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(54) **Title:** COVERING TOOL AND CABLE CONNECTING PORTION COVERING METHOD

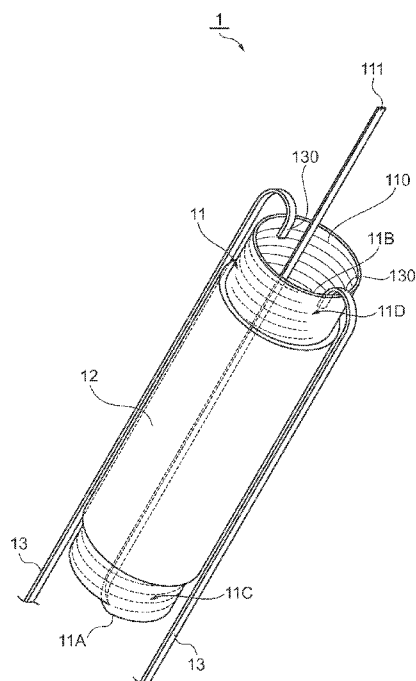


FIG. 1

(57) **Abstract:** A covering tool 1 and a method of covering a cable connecting portion that is capable of improving the operability of the covering process of a cable connecting portion 21A. A covering tool 1 includes a hollow tubular core member 11 having an unwinding line formed on the wall surface thereof, and an elastic tube member 12 that is maintained in an enlarged diameter state on the outer periphery side of the core member 11. The core member 11 can be pulled out along the unwinding line as a core ribbon 111. The core member 11 includes a first end portion 11A that is the starting end side for pulling out as the core ribbon 111, and a second end portion 11B that is the terminus end side. A long grip member is attached to the second end portion 11B side of the core member 11.



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COVERING TOOL AND CABLE CONNECTING PORTION COVERING METHOD

FIELD OF THE INVENTION

[0001]

The present invention relates to a covering tool and a cable connecting portion covering method.

BACKGROUND ART

[0002]

Conventionally, a covering tool is known, as a covering tool for waterproofing and insulating cable connecting portions of locations where cables are directly connected together or cable connecting portions of locations for connecting the terminus ends of cables, that includes a hollow tubular core member having unwinding lines formed on the wall surface over the whole length thereof, and an elastic tube member that is retained in an enlarged diameter state on the outer periphery side of the core member (for example see Japanese Examined Patent Application Publication No. S49-046190).

[0003]

In the covering tool as described above, the core member can be pulled out along the unwinding line (indicated as continuous spiral groove in the above-cited patent application) as a cord-like body. The core member is gradually unwound from one end portion side by being pulled out as the cord-like body. At the unwound portion, the support of the elastic tube member from the core member is released, so at that portion, the diameter of the elastic tube member contracts, and the cable connecting portion is covered by the elastic tube member.

SUMMARY OF THE INVENTION

Problems to be solved by the invention

[0004]

Here, when the cable connecting portion is covered using the conventional covering tool as described above, it is necessary for the operator to support the core member and the cable with one hand while maintaining the core member at an appropriate position, and pull out the cord-like body of the core member with the other hand. Also, in the case of the unwinding line being a continuous spiral groove, when pulling out the cord-like body, it is necessary to pull out the cord-like body while rotating the core member so that the cord-like body and the cable do not become entangled. Thus the operation of rotating the core member with the hand that was supporting the core member was necessary. Also, when this operation is carried out by a single operator in a narrow dark environment, the operability is affected.

[0005]

Also, if the operator is not familiar with the operation, time and effort is required to properly position the core member so that the cable connecting portion is appropriately covered. As a result of the

above, there is a need to improve the operability of the process of covering a cable connecting portion.
[0006]

The present invention was devised to solve the above problem, and it is an object of the present invention to provide a covering tool and cable connecting portion covering method that is capable of improving the operability of the process of covering a cable connecting portion.

Means to Solve the Problem

[0007]

One aspect of the present invention is a covering tool for carrying out the process of covering a cable connecting portion, comprising: a hollow tubular core member having an unwinding line formed on a wall surface thereof; and an elastic tube member that is maintained in an enlarged diameter state on an outer periphery side of the core member; wherein the unwinding line is provided so that it gradually progresses in a longitudinal axial direction of the core member while looping around, or looping around and reversing around, the longitudinal axis; the core member can be pulled out along the unwinding line as a cord-like body, the core member includes a first end portion that is a starting end side for pulling out the cord-like body, and a second end portion that is a terminus end side, and a long grip member is attached to the second end portion side of the core member.

