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(54) Device for dispensing two or more twisted wires

(57) The invention is related to a device for supplying two or more wires in a twisted configuration, so that they are mutually constrained during supply, comprising fixed support means with a first coil of a main wire (105,205,305,405,505) and with one or more additional coils of respective secondary wires (113,213,313,413,513) and means for conveying the simultaneous traction of said wires according to a concordant direction, whereby the main wire (105,205,305,405,505) is conveyed through said one or more additional coils, by determining in this way the winding of said secondary wires (113,213,313,413,513) around said the wire according to a helicoidal line.

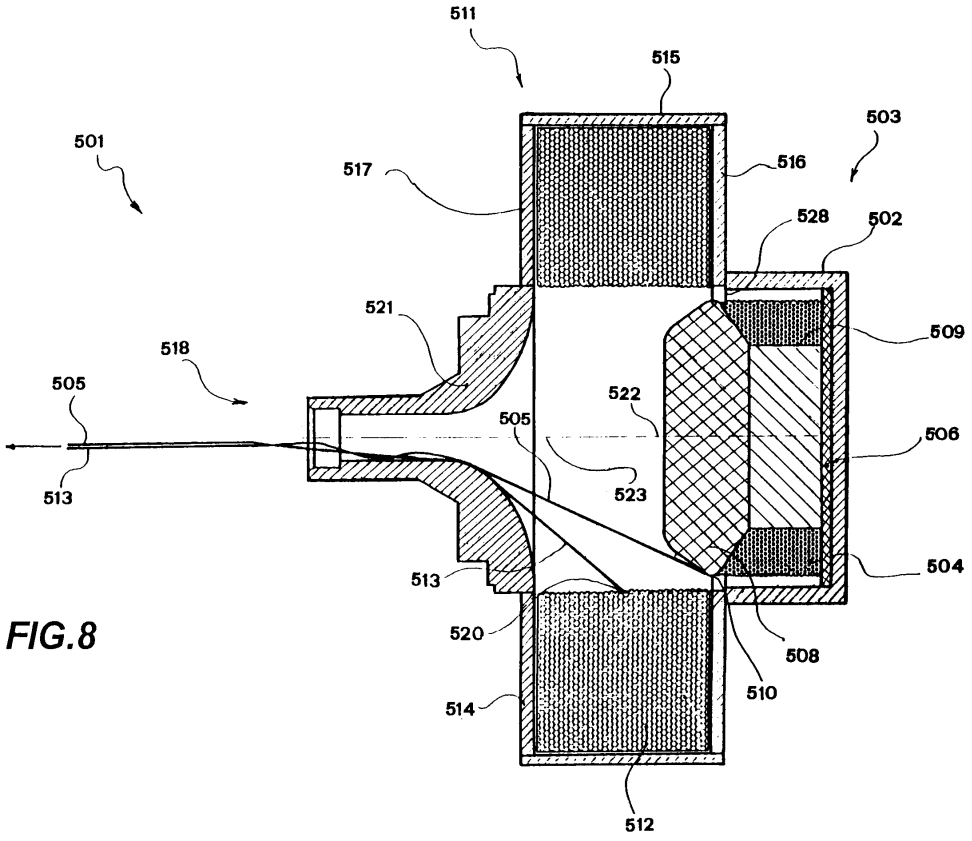

FIG.8

EP 1 693 126 A1

Description

[0001] The present invention relates to a device for dispensing two or more wires in a twisted configuration so that said two or more wires be mutually constrained during dispensing.

[0002] It is meant that such constraint is sufficient to keep together said two or more wires preventing them to follow different routes, during the dispensing thereof, so as to interfere with obstacles or the like.

[0003] Here and hereinafter, any member shaped like a wire is meant under wire, therefore cables, ropes, filaments, bands, tapes, chains and the like fall within the definition of wire according to the present invention, provided that they have a wire-like and flexible shape, so as to be wound and twisted. By way of practical example, electrical cables, metallic wires, textile fibres, optical fibres and so on may be mentioned as wires.

[0004] Here and hereinafter, the path defined by a point running along a circumference with uniform motion whereas it translates with constant speed orthogonal to its plane is meant under cylindrical helix.

[0005] Here and hereinafter, the wire length placed according to a cylindrical helix onto one or more overlapped layers is meant under coil.

[0006] Here and hereinafter, the container of a wire coil constituted by a stem or by a cylindrical tube and by two flanges connected to the ends of said stem or said tube is meant under reel, illustrated in figure 1. The coil is meant static, coaxial to the stem or to the tube and having the inner layer of turns adhering to the outer surface of the stem or the tube. The wire unwinds from the outside of the coil.

[0007] Here and hereinafter, the container of a wire coil constituted by a cylindrical tube and by two flanges connected to the ends of said tube is meant under distributor, illustrated in figure 2. The coil is meant to be static, coaxial to the tube and having the outer layer of turns adhering to the inner surface of the tube. The wire unwinds from the inside of the coil.

[0008] At this point and hereinafter, coils, reels and distributors are considered not rotating and the progressive unwinding of the coil turns takes place owing to the traction axially exerted onto the wire portion available outside the reel or by the distributor, as illustrated in figure 3.

[0009] The more the line of action of said force tends to coincide with the symmetry axis of the tube and, therefore, also with the one of the coil, the smallest the module of the tensile force is, necessary to unwind gradually the turns, under other same conditions. The unwinding of the turns of a static coil by simple axial traction is commonly used in the textile industry and in the electro technical one.

