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(72) Inventors:
• **Relats Manent, Jordi**
08140 Caldes de Montbui (ES)
• **Relats Casas, Pere**
08140 Caldes de Montbui (ES)
• **Relats Torante, Oriol**
08140 Caldes de Montbui (ES)
• **Fruns Martin, Anna**
08140 Caldes de Montbui (ES)

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(71) Applicant: **Relats, S.A.**
08140 Caldes de Montbui (ES)

(74) Representative: **Oficina Ponti, SLP**
C. Consell de Cent, 322
08007 Barcelona (ES)

(54) **Braided fabric for connector and connector comprising said fabric**

(57) Fabric for connector destined to form a grounding, which comprises a plurality of bare aluminium filaments (2) and a plurality of filaments made of non-conductive material (3), both types of filaments being destined to be inserted in two connection terminals (4, 5) provided with openings where are inserted and pressed the ends of the filaments (2, 3), wherein the percentage in weight of the filaments made of non-conductive material (3) is at most 35 % of all the filaments. This fabric is light, cheap and moreover its composition deters from possible thefts. The invention also relates to a connector provided with this fabric, and an element grounded by means said connector.

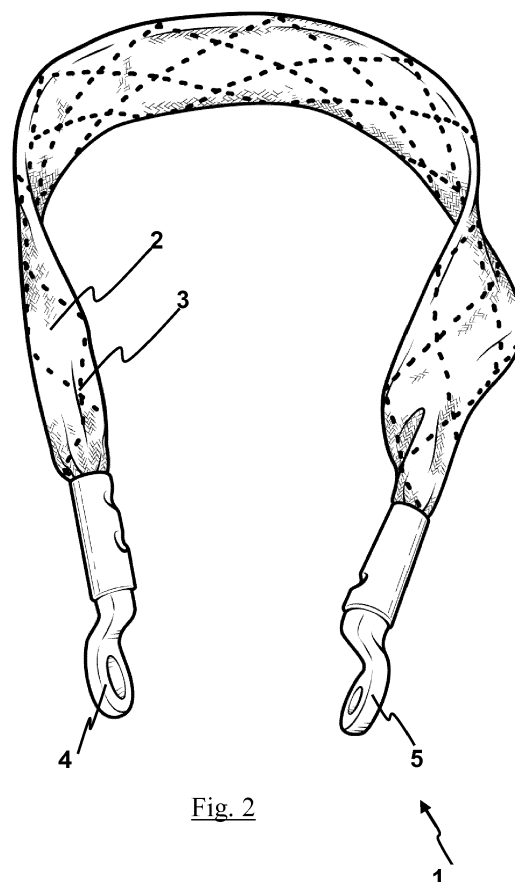


Fig. 2

Description

[0001] The present invention relates to a braided fabric for connector, to a connector which comprises said fabric and a set of an element to be grounded, such as a pylon, a fence or a machine and a connector, whose characteristics allow reducing its weight, increase its ease of assembly and also reduce the frequent robberies to which they are subjected and to guarantee the permanence of the grounding.

Background of the invention

[0002] Known in the art are connectors for grounding made of cables or cable beams made of copper, which ends are inserted in two connection terminals.

[0003] Being made of copper, these connectors are heavy, expensive and moreover are subject to frequent theft due to its copper content.

[0004] Therefore, these connectors pose problems of transportation and handling to installers, which sometimes must install them in remote locations, pose problems of costs due to the high cost of copper, a fact that is also causing them to be coveted items that ends up being the subject of thefts, which in turn represent an increase of replacement costs and a danger to the facility, which is ungrounded.

[0005] On the other hand, known are fabrics braided which comprise a plurality of metallic filaments and a plurality of filaments made of non-conductive material, both types of filaments being destined to form, for example, a protective sleeve.

Description of the invention

[0006] To solve the above drawbacks, the present invention provides for a fabric for connector destined to form a grounding, which comprises a plurality of bare aluminium filaments and a plurality of filaments made of non-conductive material, both types of filaments being destined to be inserted in two connection terminals provided with openings where are inserted and pressed the ends of the filaments, which is characterised in that the percentage in weight of the filaments made of non-conductive material is at most 35 % of all the filaments.