[0008]

In this covering tool, the core member can be pulled out along the unwinding line from the first end portion side by gradually unwinding as the cord-like body, and the long grip member is attached to the second end portion side of the core member. With this configuration, the cable connecting portion passes through the inside of the core member, the long grip member extends to the first end portion side of the core member and is gripped together with the cable, so it is possible to pull out the cord-like body through the inside of the core member from the second end portion side. The grip member is attached to the second end portion side which becomes the terminus end side for pulling out the cord-like body, so even though unwinding of the core member progresses, it is possible to maintain the state of support of the core member with the grip member. In this way, by gripping the grip member, it is possible to support the core member at the first end portion side, which is the side opposite to the second end portion side where the cord-like body is pulled out. In this way, it is possible to support the core member and the cable simply with one hand. Also, once the position of the core member is determined and the grip member is gripped, it is possible to eliminate positional deviation of the core member, so it is possible to simply and accurately determine the position with respect to the cable connecting portion. As a result of the above, it is possible to improve the operability of the process of covering the cable connecting portion.

[0009]

In another aspect, the grip member is fixed to the second end portion side. By attaching the grip member as fixed, it is not necessary to attach the grip member to the core member every time when the operator carries out the operation, so the operability is improved.

[0010]

In another aspect, the grip member is removably attached to the second end portion side. By removably attaching the grip member, it is possible to simplify manufacture and to simplify the structure of the covering tool during distribution.

[0011]

5 In another aspect, the grip member is in strip form. By making the grip member in strip form, it is possible to more easily grip the grip member.

[0012]

10 In another aspect, the grip member is in sheet form. By making the grip member in sheet form, the portion where the grip member is gripped is widened, and, it is possible to cover the whole elastic tube member, so it is possible to prevent soiling or damage to the elastic tube member during storage, transport, and construction.

[0013]

15 One aspect of the present invention is a method of covering a cable connecting portion using a covering tool that includes a hollow tubular core member having an unwinding line formed on a wall surface thereof, and that can be pulled out along the unwinding line as a cord-like body, and an elastic tube member that is maintained in an enlarged diameter state on an outer periphery side of the core member, and the unwinding line is provided so that it gradually progresses in a longitudinal axial direction of the core member while looping around, or looping around and reversing around, the longitudinal axis, the method comprising the steps of: placing the core member on the cable connecting portion; gripping, at a first end portion side that is a starting end side where the core member is pulled out along the unwinding line as the cord-like body, a long grip member, which is attached to a second end portion side that is a terminus end side for pulling out as the cord-like body, and a cable; and pulling out the cord-like body through an inner side of the core member from the second end portion side, in the state that the grip member together with the cable is gripped.

25 [0014]

30 In this method of covering a cable connecting portion, the core member of the covering tool used in the covering process of the cable connecting portion can be pulled out as the cord-like body along the unwinding line from the first end portion side, and the long grip member is attached to the second end portion side of the core member. Also, the method of covering a cable connecting portion using the covering tool as described above includes extending the long grip member to the first end portion side and gripping the core member together with the cable, and pulling out the cord-like body from the second end portion side in this gripped state. In this way, by gripping the grip member, it is possible to support the core member at the first end portion side, which is the side opposite to the second end portion side where the cord-like body is pulled out. In this way, it is possible to support the core member and the cable simply with one hand. Also, once the position of the core member is determined and the grip member is gripped, it is possible to eliminate positional deviation of the core member, so it is possible to simply and accurately determine the position with respect to the cable connecting portion. Also, the grip member is attached to the second end portion side which becomes the terminus end side for pulling out the cord-like

body, so even though unwinding of the core member progresses, it is possible to maintain the state of support of the core member with the grip member. As a result of the above, it is possible to improve the operability of the process of covering the cable connecting portion.

[0015]

5 In another aspect, the method of covering a cable connecting portion further includes attaching the grip member to the second end portion side. By including this process, it is possible to appropriately install the grip member even when the grip member has the ability to be attached and detached.

