



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.02.2012 Bulletin 2012/05

(51) Int Cl.:
D04C 1/02 (2006.01) **D04C 3/48** (2006.01)
A47L 9/24 (2006.01)

(21) Application number: **11171654.4**

(22) Date of filing: **28.06.2011**

(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: **28.07.2010 IT MO20100219**

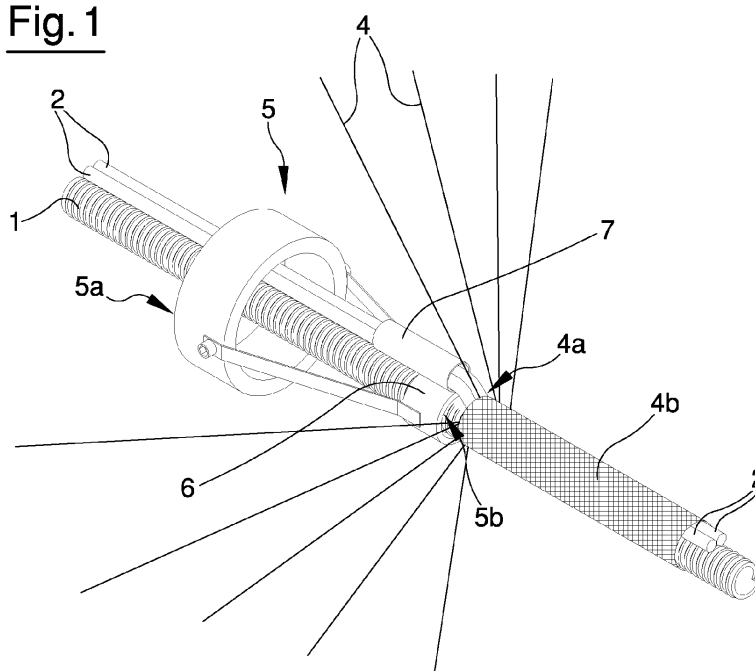
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(54) **A device for binding tubes and cables of different sizes, a bundle thus obtained and a method for obtaining it**

(57) The invention relates to a device for bundling tubes and cables of different sizes, a bundle thus obtained and a method for obtaining it. The device of the invention, which is used for bundling an aspirating tube (1) together with one or more cables (2), comprises a machine (3) of known type for braiding threads (4) and for realising, in a continuous process, a tubular sleeve (4b) which envelops the tube and the cables which are

guided into position by a guide (5) arranged between the threads (4) before the braiding point. With the device a bundle of tubes and cables of different sizes is obtained, which are enveloped by a tubular sleeve (4b) of braided threads, and a method is actuated for realising the bundle, which provides a stage of directly and continuously braiding a tubular sleeve made of braided threads on the tube and the cables which make up the aggregate, which are maintained appropriately positioned by the guide (5).

Fig. 1



Description

[0001] The present invention relates to a device for binding tubes and cables of different sizes, the bundle obtained in this way and a method for obtaining it.

[0002] The invention relates, in particular but not only, to the bundling of aspirating tubes, generally of the spiral type, made of a thermoplastic material and having a metal core, which normally have a diameter of various centimetres, with one or more electric cables or the like, which instead have a diameter in the order of millimetres; these bundles have for some time been applied for example in aspirating machines or the like. The realisation of these bundles of tubes and cables is at present done in various ways. For example, spiral springs are used for maintaining the tubes and the cables together; in other cases sheathes are used, which exhibit two openings in which the tube is inserted in one and the cables in the other; they are then clad with a casing made of a heat-retractable material.

[0003] The devices known up to the present are however quite complex and expensive and enable obtaining bundles that are heavy, not very flexible and easily deformable.

[0004] The aim of the present invention is to provide a device and a method that are simple and economical and which enable improving the characteristics of the bundles of tubes and cables, making them light, flexible and exhibiting good resistance to crushing.

[0005] An advantage of the present invention is to provide a device and a method which offer the possibility of customising the bundles obtained without incurring extra costs.