[0010] The known devices, supplying twisted wires, include rotating members which provide for generating helicoidal configurations of wires wound one with respect to the other. Said devices, apart from requiring a motor which makes the coil set to rotate, obviously occupy the space needed to the rotating members apart from the motor itself.

[0011] The problem underlying the present invention consists in providing a supply device allowing to overcome the limitations mentioned by referring to the state of art.

[0012] The solution idea underlying the supply device according to the present invention lies in the structure simplicity of the device and in the elimination of the motor and the other rotating members and the twisting of two or more wires by simple traction.

[0013] Said problem is solved by a device as stated above comprising: fixed support means of at least a first coil, wherein a respective main wire is wound, and one or more additional coils, wherein respective secondary wires are wound; and means for conveying the simultaneous traction of the main wire and of said one or more secondary wires according to a same direction, therethrough said main wire is conveyed inside said one or more additional coils, by determining in this way the winding of said one or more secondary wires around said main wire according to a helicoidal line.

[0014] The arrangement described above guarantees that the twisting between the wires under traction takes place by simple rotation of the detachment point of the secondary wire from the respective additional coil with respect to the main wire always remaining inside the so-generated helix.

[0015] It is noted that, advantageously, no rotating mechanical members and motors of any kind are present, by further allowing a reduction in the dimensions of the device.

[0016] Advantageously, in the device object of the present invention the coil will have a substantially common axis and the traction will take place according to a direction defined by said axis.

[0017] Furthermore, it is noted that it is completely unimportant that the coils are supported by a reel or by a distributor and that in the subject device only reels or only distributors or jointly reels and distributors can be used.

[0018] The mechanical connection between two or more wires, even of different type between them, is obtained by twisting the same and it has the purpose of adding the properties of the single wires.

[0019] By way of example, a set of cables assigned to different functions (data transmission, power supply, etc.) could be kept grouped by a wire wound therearound; a return rope could cause the twisting of one or more cables assigned to different functions; a cable apt to play a functional role could be coupled to another cable assigned, instead, to structural functions (increase in weight, conferring greater resistance to traction).

[0020] At last, it is noted that a plurality of configurations is possible: one or more main wires with one or more secondary wires wound therearound or even in sequence of wires wherein a main wire or inner core is identified, a secondary wire wound therearound, a sub-

sequent wire still wound outside the first two and so on.

[0021] Hereinafter, the present invention will be next described by referring to some embodiment examples and to the enclosed drawings, by simple way of example and not for limitative purposes.

[0022] In the enclosed drawings:

* figure 1 shows schematically a wire reel which can be used in the device according to the invention;
* figure 2 shows schematically a wire distributor which can be used in the device according to the invention;
* figure 3 shows schematically the unwinding of a coil in the device according to the invention;
* figure 4 shows schematically a first embodiment example of supply device according to the invention;
* figure 5 shows schematically a second embodiment example of supply device according to the invention;
* figure 6 shows schematically a third embodiment example of supply device according to the invention;
* figure 7 shows schematically a fourth embodiment example of supply device according to the invention; and
* figure 8 shows schematically a fifth embodiment example of supply device according to the invention.

[0023] It is meant that said examples are provided not only to illustrate the modes therewith the invention can be implemented, but also to clarify that many other examples are possible by combining the various members which will be described hereinafter, each additional example remaining within the protective scope as it will be defined in the enclosed claims.

[0024] By referring to figure 1, a reel 1 comprises a winding tube 2, a first side flange 3 and a second side flange 4. Said first and second side flanges 3, 4 are connected to the ends of the winding tube 2 which acts as winding stem.

[0025] A coil 5 is wound onto the reel 1 so as to fill-in the whole length of the winding tube 2.

[0026] By referring to figure 2, a distributor 6 has a containment tube 7 defining an inner surface whereon a coil 5 is adhered. The containment tube 7 determines, as the preceding winding tube 2, an axis 8 of the coil 5.

[0027] At the ends, the containment tube 7 is delimited by a first side flange 9 and by a second side flange 10.

[0028] By referring to figure 3, the coil 5 is illustrated by way of example to clarify the concept of axial traction allowing to unwind the coil 5 itself. The wire 11 unwound in the coil is pulled according to the axis 8 of the coil itself and this determines, onto the coil 5, a detachment point 12 of the wire 11 gradually rotating upon proceeding with the unwinding.

[0029] By referring to figure 4, a device for supplying two or more wires in a twisted configuration, so that said two or more wires are mutually constrained during supply, is designated with 101 as a whole.

[0030] It comprises a frame member 102 thereto fixed support means 103 of a first coil 104 are fastened, wherein a respective main wire 105 is wound. In this example, the first fixed support means comprises a first reel 106, integral with said frame member 102, which, in turn, comprises a winding tube 107, a first side flange 108 and a second side flange 109 which, in turn, is connected to said frame member 102.

[0031] Said first fixed support means 103 arranges said first coil 104 so as to have a first axis 122 defining a direction according thereto the main wire 105 is pulled. Such traction determines the unwinding of the main wire 105 from the coil 104 by detecting a detachment point 110 rotating onto the surface of the coil 104.

[0032] Said first fixed support means 103 further comprises first guide means for the rotation of the main wire 105 which, in the present embodiment example, is constituted by the first flange 108 of the reel 106.