EFFECT OF THE INVENTION

10 [0016]

According to the present invention, it is possible to provide a covering tool and a method of covering a cable connecting portion that is capable of improving the operability of the covering process of a cable connecting portion.

15 BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

FIG. 1 is a perspective view illustrating a covering tool according to the present embodiment.

FIGS. 2A and 2B illustrate a cable connecting portion, FIG. 2A illustrates a cable connecting portion at a terminus connection position, and FIG. 2B illustrates a cable connecting portion at a direct connection position.

20 FIG. 3 is a perspective view illustrating the covering tool placed over a cable (before covering the cable connecting portion).

FIGS. 4A to 4D are explanatory views for explaining the covering method for covering a cable connecting portion using the covering tool.

25 FIGS. 5A to 5D are explanatory views for explaining the covering method for covering a cable connecting portion using the covering tool.

FIGS. 6A to 6E are explanatory views for explaining the covering method for covering a cable connecting portion using the covering tool.

30 FIGS. 7A to 7E are explanatory views for explaining the covering method for covering a cable connecting portion using the covering tool.

FIGS. 8A and 8B illustrate a covering tool according to a modified example.

FIG. 9 illustrates a covering tool according to a modified example.

FIG. 10 illustrates a covering tool according to a modified example.

35 DETAILED DESCRIPTION

[0018]

An embodiment of the present invention will now be described with reference to the drawings.

[0019]

FIG. 1 is a perspective view illustrating a covering tool 1 according to the present embodiment. FIGS. 2A and 2B illustrate a cable connecting portion, FIG. 2A illustrates a cable connecting portion at a terminus connection position, and FIG. 2B illustrates a cable connecting portion at a direct connection position. Terminus connection position refers to the position where a terminal is attached to the terminal end of a cable, and direct connection position refers to the position where two cables are connected together. In the present embodiment, the term "cable" is used as a term that includes electric wires and electric cables, and the term "direct connection" is used as a term that includes not only connecting one cable to another cable, but also includes connecting a plurality of cables to one or a plurality of cables. FIG. 2A illustrates a cable connecting portion 21A as an example of the structure of a terminus connection position, and FIG. 2B illustrates a cable connecting portion 21B as an example of the structure of a direct connection position. The detailed structure of the cable connecting portions 21A, 21B is described later.

[0020]

The covering tool 1 is used when covering the cable connecting portions 21A, 21B, which are the connecting portions of cables. As illustrated in FIG. 1, the covering tool 1 includes a core member 11, an elastic tube member 12, and a grip member 13.

[0021]

The core member 11 is a circular cylindrical shaped hollow tube member having an unwinding line formed along the whole length of its wall surface. The unwinding line is provided so that it gradually progresses in the longitudinal axial direction of the core member 11 while looping around, or looping around and reversing, the longitudinal axis. In the present embodiment, a continuous spiral groove 110 is provided as the unwinding line so that it gradually progresses in the longitudinal axial direction while looping around the longitudinal axis of the core member 11. Therefore, in the present embodiment, "unwinding line" is explained as "continuous spiral groove 110". A resin such as, for example, polyethylene, polypropylene, and so on, is used as the material of the core member 11. It is possible to pull out a core ribbon 111, a cord-like body, along the continuous spiral groove 110 of the core member 11. The thickness of the portion where the continuous spiral groove 110 is formed is thin, forming a portion that is easily severed. Therefore, when the core ribbon 111 is pulled out, the core member 11 is successively severed at the continuous spiral groove 110 portion, and is pulled out continuously as new core ribbon 111. The continuous spiral groove 110 is formed with a constant pitch, so the width of the core ribbon 111 that is pulled out is constant. However, it may also be non-uniform. The continuous spiral groove 110 may be formed on the inner circumferential surface of the core member 11 only, or it may be formed on the outer circumferential surface only, or it may be formed on both the inner circumferential surface and the outer circumferential surface. Also, the continuous spiral groove 110 does not have to be a simple groove structure, but may also be a structure provided with engagement portions (not shown on the drawings) along both edge portions of the core ribbon 111, and when formed into a spiral shape, the adjacent edge portions are engaged (thermal bonding may be performed at the same time to make them difficult to break). Manufacture of the core member 11 having the continuous

spiral groove 110 may be carried out by, for example, winding the core ribbon 111 into a spiral and at the same time fixing the core ribbon 111 at adjacent positions to each other by bonding, thermal welding, engaging, or the combination of these, and so on, or it may be carried out by directly forming a continuous spiral groove 110 on a circular cylindrical member.