[0006] Further characteristics and advantages of the present invention will better emerge from the detailed description that follows of a possible embodiment of the device for obtaining bundles of tubes and cables, of the method for obtaining the bundles and of the bundles themselves, illustrated by way of non-limiting example in the accompanying figures, in which:

- figure 1 shows a partial schematic perspective view of the device of the invention;
- figure 2 shows a partial schematic side view of the device of the invention.

[0007] The device of the invention is for bundling tubes 1 and cables 2 having different sizes; in particular, though not only, the device is usable for bundling an aspirating tube with one or more cables, for example cables for transporting electric current; these bundles (which in essence are tubes and cables of different sizes maintained solidly connected to one another such as to be used as if they were "a single cable" enabling transport where necessary of air, electricity and sometimes water or steam) have for some time been used, for example, in washing-aspirating machines or the like, for both industrial and domestic use.

[0008] The device of the invention comprises a machine, schematically illustrated by 3, for braiding threads 4 and for realising at a braiding point 4a, in a continuous process, a tubular sleeve 4b of braided threads. These machines, which are of known type and used, for example for cladding electric cables or the like, are provided with reels on which the threads to be braided are wound; the reels, which are programmed to perform various movements enabling the threads to be braided, are arranged on a circular ring on an axis of which an insertion passage 3a is afforded, through which the tube and the cables to be wound are introduced between the threads, the tube and the cables being enveloped by the tubular sleeve realised by the braiding of the threads.

[0009] The device of the invention further comprises a guide 5 which is arranged between the threads before the braiding point thereof and provided with an inlet 5a and an outlet 5b for the tube and the cables to be wound.

[0010] In particular, the guide is arranged between the threads to be braided and with the outlet 5b thereof in proximity of the braiding point 4a, on the axis of the circular ring, downstream of the insertion passage.

[0011] The guide has the function of positioning the tube and the cables to be wound at the outlet thereof, in the position in which it is desired for them to be in the bundle; the machine is further programmed, with the usual programming devices these machines are equipped with, such as to create a sleeve which envelopes and binds the tube and the cables at the outlet 5b of the guide 5.

[0012] In particular the outlet of said guide comprises a first tubular element 6 having a diameter that is slightly greater than the tube of the bundle and which is destined to guide the said tube 1 in outlet; it further comprises a second tubular element 7 having a slightly greater section than the section of the cables of the bundle and which is destined to guide said cables 2 in outlet; should it be desired to have a bundle with only one cable, the second tubular element 7 will have a circular section while in a case in which the bundle comprises two or more cables which it is desired to maintain flanked, the second tubular element 7 will have a slotted section which contains, practically snugly, the sections of the various cables.

[0013] The second tubular element 7 is arranged, with respect to the first tubular element, in a desired position between the tube and the cables in the bundle; in the illustrated example in the figures, the second tubular element is superposed on the first tubular element. Naturally, in a case in which it is desired to have several cables arranged non-flankingly but in different angular positions with respect to the tube, two different second tubular elements can be provided, each arranged in the desired position for each cable with respect to the tube.

[0014] The continuity of the action of the device is guaranteed by a drawing roller, which is located downstream of the guide and the braiding point of the sleeve, which draws and envelopes the bundle that is formed at the braiding point.

[0015] The bundle obtained comprises an aspirating tube and one or more cables enveloped by a tubular sleeve 4b of braided threads. The threads making up the sleeve are preferably made of nylon, or polypropylene; both these materials guarantee the bundle good resistance to crushing, a good lightness and a good flexibility; polypropylene threads in particular provide good qualities of lightness to the bundle. By using threads of different colours, which will each be loaded on a reel of the machine, it is further possible to obtain a bundle the sleeve of which is variously-coloured, and therefore can be customised to the user's wishes.

[0016] The described device can be made using, for obtaining the described bundle, the method of the invention; the method comprises a step of braiding, directly and continuously by means of the described device, a tubular sleeve of braided threads on the tube and the cables which make up the bundle. The tube and the cables, at least in the zone in which the sleeve is formed, are maintained positioned with respect to one another in the position that they are to occupy in the bundle. The sleeve is tightly formed but in such a way as not to obstruct the flexibility of the bundle, and maintains the tube and the cables in the position they assume at the time of the formation of the sleeve itself.