[0033] To said fixed frame member 102 also second fixed support means 111 of a second coil or additional coil 112 is connected, wherein a respective secondary wire 113 is wound. In this example, the second fixed support means comprises a second reel 114, integral with said frame member 102, which, in turn, comprises a winding tube 115, a first side flange 116 and a second side flange 117, the first flange 116 being connected to said frame member 102.

[0034] Said winding tube 115 here defines a conveyance channel 118 of the main wire 105 whereon the secondary wire 113 winds and in this regard the coils 104, 112 are kept in a substantially coaxial configuration, said second reel 114 having a respective second symmetry axis 123 substantially coinciding with the first axis 122.

[0035] Said first and second axes 122, 123 define a direction according thereto the main wire 105 and the secondary wire 113 are simultaneously subjected to traction and such traction determines the unwinding of the secondary wire 113 from the coil 112 by detecting a detachment point 120 rotating onto the surface of the second coil 112.

[0036] Said second fixed support means 111 further comprises second guide means for the rotation of the secondary wire 113, which in the present example, is constituted by the second flange 117 of the second reel 114.

[0037] It is meant that the first and the second fixed support means 103, 111 constitute, as a whole, fixed support means for the coils 104, 112 of the device 101.

[0038] The device 101 according the invention comprises means for conveying the simultaneous traction of the main wire 105 and of the secondary wire 113 according to a concordant direction, identified by said axes 122, 123.

[0039] Said means comprises, in the present example, said conveyance channel 118 and a funnel-like member 121 connected to said channel 118, or to the winding tube 115, from the side of the first coil 104 and with the entrance faced towards said first coil 104, so as to receive the main wire 105 which is conveyed through the addi-

tional coil 112.

[0040] By referring to figure 5, a second device 201 is analogous to the preceding one, but with some differences which will result hereinafter.

[0041] It comprises a frame member 202 thereto first fixed support means 203 of a first coil 204 are fastened, wherein a respective main wire 205 is wound. In this example, the first fixed support means comprises a distributor 206, integral to said frame member 202, which in turn comprises a containment tube 207, a first side flange 208 and a second side flange 209 which, in turn, is connected to said frame member 202.

[0042] Said first fixed support means 203 arranges said first coil 204 so as to have a first axis 222 defining a direction according thereto the main wire 205 is pulled. Such traction determines the unwinding of the main wire 205 from the coil 204 by detecting a detachment point 210 rotating onto the surface of the coil 204.

[0043] Said first fixed support means 203 further comprises first guide means for the rotation of the main wire 205 which, in the present embodiment example, is constituted by the first flange 208 of the distributor 206.

[0044] To said fixed frame member 202 also second fixed support means 211 of a second coil or additional coil 212 is connected, wherein a respective secondary wire 213 is wound. In this example, the second fixed support means comprises a reel 214, integral with said frame member 202, which, in turn, comprises a winding tube 215, a first side flange 216 and a second side flange 217, the first flange 216 being connected to said frame member 202.

[0045] Said winding tube 215 here defines a conveyance channel 218 of the main wire 205 whereon the secondary wire 213 twists and in this regard the coils 204, 212 are kept in a substantially coaxial configuration, said reel 214 having a respective second symmetry axis 223 substantially coinciding with the first axis 222.

[0046] Said first and second axes 222, 223 define a direction according thereto the main wire 205 and the secondary wire 213 are simultaneously subjected to traction and such traction determines the unwinding of the secondary wire 213 from the coil 212 by detecting a detachment point 220 rotating onto the surface of the second coil 212.

[0047] Said second fixed support means 211 further comprises second guide means for the rotation of the secondary wire 213, which in the present example is constituted by the second flange 217 of the second reel 214.

[0048] It is meant that the first and second fixed support means 203, 211 constitute, as a whole, fixed support means for the coils 204, 212 of the device 201.

[0049] The device 201 according to the invention comprises means for conveying the simultaneous traction of the main wire 205 and of the secondary wire 213 according to a concordant direction, identified by said axes 222, 223.

[0050] Said means comprises, in the present example, said conveyance channel 218 and a funnel-like member 221 connected to said channel 218, that is to the winding tube 215, from the side of the first coil 204 and with the entrance faced towards said first coil 204 so as to receive the main wire 205 which is conveyed through the additional coil 212.

[0051] The operation of the device 201 according to this example is analogous to the preceding one, but with some differences which will result hereinafter.

[0052] By referring to figure 6, a third example of device 301 is analogous to the preceding ones. It comprises a frame member 302 thereto first fixed support means 303 of a first coil 304 are fastened, wherein a respective main wire 305 is wound. In this example, the first fixed support means comprises a reel 306, integral with said frame member 302, which in turn comprises a winding tube 307, a first side flange 308 and a second side flange 309 which, in turn, is connected to said frame member 302.

[0053] Said first fixed support means 303 arranges said first coil 304 so as to have a first axis 322 defining a direction according thereto the main wire 305 is pulled. Such traction determines the unwinding of the main wire 305 from the coil 304 by detecting a detachment point 310 rotating onto the surface of the coil 304.

[0054] Said first fixed support means 303 further comprises first guide means for the rotation of the main wire 305 which, in the present embodiment example, is constituted by the first flange 308 of the reel 306.