[0022]

The core member 11 includes a first end portion 11A which is a starting end side for pulling out the core ribbon 111, and a second end portion 11B which is the terminus end side. Near the first end portion 11A, an exposed portion 11C is formed in which the outer circumferential surface of the core member 11 is exposed and not covered by the elastic tube member 12, and near the second end portion 11B, an exposed portion 11D is formed in which the outer circumferential surface of the core member 11 is exposed and not covered by the elastic tube member 12. The core ribbon 111 released from the first end portion 11A can be pulled out from the second end portion 11B side through the inside of the core member 11. By pulling out the core ribbon 111 at the second end portion 11B side, the core member 11 is gradually unwound from the first end portion 11A towards the second end portion 11B. In the present embodiment, by forming the continuous spiral groove 110 along the total length of the core member 11, it is possible to completely unwind as far as the second end portion. However, in the core member 11, the continuous spiral groove may be formed in the portion where the elastic tube member 12 is retained with an enlarged diameter, and a portion in which the continuous spiral groove is not formed may be provided over a predetermined range on the second end portion 11B side.

[0023]

The elastic tube member 12 is a member that is retained on the outer periphery side of the core member 11 in an extended and enlarged diameter state, and is a member that covers the cable connecting portions 21A, 21B. The material of the elastic tube member 12 is, for example, an insulating rubber with excellent extension properties and that contracts at normal temperatures, such as ethylene propylene rubber, silicone rubber, and so on.

[0024]

The elastic tube member 12 is supported on the core member 11 in an expanded diameter state, but by pulling out core ribbon 111 of the core member 11, and gradually unwinding the core member 11, the support of the core member 11 at the unwound portion is released, so the diameter of the elastic tube member 12 at this portion contracts. The elastic tube member 12 can cover the cable connecting portions 21A, 21B by contracting its diameter.

[0025]

The grip member 13 is a long member attached to the second end portion 11B side of the core member 11. The grip member 13 grips the core member 11 to support it when the core ribbon 111 of the core member 11 is pulled out and unwound. Also, the grip member 13 grips the core member 11 so that it is supported at the appropriate position relative to the cable.

[0026]

In the present embodiment, a member in strip form is used as the grip member 13. A first end

130 of the grip member 13 is attached to the second end portion 11B side of the core member 11, and a second end portion is not fixed but is a free end. The first end 130 of the grip member 13 is attached by fixing it to the inner circumferential surface near the second end portion 11B of the core member 11. However, the position of attaching the first end 130 of the grip member 13 may be anywhere on the second end portion 11B side, it may be fixed to the outer circumferential surface near the second end portion 11B of the core member 11, or it may be fixed to the second end portion 11B itself. Also, in the present embodiment, the first end 130 of the grip member 13 is fixed near the second end portion 11B, in other words at a position corresponding to the exposed portion 11D. However, when the first end 130 is fixed to the inner circumferential surface of the core member 11, the first end 130 may be fixed to the inner side in the axial direction of the core member 11 from the exposed portion 11D (in other words, the portion of the core member 11 where the elastic tube member 12 is wrapped). In this case, it is necessary to release the grip member 13 during the operation of extracting the core ribbon 111, but in doing so, the core member 11 can move in the longitudinal direction of the cable, and the fixed state of the second end portion 11B is released, and the occurrence of the phenomenon in which the elastic tube member 12 is reversed and overlapped onto the elastic tube member 12 that has already contracted and covered the cable is prevented. By removing the hand that grips the grip member 13 during the operation of extracting the core ribbon 111, it is possible to prevent the reversal phenomenon, but by forcibly releasing the fixed state of the second end portion 11B, it is possible to reliably prevent the reversal phenomenon without the operation of the operator actively releasing their hand.