[0007] First, aluminium is light and is a good conductor, which guarantees the conductivity on one hand, and results in a lighter element with respect to a copper connection on the other hand.

[0008] In addition, aluminium is less expensive than copper.

[0009] Furthermore, aluminium may also be subject to theft. The final destination of the stolen cables is recycling. However, the presence of non-conducting material makes it difficult to separate the conductive material, so it will not be profitable to just steal it. In case of direct recycling of braided fabric, the product obtained is totally useless due to the presence of non-conductive material,

that "contaminates" it.

[0010] According to various optional characteristics of the fabric according to the invention

- 5 - the percentage in weight of the filaments made of non-conductive material is at most 10 % in weight of all the filaments, and more preferably is at most 5 % of all the filaments. This upper limit also ensures the "contamination" of the fabric in case of recycling, and thus deters the thieves.
- 10 - advantageously the bare aluminium filaments and the filaments made of non-conductive material are braided, in a tubular structure or in an open structure.
- 15 - the non-conductive material is fibreglass or a polymer such as polyester, polyamide, polypropylene.
- 20 - the non-conductive material is monofilament or multi-filament.
- 25 - advantageously, the diameter of the bare aluminium filaments is comprised between 0,08 and 0,30 mm and the diameter of the filaments of polymeric material is comprised between 34 and 800 Tex (g/km), and more preferably, the diameter of the bare aluminium filaments is comprised between 0,12 and 0,20 mm and the diameter of the filaments of polymeric material is comprised between 110 and 136 Tex (g/km).
- 30

[0011] The invention also relates to a connector for grounding, which comprises a plurality of bare aluminium filaments and a plurality of filaments of non-conductive material and two connection terminals provided with openings where the ends of the filaments are inserted and pressed, which is characterised in that the percentage in weight of the filaments made of non-conductive material is at most 35 % of all the filaments.

35 **[0012]** This connector also has the features that solve the problems of the prior art.

[0013] According to various optional features of the connector of the invention:

- 45 - the percentage in weight of the filaments made of non-conductive material is at most 10 % in weight of all the filaments, and more preferably is at most 5 % of all the filaments.
- 50 - the filaments are arranged as a fabric according to any of the variants according to the invention of the fabric mentioned above.
- 55 - according an alternative arrangement of the filaments as a fabric, the bare aluminium filaments and the filaments of polymeric material are entangled and/or twisted. This is a variant which also solves the problems of the prior art, but that solution is re-

duced from the point of view of manufacture.

- the openings of the connectors can be circular or rectangular.

[0014] According to a particularly preferred variant of the connector, it has a plurality of tubular fabrics of aluminium and polymeric material arranged one inside the other, preferably two, three or four fabrics. In such a way, the desired section for the conduction of current depending on the requirements of the application can be achieved. Therefore, the aggregate section of the aluminium filaments is comprised between 10 and 200 mm². According to especially preferred embodiments, the aggregate section of the aluminium filaments is of 40, 50, 80, or 147 mm².

[0015] Finally, the invention relates to a set of element to be grounded, such as a pylon, a fence or a machine and a connector for grounding according to any of the variants of the connector of the invention exposed above.

Brief description of the drawings

[0016] For a better understanding of what has been outlined some drawings in which, schematically and solely by way of non-limiting example, some practical cases of embodiment are attached represent.

Fig. 1 is a connector according to the invention.

Fig. 2 shows the fabric according to the invention.

Fig. 3 show an element grounded by means a connector according to the invention.

Description of a preferred embodiment

[0017] As it can be seen in fig. 2, the invention first relates to a un fabric for connector destined to form a grounding, which comprises a plurality of bare aluminium filaments 2 and a plurality of filaments made of non-conductive material 3 wherein the percentage in weight of the filaments made of non-conductive material 3 is at most 35 % of all the filaments. Specifically, in the embodiment depicted in fig. 2 the bare aluminium filaments 2 and the filaments made of non-conductive material 3 are braided.