[0055] To said fixed frame member 302 also second fixed support means 311 of a second coil or additional coil 312 is connected, wherein a respective secondary wire 313 is wound. In this example, the second fixed support means comprises a distributor 314, integral with said frame member 302, which in turn comprises a containment tube 315, a first side flange 316 and a second side flange 317, the first flange 316 being connected to said frame member 302.

[0056] Said containment tube 315 and the second coil 312 here define a conveyance channel 318 of the main wire 305 whereon the secondary wire 313 twists and in this regard the coils 304, 312 are kept in a substantially coaxial configuration, said distributor 314 having a respective second symmetry axis 323 substantially coinciding with the first axis 322.

[0057] Said first and second axes 322, 323 define a direction according thereto the main wire 305 and the secondary wire 313 are simultaneously subjected to traction and such traction determines the unwinding of the secondary wire 313 from the coil 312 by detecting a detachment point 320 rotating onto the inner surface of the second coil 312.

[0058] Said second fixed support means 311 further comprises second guide means for the rotation of the secondary wire 313, which, in the present example, is constituted by the second flange 317 of the distributor 314.

[0059] It is meant that the first and second fixed support means 303, 311 constitute, as a whole, fixed support means for the coils 304, 312 of the device 301.

[0060] The device 301 according to the invention comprises means for conveying the simultaneous traction of the main wire 305 and the secondary wire 313 according to a concordant direction, identified by said axes 322, 323.

[0061] Said means comprises, in the present example, said conveyance channel 318 and a funnel-like member 321 connected to said channel 318, that is to the containment tube 315 and to the first flange 316, from the side of the first coil 304 and with the entrance faced towards said first coil 304, so as to receive the main wire 305 which is conveyed through the additional coil 312.

[0062] The operation of the device 301 according to this third example is analogous to the preceding ones.

[0063] By referring to figure 7, a fourth device 401 is analogous to the preceding one, but with some differences which will result hereinafter.

[0064] It comprises a frame member 402 thereto first fixed support means 403 of a first coil 404 are fastened, wherein a respective main wire 405 is wound. In this example, the first fixed support means comprises a first distributor 406, integral with said frame member 402, which in turn comprises a containment tube 407, a first side flange 408 and a second side flange 409 which, in turn, is connected to said frame member 402.

[0065] Said first fixed support means 403 arranges said first coil 404 so as to have a first axis 422 defining a direction according thereto the main wire 405 is pulled. Such traction determines the unwinding of the main wire 405 from the coil 404 by detecting a detachment point 410 rotating onto the inner surface of the coil 404.

[0066] Said first fixed support means 403 further comprises first guide means for the rotation of the main wire 405 which, in the present embodiment example, is constituted by the first flange 408 of the reel 406.

[0067] To said fixed frame member 402 also second fixed support means 411 of a second coil or additional coil 412 is connected, wherein a respective secondary wire 413 is wound. In this example, the second fixed support means comprises a second distributor 414, integral with said frame member 402, which in turn comprises a containment tube 415, a first side flange 416 and a second side flange 417, the first flange 416 being connected to said frame member 402.

[0068] Said containment tube 415 here defines a conveyance channel 418 of the main wire 405 whereon the secondary wire 413 twists and in this regard the coils 404, 412 are kept in a substantially coaxial configuration, said second distributor 414 having a respective second symmetry axis 423 substantially coinciding with the first axis 422.

[0069] Said first and second axes 422, 423 define a direction according thereto the main wire 405 and the secondary wire 413 are simultaneously subjected to traction and such traction determines the unwinding of the secondary wire 413 from the coil 412 by detecting a detachment point 420 rotating onto the inner surface of the second coil 412.

[0070] Said second fixed support means 411 further comprises second guide means for the rotation of the secondary wire 413, which, in the present example, is constituted by the second flange 417 of the second distributor 414.

[0071] It is meant that the first and second fixed support means 403, 411 constitute, as a whole, fixed support means for the coils 404, 412 of the device 401.

[0072] The device 401 according to the invention comprises means for conveying the simultaneous traction of the main wire 405 and the secondary wire 413 according to a concordant direction, identified by said axes 422, 432.

[0073] Said means comprises, in the present example, said conveyance channel 418 and a funnel-like member 3421 connected to said channel 418, that is to the containment tube 415, from the side of the first coil 404 and with the entrance faced towards said first coil 404, so as to receive the main wire 405 which is conveyed through the additional coil 412.

[0074] The operation of the device 401 according to this fourth example is analogous to the preceding ones.

[0075] By referring to figure 8, a fifth example of device 501 substantially has a compact configuration of the device considered during the third embodiment example. It comprises first fixed support means 503 of a first coil 504, wherein a respective main wire 505 is wound. In this example, the first fixed support means 503 comprises a reel 506, constituted by a stem 507, by a first side flange 508 and a second side flange 509, with reduced sizes compared to the first one, which, in turn, is connected to a cylindrical container 502.

[0076] Said first fixed support means 503 arranges said first coil 504 so as to have a first axis 522 defining a direction according thereto the main wire 505 is pulled. Such traction determines the unwinding of the main wire 505 from the coil 504 by detecting a detachment point 510 rotating onto the surface of the coil 504.

[0077] Said first fixed support means 503 further comprises first guide means for the rotation of the main wire 505 which, in the present embodiment example, is constituted by the first flange 508 of the reel 506.

[0078] To said first support means 503 second fixed support means 511 of a second coil or additional coil 512 is connected, wherein a respective secondary wire 513 is wound. In this example, the second fixed support means comprises a distributor 514, which in turn comprises a containment tube 515, a first side flange 516 and a second side flange 517, the first flange 516 being connected to said cylindrical container 502.