[0027]

When a grip member 13 in strip form is used, there is no particular limitation on the number of grip members 13, but in order to stably support the core member 11, there should be at least two or more grip members 13. Also, a plurality of grip members 13 may be disposed at predetermined angles in the circumferential direction of the core member 11. The plurality of grip members 13 may be disposed at substantially equal angles in the circumferential direction. Also, there may be one grip member 13. In the example illustrated in FIG. 1, two grip members 13 are disposed in the circumferential direction of the core member 11 at 180°.

[0028]

When the covering tool 1 is used, the grip member 13 extends in the first end portion 11A side of the core member 11. Also, the grip member 13 is disposed on the outer circumferential side of the core ribbon 111, so as not to interfere with the core ribbon 111 being pulled out. In the example illustrated in FIG. 1, the first end of the grip member 13 is fixed to the inner circumferential surface of the core member 11, and the grip member 13 is bent back at the second end portion 11B and extends towards the first end portion 11A side on the outer periphery side of the core member 11. The length of the grip member 13 in the state in which it is extended towards the first end portion 11A side is at least a length to extend to the outside (the opposite side to the second end portion 11B viewed from the first end portion 11A) in the axial direction from the first end portion 11A, and such that the cable and the grip member 13 can be gripped. In other words, there should be sufficient length to enable the grip member 13 and the

cable to be gripped with the thumb and index finger of one hand, and preferably with the five fingers and the whole palm of one hand. Specifically, in the state in which the grip member 13 extends to the first end portion 11A side, the portion extending to the outside in the axial direction from the first end portion 11A should be about 25 to about 160 mm. In the state in which the grip member 13 and the cable are gripped with one hand at the first end portion 11A side of the core member 11 so that the position of the core member 11 is fixed, the core ribbon 111 is pulled out with the other hand at the second end portion 11B side, as described above. When pulling out the core ribbon 111, it is necessary to pull out the core ribbon 111 while rotating it around in order not to entangle the core ribbon 111 and the cable or the like. [0029]

The cable connecting portion 21A in the terminus connecting position that is the object of processing by the covering tool 1 as described above is a region that includes a cable insulator 211A, a clamp 212 for grounding that is attached to the cable, high dielectric constant tape 213, and adhesive polyethylene tape 214, as shown in FIG. 2A. When covering the cable connecting portion 21A, the tip of the elastic tube member 12 on the first end portion 11A side of the covering tool 1 is positioned so that it overlaps an end portion of positioning tape 215, and the core ribbon 111 is pulled out. The region of the cable connecting portion 21A in the terminus connection position is determined for each type of cable, so the position of the positioning tape 215 is determined for each type of cable. Also, the length of the core member 11 and the elastic tube member 12 is determined accordingly. The cable connecting portion 21A illustrated in FIG. 2A is one example of the configuration of a terminus connection position, and other configurations are possible. [0030]

The cable connecting portion 21B in the direct connection position is a region that includes a cable insulator 211B, a cable conductor 216, and a connector 217 that is used in the position where two cables are connected, as shown in FIG. 2B. The cable connecting portion 21B illustrated in FIG. 2B is one example of the configuration of a direct connection position, and other configurations are possible. [0031]

Of the terminus connection position and the direct connection position as described above, the following is an explanation of covering the cable connecting portion 21A in a 6,600 volt terminus connection position. [0032]

Next, referring to FIG. 3, covering the cable connecting portion 21A with the elastic tube member 12 using the covering tool 1 is described. FIG. 3 is a perspective view illustrating the covering tool 1 placed over a cable (before covering the cable connecting portion). [0033]

As illustrated in FIG. 3, an operator places the covering tool 1 so that it covers the cable connecting portion 21A, overlaps a tip 12A of the elastic tube member 12 with the position of the positioning tape 215 (described in detail later), and the operator grips the cable and the grip member 13 on the outside of the first end portion 11A (the opposite side to the second portion 11B viewed from the

first end portion 11A). Then the core member 11 is gradually released from the first end portion 11A by pulling out the core ribbon 111 from the second end portion 11B side, and the elastic tube member 12 covers the cable connecting portion 21A from the first end portion 11A side of the core member 11.
[0034]

