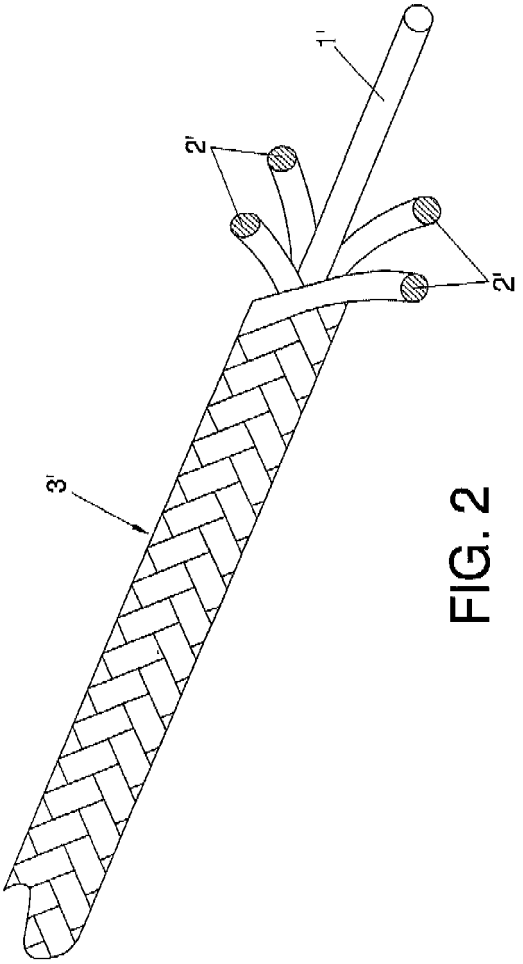

FIG. 2

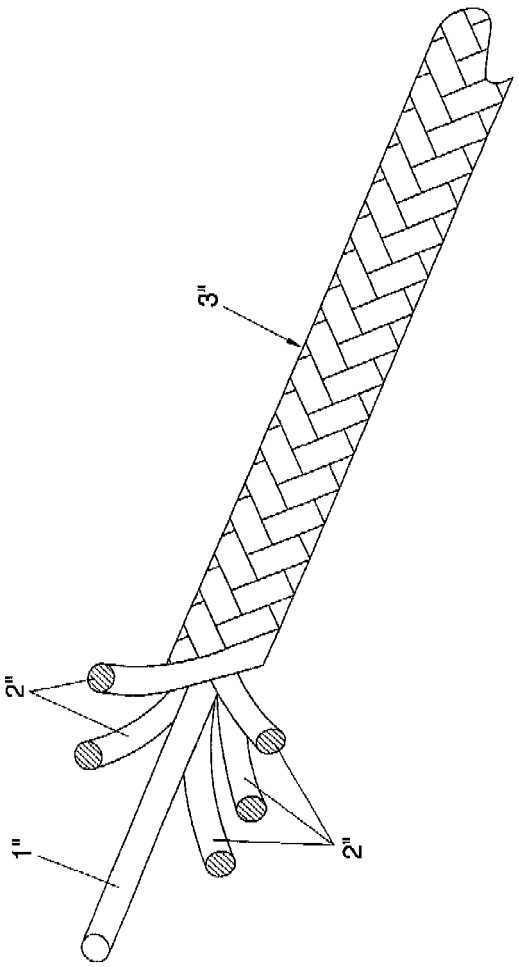

FIG. 3

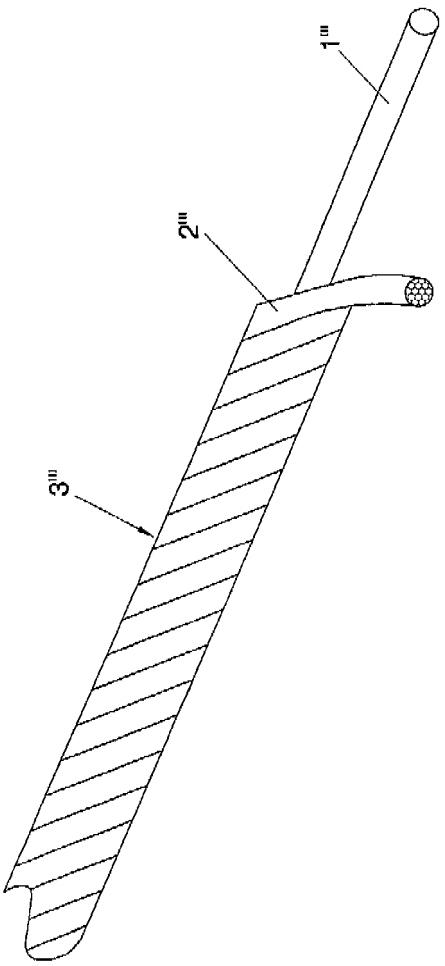

FIG. 4

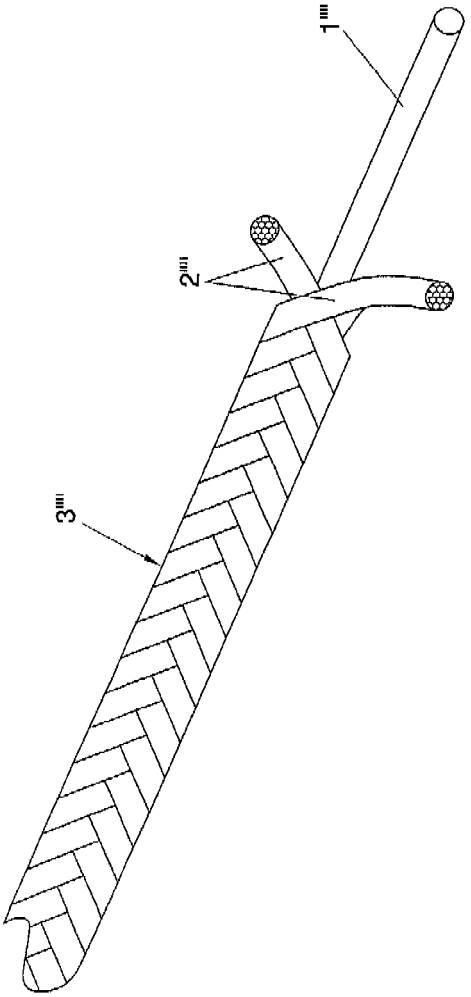

FIG. 5

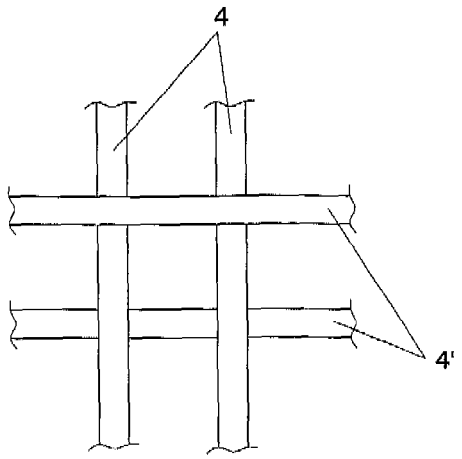

FIG. 6

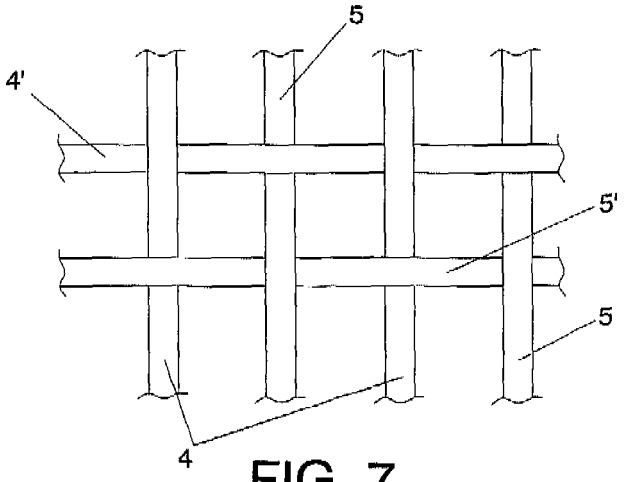

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2008/000591

A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet
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)
D02G

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 practicable, search terms used)

INVENES,EPODOC,WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 644283 B1 (INDUSTRIE TESSILI AVIANESI) 22.03.1995,figures; claims1,10 and 14	1-7
X	EP 250260 B1 (MITSUBISHI RAYON) 23.12.1987, description	1-7
X	GB 1139537 A (ACME) 08.01.1969, description	1-7
A	US 5809861 A (HUMMEL) 22.09.1998, figure 1; abstract	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents , such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 November 2008 (27.11.2008)	**(12/01/2009)**
Name and mailing address of the ISA/ O.E.P.M. Paseo de la Castellana, 75 28071 Madrid, España. Facsimile No. 34 91 3495304	Authorized officer M. Ojanguren Fernández Telephone No. +34 91 349 8468

Form PCT/ISA/210 (second sheet) (July 2008)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ ES 2008/000591

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GB 1139537 A	08.01.1969	NONE	----------
US 5809861 A	22.09.1998	NONE	----------

Form PCT/ISA/210 (patent family annex) (July 2008)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2008/000591

CLASSIFICATION OF SUBJECT MATTER

D02G 3/12 (2006.01)
D02G 3/36 (2006.01)

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REFERENCES CITED IN THE DESCRIPTION

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- GB 1387299 A **[0005]**
- US 37954524 B **[0005]**