[0079] A funnel-like member 521, connected to the second flange 517, the containment tube 515 and the second coil 512 here define a conveyance channel 518 of the main wire 505 whereon the secondary wire 513 twists and in this regard the coils 504, 512 are coaxial, said distributor 514 having a respective second symmetry axis 523 coinciding with the first axis 522.

[0080] Said first and second axes 522, 523 define a

direction according thereto the main wire 505 and the secondary wire 513 are simultaneously subjected to traction and such traction determines the unwinding of the secondary wire 513 from the coil 512 by detecting a detachment point 520 rotating onto the inner surface of the second coil 512.

[0081] Said second fixed support means 511 further comprises second guide means for the rotation of the secondary wire 513, which in the present example is constituted by the funnel-like member 521.

[0082] It is meant that the first and second fixed support means 503, 511 constitute, as a whole, fixed support means for the coils 504, 512 of the device 501.

[0083] The device 501 according to the invention comprises means for conveying the simultaneous traction of the main wire 505 and of the secondary wire 513 according to a concordant direction, identified by said coincident axes 522, 523, which, in the present example, is constituted by said conveyance channel 518.

[0084] The operation of the device 501 according to this fifth example is substantially analogous to the preceding ones and by operating with a reel and a distributor, as in the third example, this fifth example is much more compact.

[0085] By illustration simplicity a pair of coils has been considered sofar, but obviously the operation principle is valid also for a greater number thereof, indifferently contained in reels or in distributors.

[0086] The protection scope conferred to the present invention is determined by the contents of the claims. Nevertheless, the person skilled in the art, in order to face contingent needs in the range of his/her own skills, could introduce modifications and variants all within the protective scope itself.

Claims

1. Device for supplying two or more wires in a twisted configuration so that said two or more wires are mutually constrained during supply, comprising: fixed support means of at least a first coil, wherein a respective main wire is wound, and of one or more additional coils, wherein respective secondary wires are wound; and means for conveying the simultaneous traction of the main wire and/or of said one or more secondary wires according to a concordant direction, therethrough said main wire is conveyed through said one or more additional coils, by determining in this way the winding of said one or more secondary wires around said main wire according to a helicoidal line.

2. The device according to claim 1, comprising a frame member thereto the fixed support means is fastened.

3. The device according to any of the preceding claims, wherein the support means comprises guide means for the rotation of the respective wire under traction.

4. The device according to any of the preceding claims, wherein the fixed support means comprises a reel.

5. The device according to any of the claims 1 to 3, wherein the fixed support means comprises a distributor.

6. The device according to any of the preceding claims, wherein the first coil has an axis which substantially defines a direction according thereto the main wire is pulled.

7. The device according to claim 3 and 4 or 5, wherein the guide means is constituted by a side flange of the reel or of the distributor, shifted in the unwinding direction.

8. The device according to any of the preceding claims, wherein said one or more additional coils are crossed by a conveyance channel of the main wire.

9. The device according to any of the preceding claims, wherein the means for conveying the simultaneous traction of the main wire and/or of the secondary wire comprises a funnel-like member.