[0017] With the method of the invention, bundles are obtained which apart from being lighter and more resistant than those of known type, are constituted only by the tube, the cables and the sleeve which keeps the former two together, without any other support element which, apart from increasing the weight of the bundle, would increase the cost thereof.

Claims

1. A device for binding tubes (1) and cables (2) of different sizes, usable for binding an aspirating tube together with one or more cables, **characterised in that** it comprises: a machine (3), of known type, for braiding threads (4) and realising at a braiding point (4a), in a continuous process, a tubular sleeve (4b) of braided threads, the machine being provided with an insertion passage (3a) through which the tube and the cables to be bound by the tubular sleeve (4b) are introduced between the threads; a guide (5), arranged between the threads before the braiding point thereof, provided with an inlet (5a) and an outlet (5b) for the tube and cables to be bound and arranged with an outlet (5b) in proximity of the braiding point (4a), the guide being destined to position, at the outlet thereof, the tube and cables to be bound in a desired position of the tube and the cables; the machine being programmed such as to create a sleeve which envelopes and binds the tube and cables at the outlet (5b) of the guide (5).

2. The device of claim 1, **characterised in that:** the

machine exhibits the threads wound on reels arranged on a circular ring and the insertion passage is arranged on an axis of the circular ring; the guide (5) is arranged on the axis of the circular ring, downstream of the insertion passage.

3. The device of claim 1, **characterised in that** the outlet of the guide comprises: a first tubular element (5) having a diameter that is slightly greater than the tube of the bundle and destined to guide the tube in outlet; a second tubular element (7), having a slightly greater section than a section of the cables of the bundle and destined to guide the cables in outlet; the second tubular element (7) being arranged, with respect to the first tubular element, in a desired position between the tube and the cables of the bundle.

4. A bundle of tubes and cables having different dimensions, comprising an aspiration tube with one or more cables, **characterised in that** the tube and the cables are enveloped by a tubular sleeve (4b) of braided threads.

5. The bundle of claim 4, **characterised in that** the threads making up the sleeve are made of nylon.

6. The bundle of claim 4, **characterised in that** the threads making up the sleeve are made of polypropylene.

7. The bundle of claim 4, **characterised in that** the threads making up the sleeve are of different colours.

8. A method for realising a bundle of tubes and cables of different dimensions comprising an aspirating tube and one or more cables, **characterised in that** it comprises a stage of directly and continuously braiding a tubular sleeve made of braided threads on the appropriately-positioned tube and cables which make up the bundle.