[0018] As it can be seen in fig. 1, the invention also relates to a connector 1 for grounding T, which comprises a plurality of bare aluminium filaments 2 and a plurality of filaments of non-conductive material 3 and two connection terminals 4, 5 provided with openings where the ends of the filaments are inserted and pressed 2, 3 wherein the percentage in weight of the filaments made of non-conductive material 3 is at most 35 % of all the filaments. Preferably, the connectors are bimetallic. In fig., connection terminals with circular openings are depicted. However, since it is made of fabric, the connection terminals can have rectangular and elongated openings,

to facilitate the pressing of the fabrics.

[0019] Fig. 3 shows a set of an element E to be grounded, such as a pylon, a fence or a machine and a connector 1 for grounding T according to any of the variants of the invention.

Examples of fabrics according to the invention:

Example 1 (not shown)

[0020] The fabric can be manufactured with a machine with 120 bobbins, 60 reels and 8 cables of aluminium of 0,12 mm and 1 yarn of multifilament of polyester of 110 tex, 60 reels with 8 yarns of aluminium of 0,12 and 1 yarn of texturized multifilament of polyester of 120 tex. The composition in weight will be: 65,8% of aluminium 15,7 % multifilament of polyester of 110 tex, 18,5 % texturized multifilament of polyester of 120 tex.

Example 2 (Figure 2)

[0021] It has two layers. The fabric can be manufactured with a machine with 120 bobbins with 8 reels with 5 cables of multifilament of polyester of 110 tex, 112 reels with 10 cables of aluminium of 0,15. the composition in weight will be: 92,11 % aluminium, 7,89% multifilament of polyester of 110 tex.

[0022] Although reference has been made to particular embodiments of the invention, it is apparent to one skilled in the art that the fabric, the connector and the installation described are susceptible of numerous variations and modifications, and that all the details mentioned can be substituted by other technically equivalent, without departing from the scope of protection defined by the appended claims.

Claims

1. Fabric for connector destined to form a grounding, which comprises a plurality of bare aluminium filaments (2) and a plurality of filaments made of non-conductive material (3), both types of filaments being destined to be inserted in two connection terminals (4, 5) provided with openings where are inserted and pressed the ends of the filaments (2, 3), **characterised in that** the percentage in weight of the filaments made of non-conductive material (3) is at most 35 % of all the filaments.
2. Fabric according to claim 1, wherein the percentage in weight of the filaments made of non-conductive material (3) is at most 10 % of all the filaments.
3. Fabric according to claim 2, wherein the percentage in weight of the filaments made of non-conductive material (3) is at most 5 % of all the filaments.

4. Fabric according to any of the preceding claims, wherein the bare aluminium filaments (2) and the filaments made of non-conductive material (3) are braided. 5
5. Fabric according to claim 4, wherein the filaments are braided in a tubular structure or in an open structure.
6. Fabric according to any of the preceding claims, wherein the non-conductive material is fibreglass or a polymer such as polyester, polyamide, polypropylene, etc. 10
7. Fabric according to any of the preceding claims, wherein the non-conductive material is monofilament or multi-filament. 15
8. Fabric according to any of the preceding claims, wherein the diameter of the bare aluminium filaments (2) is comprised between 0,08 and 0,30 mm and the diameter of the filaments of polymeric material (3) is comprised between 34 and 800 Tex (g/km). 20
9. Fabric according to claim 8, wherein the diameter of the bare aluminium filaments (2) is comprised between 0,12 and 0,20 mm and the diameter of the filaments of polymeric material (3) is comprised between 110 and 136 Tex (g/km). 25
10. Connector (1) for grounding (T), which comprises a plurality of bare aluminium filaments (2) and a plurality of filaments of non-conductive material (3) and two connection terminals (4, 5) provided with openings where the ends of the filaments (2, 3) are inserted and pressed, **characterised in that** the percentage in weight of the filaments made of non-conductive material (3) is at most 35 % of all the filaments. 30 35
11. Connector according to claim 10, wherein the percentage in weight of the filaments made of non-conductive material (3) is at most 10 % of all the filaments. 40
12. Connector according to claim 10, wherein the percentage in weight of the filaments made of non-conductive material (3) is at most 5 % of all the filaments. 45
13. Connector according to claim 10, wherein the bare aluminium filaments (2) and the filaments of polymeric material (3) are entangled and/or twisted. 50
14. Connector according to claim 10, which comprises a plurality of tubular fabrics of aluminium and polymeric material arranged one inside the other, preferably two, three or four fabrics. 55
15. Connector according to any of claims 10 to 14, wherein the aggregate section of the aluminium filaments is comprised between 10 and 200 mm².