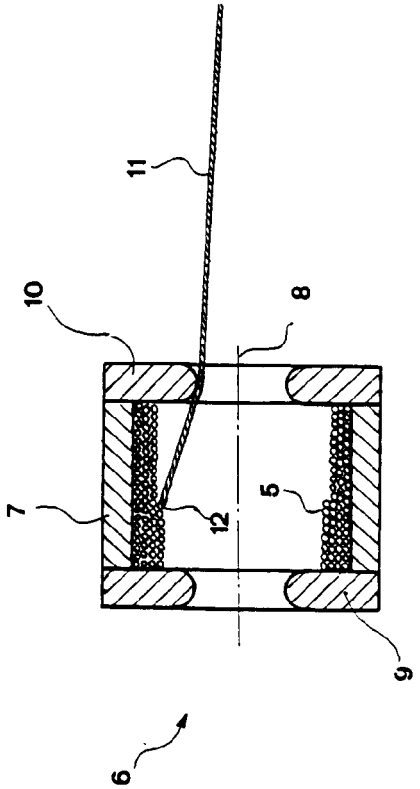

FIG.2

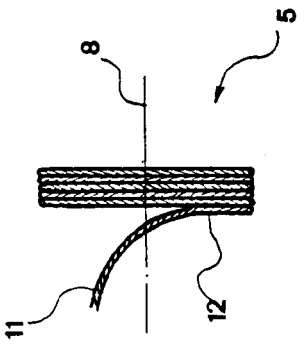

FIG.3

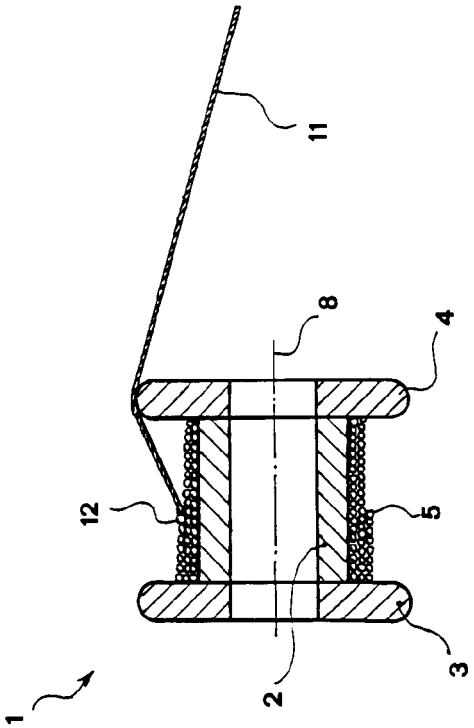

FIG.1

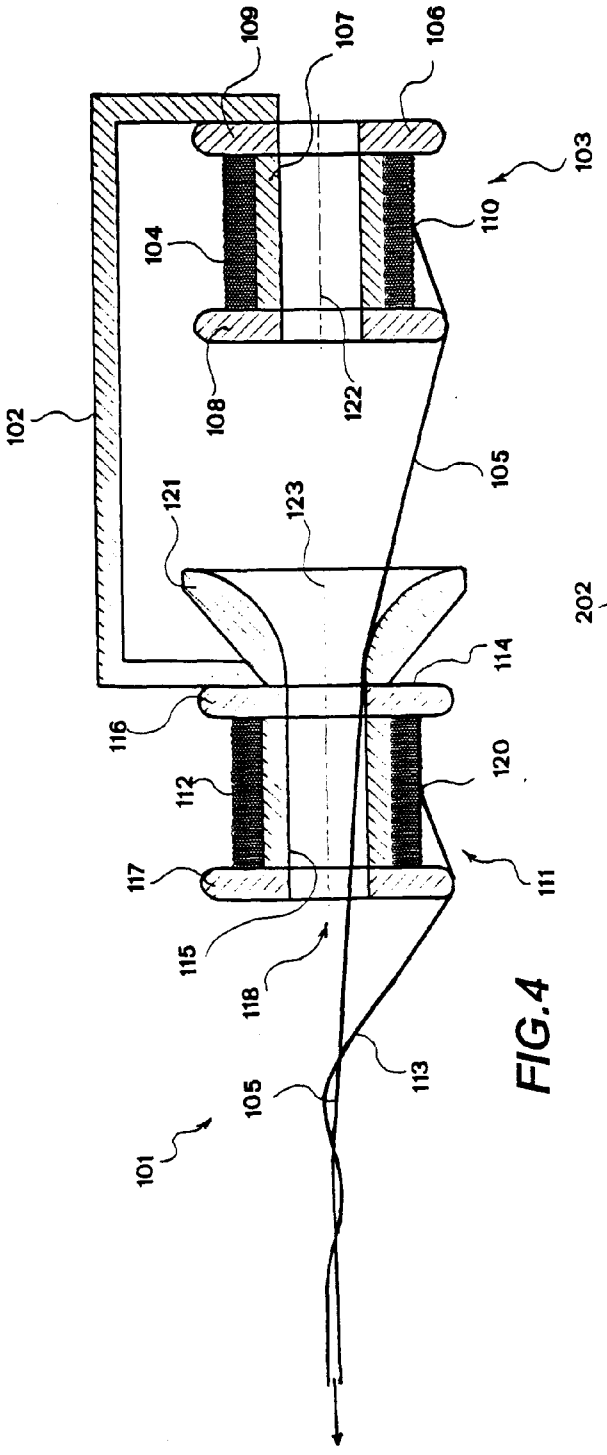
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FIG.4

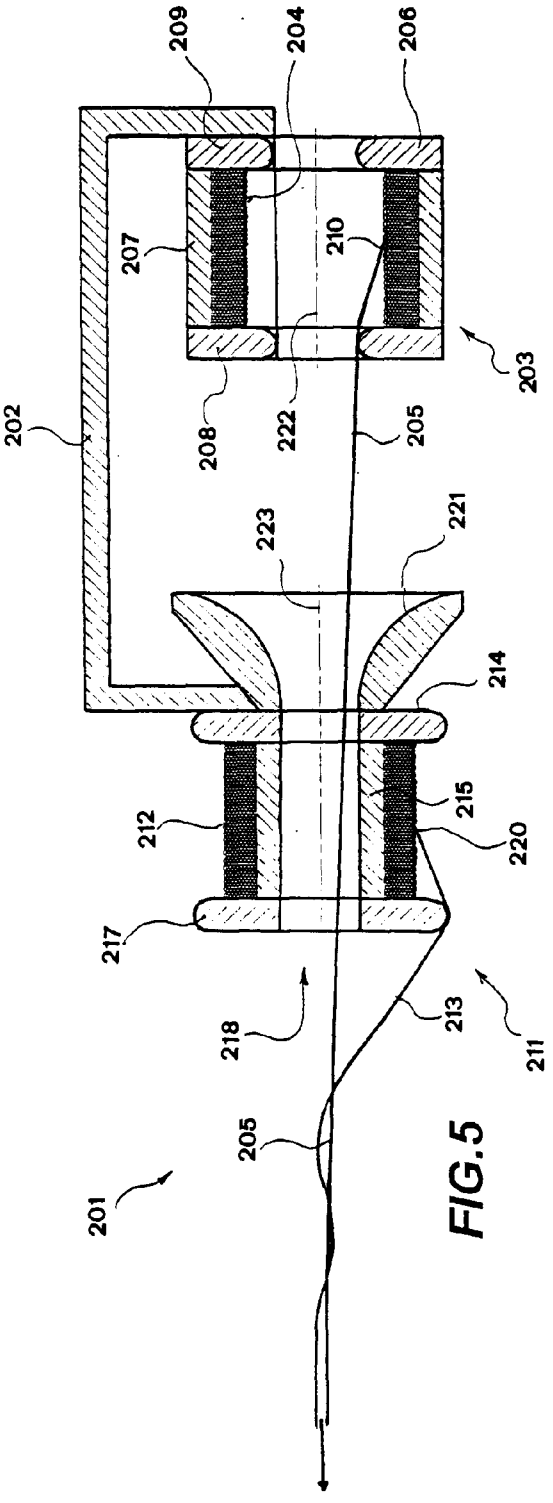
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FIG.5