5 Next, the covering method of covering the cable connecting portion 21A using the covering tool 1 is explained, using FIG. 4A through FIG. 7E. In the explanation, the operation of covering the cable connecting portion 21A in a terminus connecting portion in the initial stage is also explained. Also, only an example of the covering method for the triplex cable illustrated in FIG. 4A and FIG. 7E is described.
[0035]

10 First, a plurality of cables 30 is fixed at the terminus connecting portion with a multicore bracket 31, as illustrated in FIG. 4A, and the tip portions 30A of the cables are cut so that the tip portions 30A are level. Then, as illustrated in FIG. 4B, the depth L of the terminal hole is measured for a terminal 32a or a terminal 32b that is to be attached to the tip portions 30A of the cable.
[0036]

15 Then the cable sheath 33 is removed for a predetermined dimension, to expose the cable shielding copper tape 34, as shown in FIG. 4C. The predetermined dimension here is determined from the conductor nominal cross-sectional area, the terminal type, and the depth of the terminal hole L. Then, as illustrated in FIG. 4D, tin plated annealed copper wire is applied at a predetermined position, the cable shielding copper tape 34 is removed along the tin plated annealed copper wire, and a cable
20 semiconducting layer 37 is further removed to expose the cable insulator 35. The extent of the cable shielding copper tape is about 30 mm, and the extent of the cable semiconducting layer 37 is about 10 mm.
[0037]

25 Then, as illustrated in FIG. 5A, the cable insulator 35 is removed over a predetermined dimension, to expose the cable conductor 38. The predetermined dimension here is determined from the conductor nominal cross-sectional area, the terminal type, and the depth of the terminal hole L. Also, the total range of the individual ranges of the cable shielding copper tape 34, the cable semiconducting layer 37, and the cable insulator 35 is 135 mm or more.
[0038]

30 Then, as illustrated in FIG. 5B, the cable sheath 33 is wiped clean with cable cleaning agent or the like for about 300 mm from the cut in the cable sheath 33. Then, as illustrated in FIG. 5C, the positioning tape 215 is wrapped around a position 40 mm on the cable sheath 33 side from the boundary surface 33A between the cable sheath 33 and the cable shielding copper tape 34. The position of covering with the elastic tube member 12 is determined by the position of the positioning tape 215, so the operation
35 of wrapping the positioning tape 215 is performed accurately.
[0039]

 Then, as illustrated in FIG. 5D, a grounding clamp 212 is attached at a position as close to the cable sheath 33 side as possible in a position where the cable shielding copper tape 34 is wrapped. At this

time, a grounding clamp lead 39 is installed. Then, as illustrated in FIG. 6A, the surface of the cable insulator 35 is wiped clean with cable cleaning agent or the like. At this time, the direction of cleaning is from the cable semiconducting layer 37 side to the cable conductor 38 side.

[0040]

5 Then, high dielectric constant tape 213 is wrapped as illustrated in FIG. 6B to prevent concentration of electric field in the cable connecting portion 21A. The high dielectric constant tape 213 is wrapped over a range of 50 mm from the end portion of the cable semiconducting layer 37 near the cable insulator 35 side to the cable insulator 35 side, starting from the end portion of the grounding clamp on the side near the cable insulator 35. The high dielectric constant tape 213 is wrapped forward and
10 backward with 1/2 overlap at 2/3 width. If the cable shielding copper tape 34 is peeled, correct it before wrapping with the high dielectric constant tape 213.

[0041]

Then, as illustrated in FIG. 6C, adhesive polyethylene tape 214 is wound 1/2 overlapping forward and backward from a position 30 mm in the direction of the positioning tape 215 from the
15 boundary surface 33A between the cable sheath 33 and the cable shielding copper tape 34, to a position that overlaps one turn onto the end portion of the high dielectric constant tape 213.