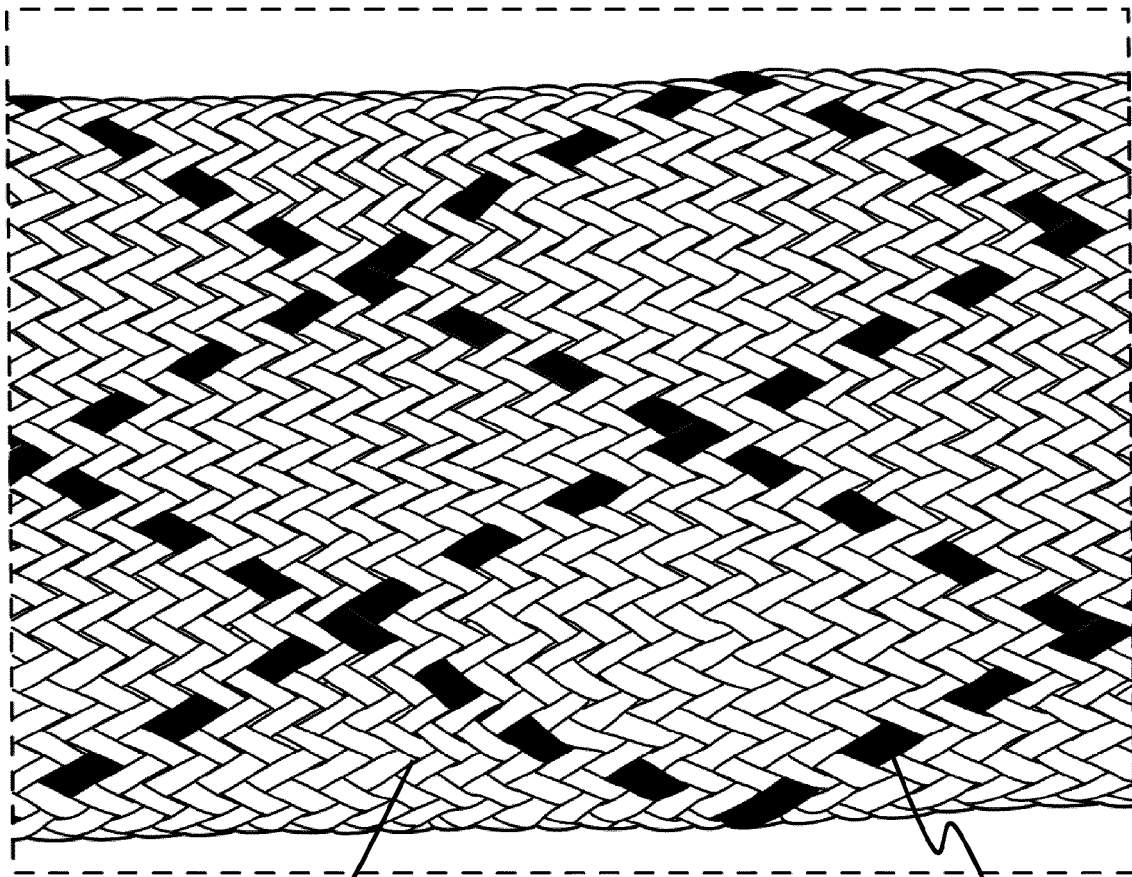


Fig. 1

2

3

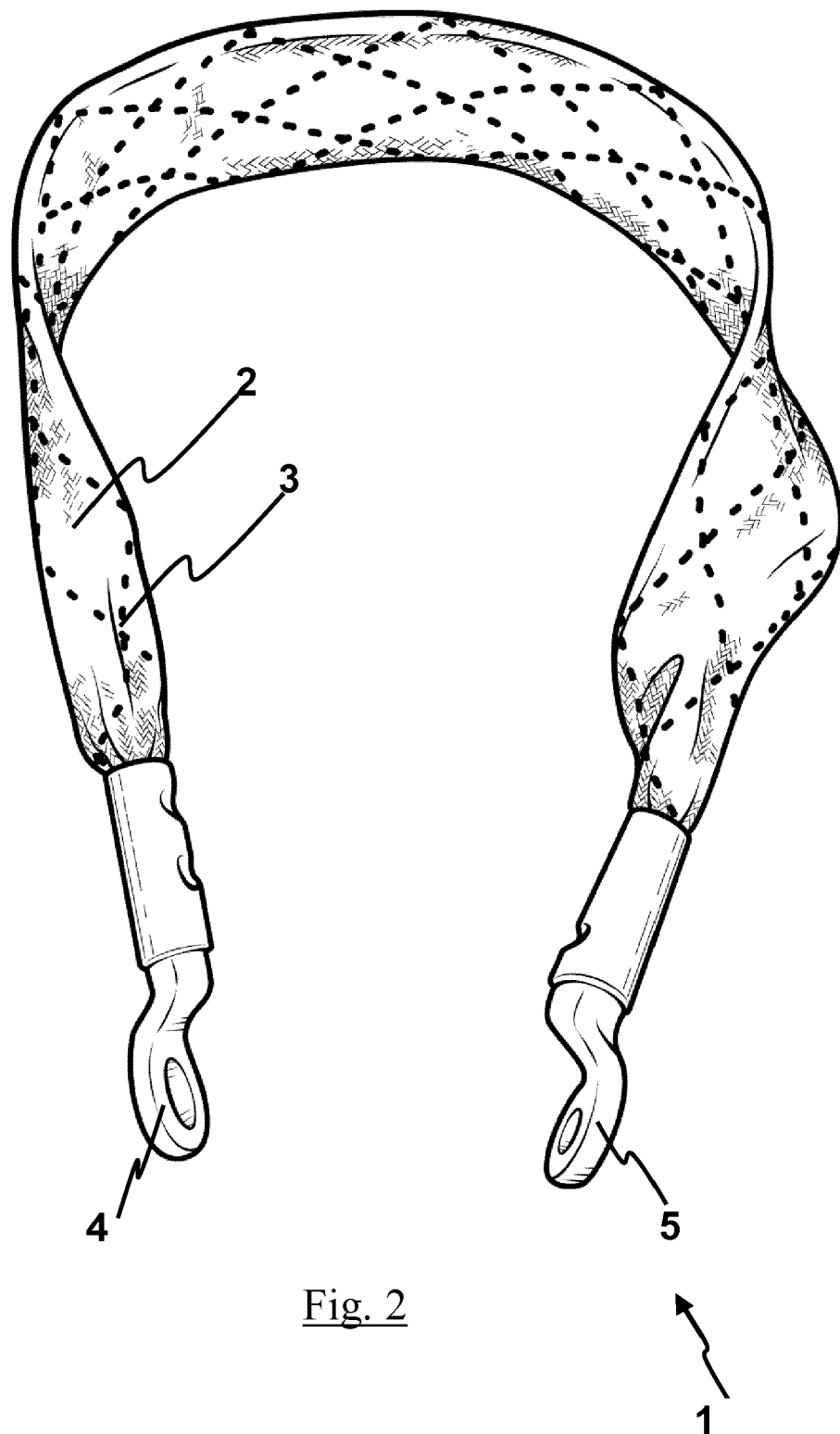


Fig. 2

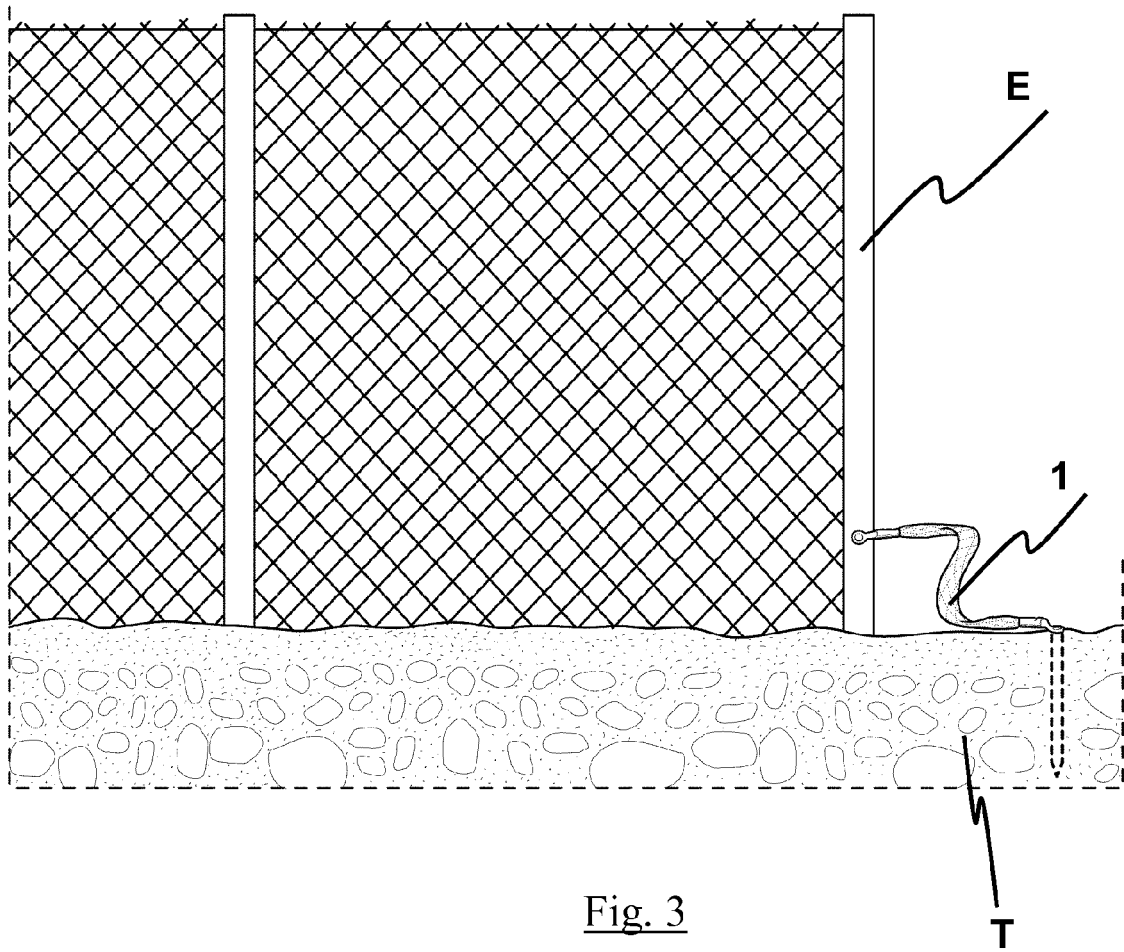


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 14 38 2121

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 52 465 A1 (HERMANN GUTMANN WERKE) 4 May 1972 (1972-05-04) * page 8, lines 1 - 9; figures 1-3 *	1-15	INV. D04C1/02 H01B5/12 H01B1/02
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A	WO 2012/107873 A1 (CEMBRE SPA [IT]; ROSANI GIOVANNI [IT]) 16 August 2012 (2012-08-16) * paragraph [0004]; figures 6,8 *	1,10	
A,P	WO 2014/016716 A1 (RELATS SA [ES]) 30 January 2014 (2014-01-30) * page 1, line 25 - page 2, line 23; claims 1, 6 *	1,6-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			D04C H01B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 June 2014	Examiner Kirner, Katharina
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 14 38 2121

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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24-06-2014

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