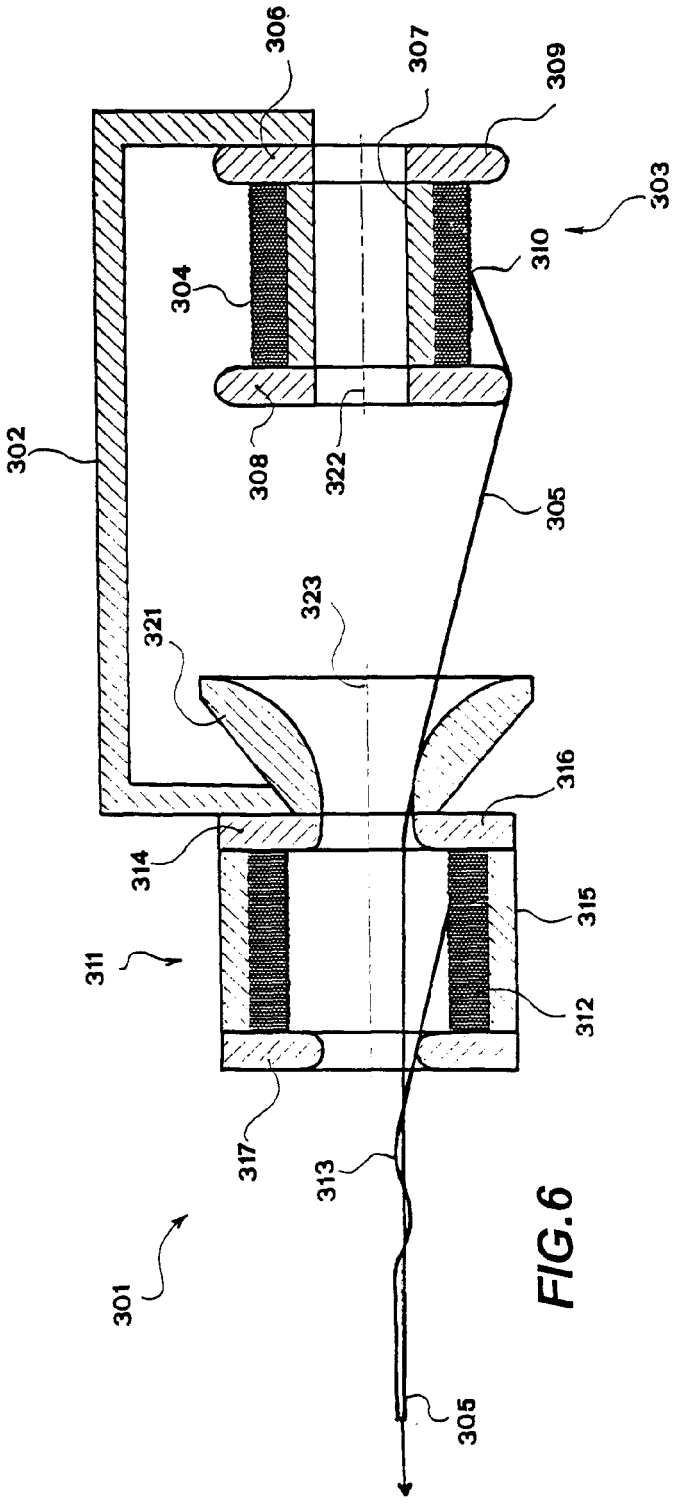
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FIG.6

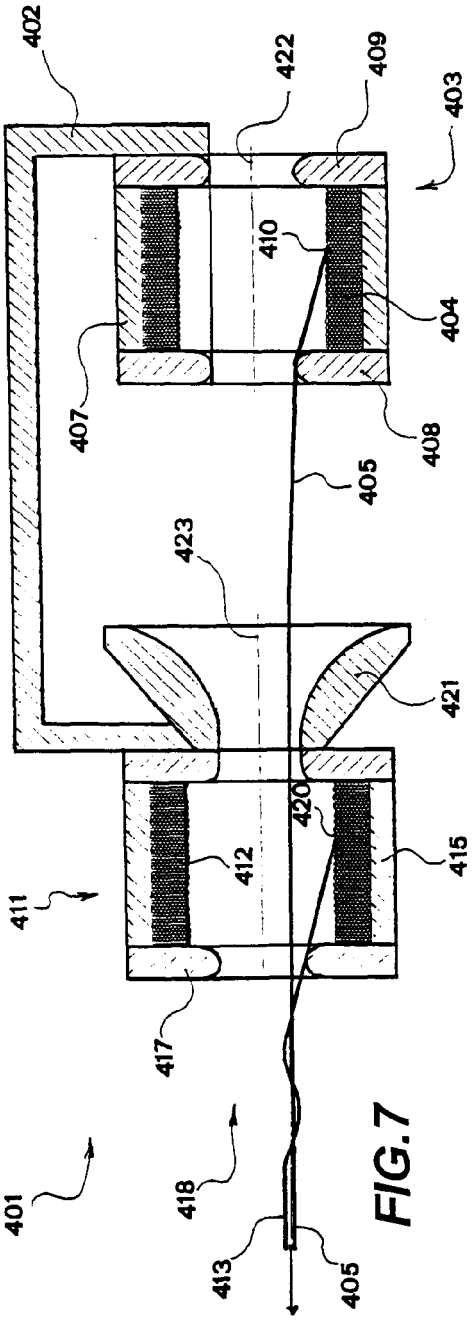
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FIG.7