Fig. 1

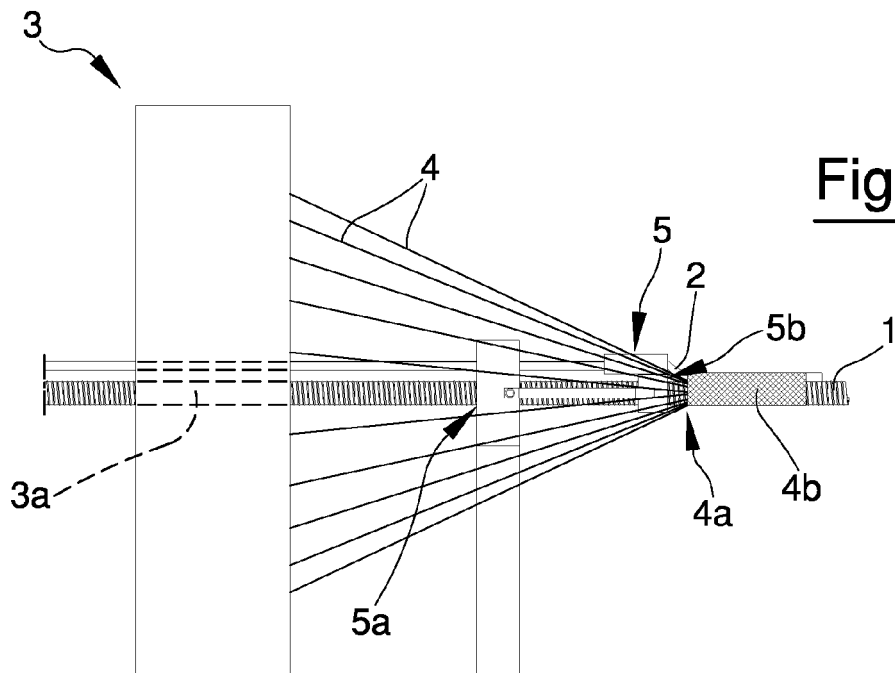
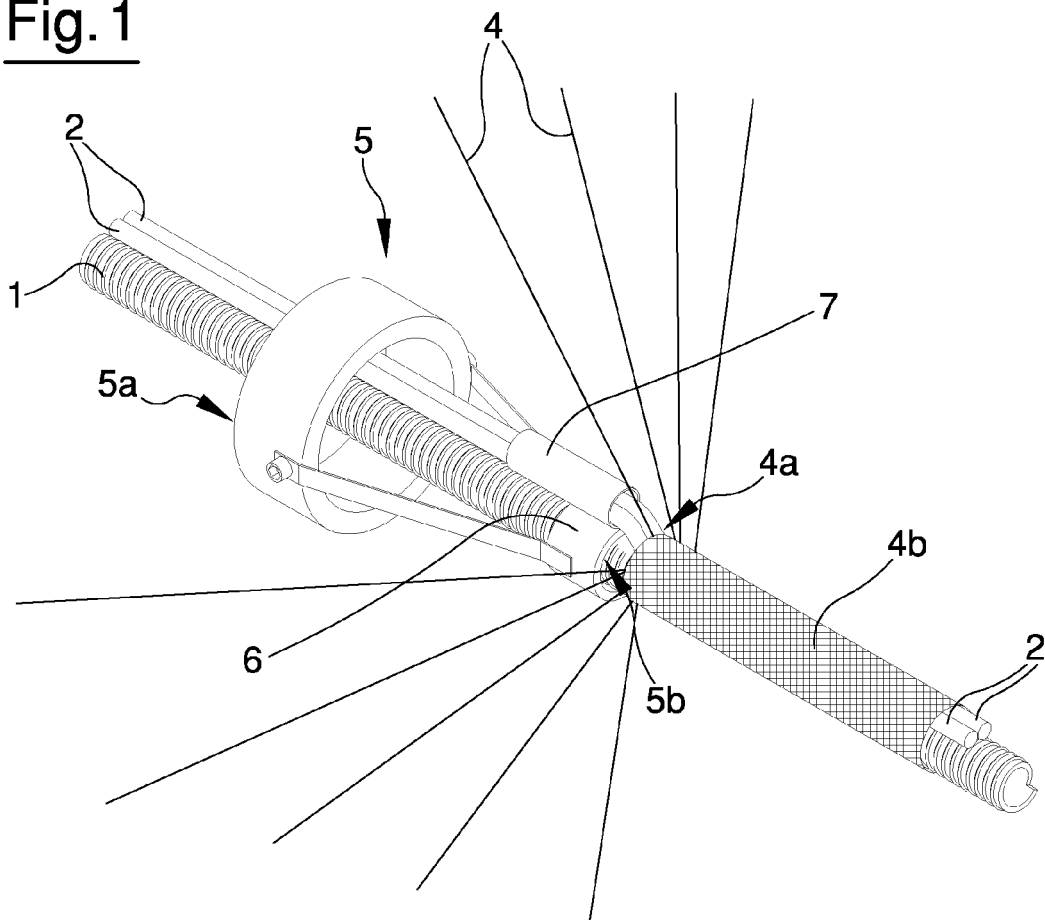


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 11 17 1654

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A	figures 1-3 *	1-3,6	ADD. A47L9/24
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	* column 3, lines 21-24 - column 4, lines 59-61; figures 2-4 *		
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A	* column 1, line 53 - column 2, line 48; claim 1; figures 1-3 *	1,2,8	
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			D04C A47L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 September 2011	Examiner Sterle, Dieter
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 11 17 1654

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The members are as contained in the European Patent Office EDP file on
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15-09-2011

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