



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.09.2012 Bulletin 2012/38

(51) Int Cl.:
D07B 1/16 (2006.01) D07B 1/14 (2006.01)

(21) Application number: **12151481.4**

(22) Date of filing: **18.01.2012**

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

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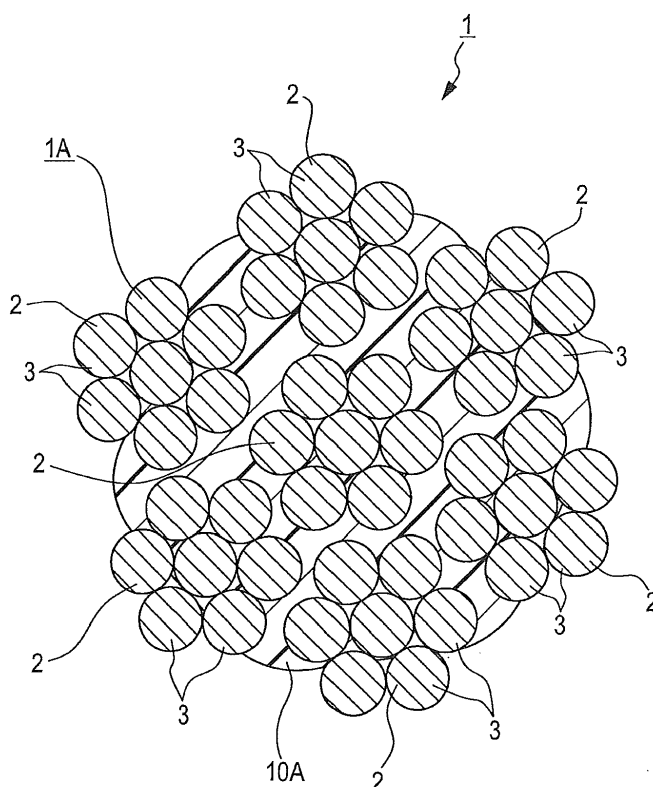
(30) Priority: **17.03.2011 JP 2011059029**

(54) **Filled wire rope**

(57) A wire rope (1) includes a rope body (1A) including a plurality of strands (2) that are twisted, each strand (2) including a plurality of wires (3). A gap between the strands (2) of the rope body (1A) is filled with a different material differing from a material of the wires (3). The

different material is exposed from the gap between the strands (2) at a surface of the rope body (1A), so that a different-material spiral portion (10A, 10B) that is spirally formed around an axial line of the rope body (1A) is formed at the surface of the rope body (1A).

FIG. 2



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a wire rope.

2. Description of the Related Art

[0002] Hitherto, a wire rope formed by twisting together a plurality of wires has been known. Such a wire rope is used in, for example, a guide wire used at medical sites. More specifically, various guide wires that are used at medical sites and whose visibility during use is increased are disclosed in e.g. JP 2002-17864 A (Patent Document 1)).

[0003] However, a wire rope is not easily applicable to the structure described in Patent Document 1. That is, since the wire rope is formed by twisting a plurality of strands including each a plurality of wires, a surface of the wire rope has a fine and complex uneven structure. Therefore, it is very troublesome and cumbersome to apply a color to the surface of the wire rope along the wires and to form a visual recognition marker, thereby increasing overall manufacturing costs.

[0004] In addition, although, in general, the characteristics of the entire wire rope are determined by, for example, winding conditions and characteristics of the wires of the wire rope, the determination is not limited thereto. There is a demand for adding various characteristics to the wire rope by a simple method.

SUMMARY OF THE INVENTION

[0005] Accordingly, in view of such problems, it is an object of the present invention to provide a wire rope to which various characteristics can be easily added and that provides excellent functionality. It is also an object of the present invention to provide, for example, a structure that allows different colors to be spirally formed on the surface of the wire rope using a simple method while increasing visibility. These objects are solved by a wire rope according to claim 1. Preferred embodiments are subject-matter of dependent claims.

[0006] According to the present invention, there is provided a wire rope including a rope body including a plurality of strands that are twisted, each strand including a plurality of wires. A gap between the strands of the rope body is filled with a different material differing from a material of the wires. The different material is exposed from the gap between the strands at a surface of the rope body, so that a different-material spiral portion that is spirally formed around an axial line of the rope body is formed at the surface of the rope body.