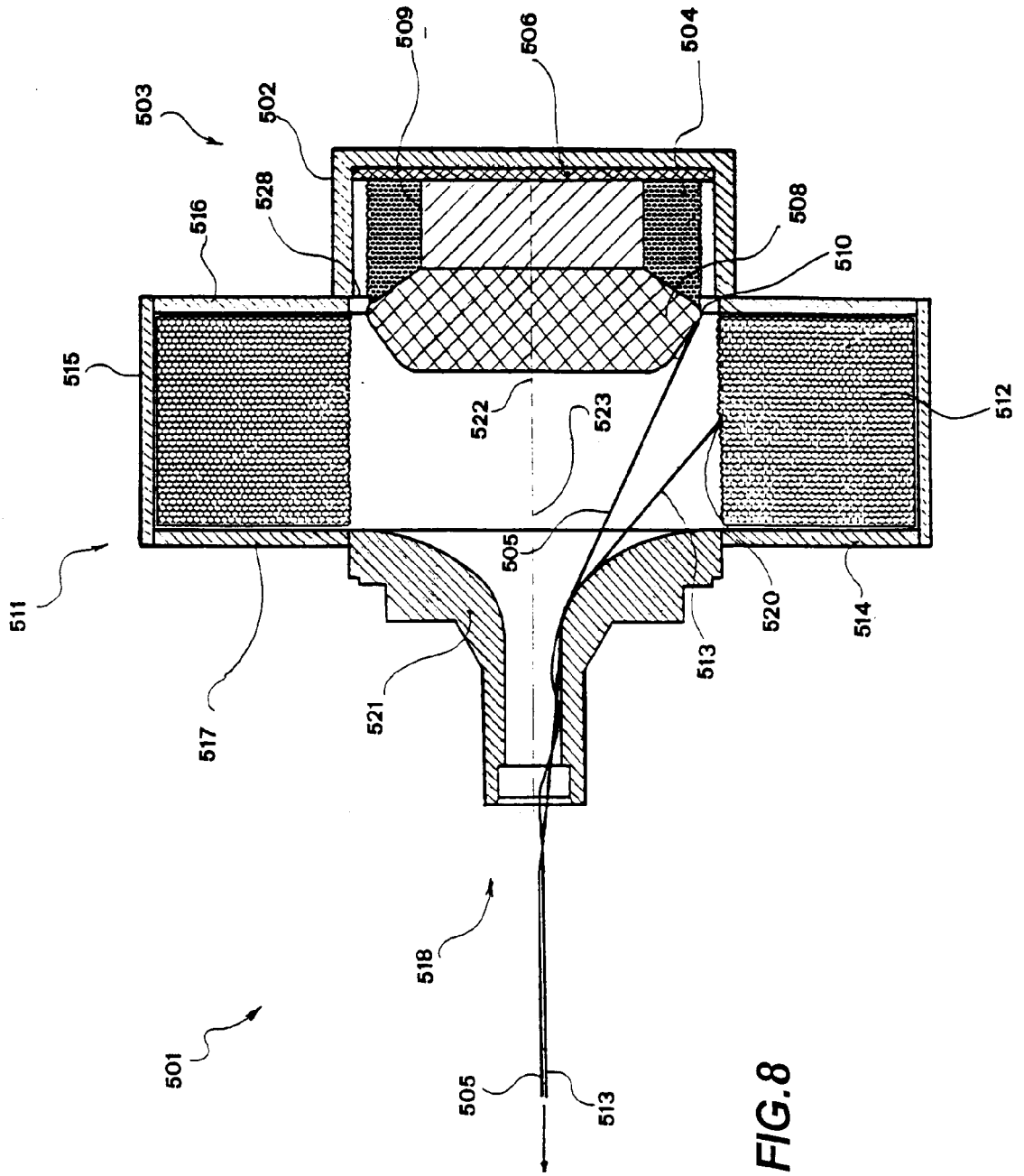
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FIG.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 10 5617

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 Y	FR 1 439 101 A (ALBER, MARCEL ET CYPRIEN, ALEXANDRE) 20 May 1966 (1966-05-20) * page 3, column 1, line 34 - page 3, column 2, line 4 * -----	1-4,8,9 5,6	INV. B21F21/00 D02G3/36 B65H49/14
Y	US 3 763 899 A (ORLANDI J,US) 9 October 1973 (1973-10-09) * figure 1 * -----	5	
Y	US 2 365 661 A (WINSLOW ALBERT E) 19 December 1944 (1944-12-19) * figure 2 * -----	6	

TECHNICAL FIELDS SEARCHED (IPC)

B21F
D02G
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 May 2006	Kising, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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