[0042]

Then, as illustrated in FIG. 6D, the covering tool 1 is placed over the cable. At this time, the direction of pulling out the core ribbon 111 is the cable conductor 38 side. Then, as illustrated in FIG. 6E,
20 the end 215A of the positioning tape 215 on the side nearest the cable conductor 38 and the tip 12A of the elastic tube member 12 are overlapped, so the covering tool 1 is positioned, and the cable and grip member 13 are gripped on the outside (the opposite side to the second end portion 11B when viewed from the first end portion 11A) of the first end portion 11A. At this time, the grip member 13 is gripped so that it is not bent, so that the core member 11 does not move during the pulling out operation. Then, the core
25 member 11 is gradually unwound from the first end portion 11A side by pulling out the core ribbon 111 in the cable conductor 38 direction. A mark for positioning the first end portion 11A or the second end portion 11B of the core member 11 or a mark for the position to grip the grip member 13 may be applied during the operation of applying the positioning tape 215 illustrated in FIG. 5C. By applying marks in this way, the positioning operation illustrated in FIG. 6E is further simplified.

30 [0043]

Then, as illustrated in FIG. 7A, the core member 11 is gradually unwound from the first end portion 11A side by pulling out the core ribbon 111 in the cable conductor 38 direction, and the elastic tube member 12 gradually covers the cable connecting portion 21A from the positioning tape 215 side. The whole core ribbon 111 is pulled out. Also, when a portion of the cable connecting portion 21A is
35 covered with the elastic tube member 12, the hand that is gripping the grip member 13 is released to prevent the reversal phenomenon as described above.

[0044]

Then, as illustrated in FIGS. 7B and 7C, a terminal 32a or 32b is attached to the cable conductor

38 using a predetermined tool. Then, as illustrated in FIG. 7D, the terminal 32a, the cable conductor 38, the cable insulator 35, and the elastic tube member 12 portions are wrapped in adhesive polyethylene tape 214a. Then, if a grounding process is necessary, the grounding process is carried out, and the process is completed as illustrated in FIG. 7E.

5 [0045]

Next, the action and effect of the covering tool 1 according to the present invention will be described.

[0046]

A covering tool configured as the covering tool 1 illustrated in FIG. 1 without the grip member 13 is explained as a comparative example. When covering the cable connecting portion 21A using the covering tool according to the comparative example, the operator pulls out the core ribbon 111 from the second end portion 11B side (the terminus end side where the core member 11 is pulled out as core ribbon 111) of the core member 11 with one hand. At this time, with the other hand, the operator supports the core member 11 and the cable at the second end portion 11B side of the core member 11, and it is necessary to pull out the core ribbon 111 while rotating the core member 11. The operation of rotating the core member 11 is an operation carried out so that the core ribbon 111 does not become entangled with the cable. Here, in order to avoid the core ribbon 111 and the cable from becoming entangled, besides the method of rotating the core member 11, a method of pulling out the core ribbon 111 while rotating the core ribbon 111 can be considered as a simpler method. However, if the core member 11 or the like is supported at the second end portion 11B side, which is the terminus end side for pulling out the core ribbon 111, the core ribbon 111 interferes with the hand supporting the core member 11 or the like, so it is not possible to pull out the core ribbon 111 while rotating it. Also, if the hand supporting the core member 11 or the like is at the first end portion 11A side (the starting end side for pulling out the core member 11 as core ribbon 111) of the core member 11, the direction for pulling out the core ribbon 111 and the side for supporting the core member 11 or the like become different, interference of the core ribbon 111 with the hand supporting the core member 11 or the like is not a problem. However, at the first end portion 11A side, the core member 11 is gradually unwound, so it is not possible to support the core member 11 or the like. Therefore, it was necessary for the operator to carry out the operation of rotating the core member 11 as described above.

30 [0047]

When carrying out the operation to rotate the core member 11 as described above, the operator supports the cable with their little finger and ring finger, and rotate the core member 11 while gripping the exposed portion 11D of the core member 11 with their thumb and index finger. This rotation operation took time for an operator that was not familiar with it. In particular, when carrying out this operation in a narrow dark environment, the operability is further affected. Also, the operation of pulling out the core ribbon 111 while rotating the core member 11 requires more operation time compared with the case where the core ribbon 111 is rotated while pulling it out. Also, during the operation of rotating the core member 11, the hand supporting the core member 11 and the cable is not stable, and deviation in position

sometimes occurs while rotating the core member 11, so depending on the operator, time and effort was required for accurately positioning relative to the cable connecting portion.