[0007] The present invention provides the excellent advantage of making it possible to easily add various characteristics to the wire rope by a simple method.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

- 5 Fig. 1 is an external view of a wire rope.
Fig. 2 is a transverse cross sectional view of the wire rope.
Fig. 3 is a transverse cross sectional view of a wire rope having a different form.

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DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] A wire rope according to an embodiment of the present invention will be described with reference to the attached drawings.

15 **[0010]** As shown in Figs. 1 and 2, a wire rope 1 includes a rope body 1A which is formed by twisting a plurality of (seven) strands 2. The number of strands 2 is not limited to seven. Each strand 2 is formed by twisting a plurality of (seven) wires 3 formed of a metallic material. The number of wires 3 is not limited to 7. The wires 3 may be hollow.

25 **[0011]** Gaps between the strands 2 of the rope body 1A are filled with resinous material. By exposing the resinous material from the gaps between the strands 2 at a surface of the rope body 1A, a resinous spiral portion (different-material spiral portion) 10A is spirally formed at the surface of the rope body 1A around an axial line of the rope body 1A. The surface of the resinous spiral portion 10A is positioned inwardly of an outer periphery of the rope body 1A, formed by the strands 2 that are positioned at an outermost periphery among the strands 2 of the rope body 1A.

30 **[0012]** For example, pigments or coloring agents are added to the resinous material of the resinous-material spiral portion 10A, so that its color differs from those of the surfaces of the wires 3. This causes spirally formed colored portions that enhance discriminability in a twisting direction of the strands 2 to be observed on the surface of the wire rope 1.

40 **[0013]** For example, when twisting together the plurality of strands 2, the gaps between the strands 2 may be filled with softened resin that is later cooled to manufacture the wire rope 1; or softened resin may be poured into the gaps between the twisted strands to manufacture the wire rope 1.

45 **[0014]** By virtue of the above-described structure, it is possible to easily manufacture the wire rope 1 including the resinous-material spiral portion 10A, and to spirally form colored portions having excellent discriminability in the twisting direction on the rope body 1A having a complex uneven surface. The resinous material is desirably thermoplastic resin which is selectable from, for example, vinyl resin, polystyrene resin, polyethylene resin, acrylic resin, polyamide resin, nylon resin, and fluororesin. The resinous material may also be any of various rubber materials, such as styrene-butadiene rubber or polyisoprene rubber.

[0015] A modification is hereunder proposed.

[0016] That is, as shown in Fig. 3, a surface of a resinous-material spiral portion 10B is exposed from the gap between the strands 2 such that it protrudes outwardly of the rope body 1A, wherein the protruding surface is positioned outwardly of the outer periphery of the rope body 1A, formed by the strands 2 that are positioned at an outermost periphery among the plurality of strands 2 of the rope body 1A. By such a structure, the resinous-material spiral portion 10B can prevent damage to the surfaces of wires 3 when the wire rope 1 contacts another object.

[0017] In the wire rope 1, the friction resistance of the surface of the resinous-material spiral portion 10A and the friction resistance of the surface of the resinous-material spiral portion 10B may differ from the friction resistance of the surfaces of the wires 3. By forming the resinous-material spiral portion 10A or 10B out of, for example, thermoplastic elastomer with respect to the metallic wires 3, it is possible to cause the friction resistance of the surface of the wire rope 1 to be greater than that of a wire rope that is only formed of metallic wires 3. In addition, by forming the resinous-material spiral portion 10A or 10B out of, for example, polytetrafluoroethylene, it is possible to reduce the friction resistance of the surface of the wire rope 1.

[0018] The present invention is not limited to the above-described embodiment and modification, so that, obviously, design changes may be made and various combinations may be made as appropriate without departing from the gist of the present invention as defined by the appended claims. For example, when the wire rope 1 is to exhibit heat resistance performance, mechanical performance, molding performance, electric performance, chemical performance, or chemical resistance performance, it is possible to select a desired resinous material as appropriate to form the resinous-material spiral portion 10A or 10B. For example, pigments, dyes, anti-oxidizing agents, antistatic agents, crystallization accelerating agents, flame retardants, flame-proofing agents, water repellents, oil repellents, insecticides, antiseptics, waxes, surface-active agents, lubricants, age resistors, ultraviolet absorbers, or plasticizers may be added to or mixed with the resinous material. Alternatively, the resinous material may be formed of only one type of material or may be a combination of two or more types of materials.

[0019] The above-described wire rope 1 can be suitably used, in particular, as a guide wire in the medical field.

that

a gap between the strands (2) of the rope body (1A) is filled with a different material differing from a material of the wires (3), and the different material is exposed from the gap between the strands (2) at a surface of the rope body (1A), so that a different-material spiral portion (10A, 10B) that is spirally formed around an axial line of the rope body (1A) is formed at the surface of the rope body (1A).

2. The wire rope (1) according to Claim 1, wherein a color of the different material differs from a color of a surface of each wire (3).
3. The wire rope (1) according to either Claim 1 or Claim 2, wherein a friction resistance of a surface of the different-material spiral portion (10A, 10B) differs from a friction resistance of a surface of each wire (3).

Claims

1. A wire rope (1) comprising:

a rope body (1A) comprising a plurality of strands (2) that are twisted, each strand (2) including a plurality of wires (3), **characterized in**

FIG. 1

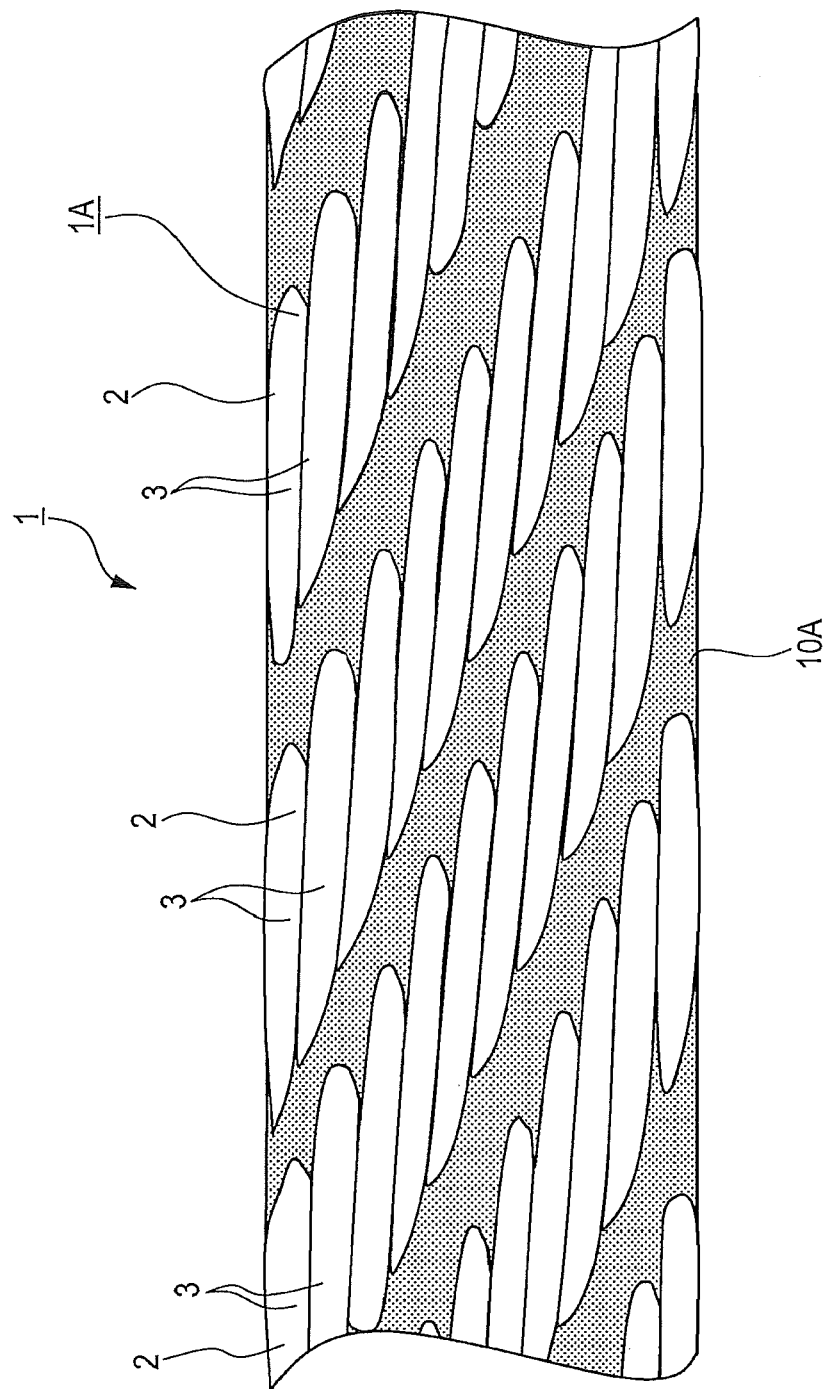


FIG. 2

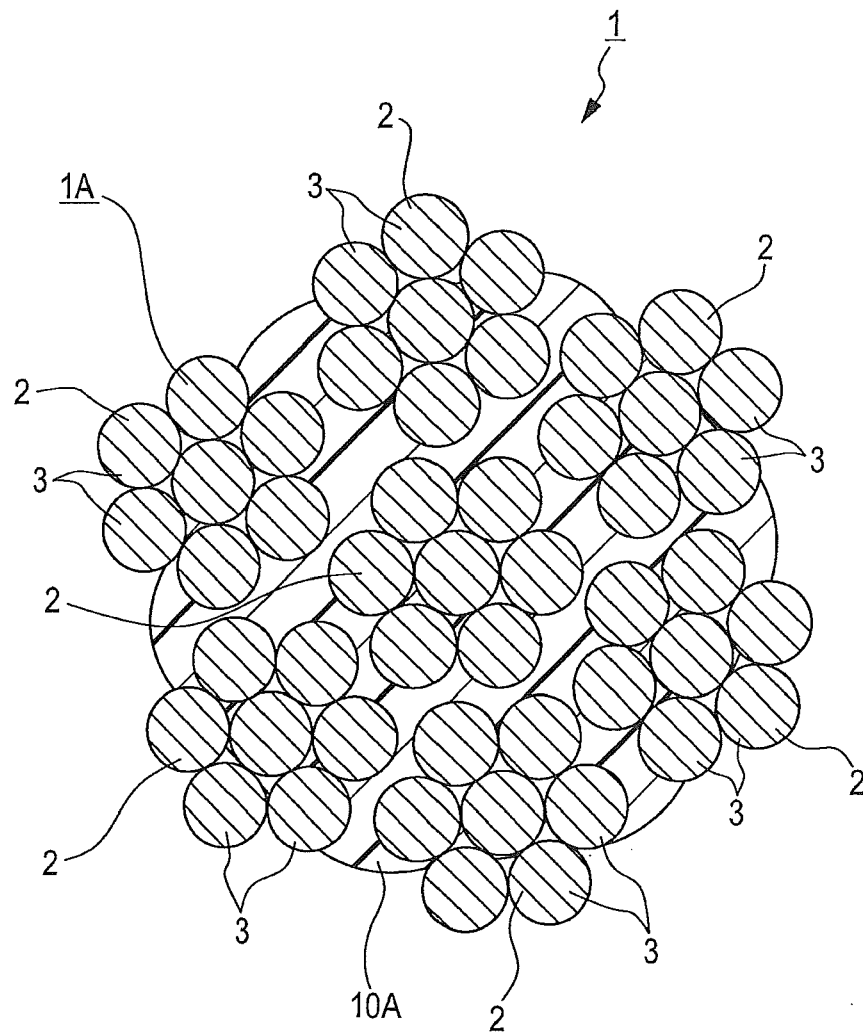
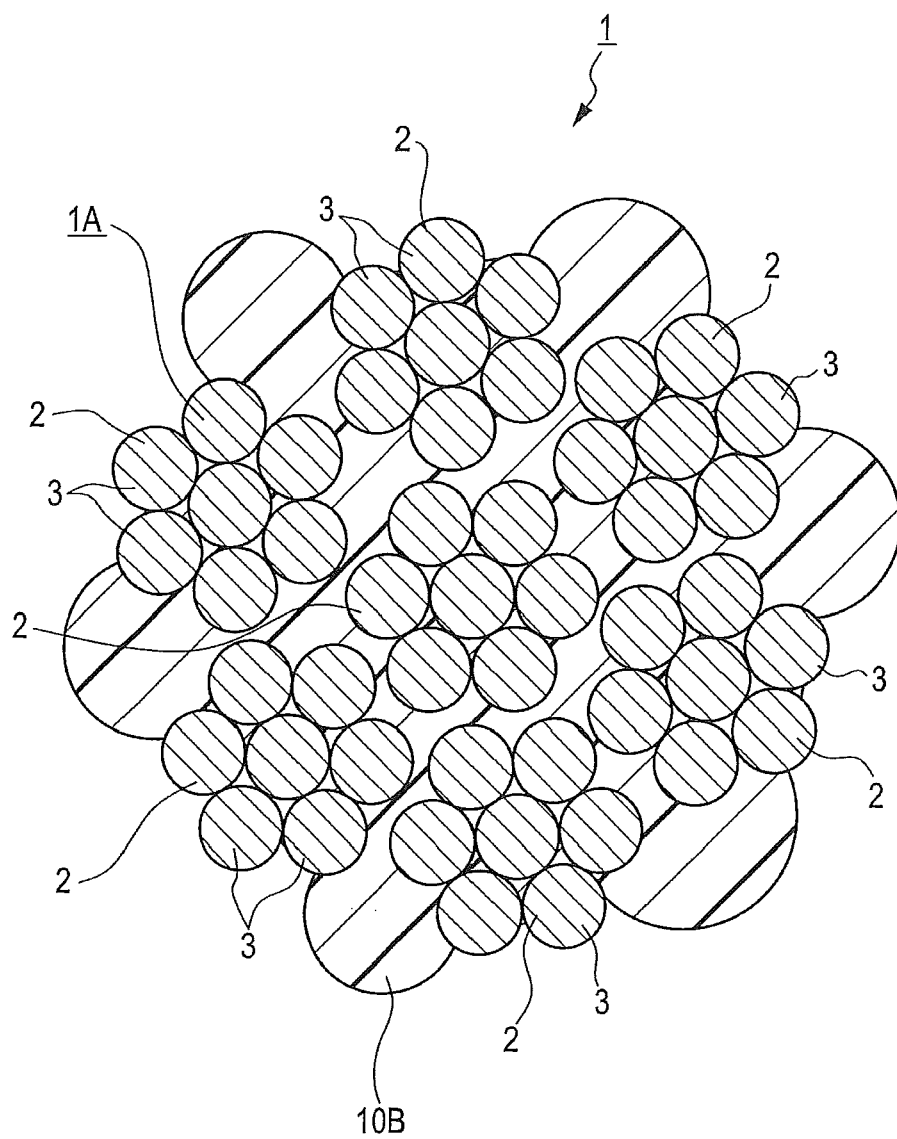


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 12 15 1481

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	JP 2002 235290 A (TOKYO SEIKO CO LTD; HAKKO KOYU KK) 23 August 2002 (2002-08-23) * abstract; figures *	1-3	INV. D07B1/16 D07B1/14
X	EP 1 359 248 A2 (FATZER AG [CH]; HUBER & SUHNER AG [CH]) 5 November 2003 (2003-11-05) * paragraph [0020] - paragraph [0022]; figures 4,5 *	1-3	
X	JP 2000 120648 A (ASAHI INTECC CO LTD) 25 April 2000 (2000-04-25) * abstract; figure 1 *	1-3	
X	US 2 136 865 A (REED MALCOLM W) 15 November 1938 (1938-11-15) * page 1, right-hand column, line 11 - line 26; claims 1,2; figures 1,2,7 *	1-3	
X	FR 2 769 027 A3 (TREFILEUROPE [FR]) 2 April 1999 (1999-04-02) * claims 1,7; figures 3b,5 *	1-3	
			TECHNICAL FIELDS SEARCHED (IPC)
			D07B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 July 2012	Examiner Uhlig, Robert
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 03/02 (P04C01)

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

EP 12 15 1481

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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02-07-2012

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REFERENCES CITED IN THE DESCRIPTION

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