[0048]

On the other hand, with the covering tool 1 according to the present embodiment, it is possible to pull out the core member 11 along the continuous spiral groove 110 from the first end portion 11A side as core ribbon 111, and the long grip member 13 is attached to the second end portion 11B side of the core member 11. With this configuration, the cable connecting portion 21A passes through the inside of the core member 11, the long grip member 13 extends to the first end portion 11A side of the core member 11 and is gripped together with the cable, so it is possible to pull out the core ribbon 111 through the inside of the core member 11 from the second end portion 11B side. The grip member 13 is attached to the second end portion 11B side which becomes the terminus end side for pulling out the core ribbon 111, so even though unwinding of the core member 11 progresses, it is possible to maintain the state of support of the core member 11 with the grip member 13.

[0049]

In this way, by gripping the grip member 13, it is possible to support the core member 11 at the first end portion 11A side, which is the side opposite to the second end portion 11B side where the core ribbon 111 is pulled out. By supporting the core member 11 while gripping the grip member 13, the problem of interference between the hand supporting the core member 11 at the second end portion 11B side and the core ribbon 111 does not occur, as in the conventional method. Therefore, it is possible to adopt the method of pulling out by rotating the core ribbon 111, as a method of avoiding entangling the core ribbon 111 and the cable. In this way, it is possible to support the core member 11 and the cable simply with one hand. Also, once the position of the core member 11 is determined and the grip member 13 is gripped, it is possible to reduce positional deviation of the core member 11 due to rotation and so on during unwinding. Therefore, it is possible to simply and accurately determine the position with respect to the cable connecting portion 21A. Also, it is possible to simply carry out this series of operations using the grip member 13 regardless of the skill of the operator. As a result of the above, it is possible to improve the operability of the process of covering the cable connecting portion 21A.

[0050]

Also, by attaching the grip member 13 fixed to the second end portion 11B, it is not necessary to attach the grip member 13 every time when the operator carries out the operation, so the operability is improved.

[0051]

Also, the grip member 13 is in strip form, so it is possible to more easily grip the grip member 13.

[0052]

The present invention is not limited to the above described embodiments, but includes modifications which do not depart from the spirit of the present invention.

[0053]

For example, in the embodiment as described above, the grip member 13 was described as being in strip form, but a sheet-like grip member 72 as illustrated in a covering tool 71 in FIG. 9 may be used. The first end 130 of the sheet-like grip member 72 is attached at the second end portion 11B side of the core member 11, and the other end is a free end that is not fixed. The first end 130 of the grip member 72 is installed fixed by applying adhesive tape or the like at the inner circumferential surface near the second end portion 11B of the core member 11. The material of the grip member 72 maybe the same material used in the core member 11, and a material such as nylon, vinyl, polypropylene, polyethylene, and the like may be used. By making the grip member 72 sheet-like, it is possible to widen the portion where the grip member 72 is gripped. In addition, it is possible to prevent soiling or damage of the elastic tube during storage, transport, and construction.

[0054]

Also, in the embodiment as described above, the grip member 13 was installed fixed at the second end portion 11B side, but a grip member 52 that has the ability to be attached to and detached from the second end portion 11B of the core member 11, as illustrated in the covering tool 51 in FIG. 8A, may be used. The grip member 52 that has the ability to be attached and detached is fixed to the core member 11 by attaching the first end 130 that has a groove portion to the second end portion 11B of the core member 11. The first end 130 of the grip member 52 may be made using the material same as the grip member 52, or a different material may be used. When the grip member 52 with the ability to be attached and detached is attached to the second end portion 11B, it is possible to simplify manufacture and to simplify the structure of the covering tool during distribution by being able to attach and detach the grip member 52.

[0055]

Also, the first end 130 of a grip member 62 may be attached sandwiched between the elastic tube member 12 and the core member 11 at the first end portion 11A side of the core member 11 as in the covering tool 61 illustrated in FIG. 8B. By configuring the tool in this way, by pulling out the core ribbon 111, the core member 11 is unwound from the first end portion 11A side, and the elastic tube member 12 that is maintained in an enlarged diameter state by the core member 11 contracts, and when the diameter reduces, the grip member 62 that is attached so that it is sandwiched between the elastic tube member 12 and the core member 11 becomes sandwiched between the elastic tube member 12 and the cable. The grip member 62 that is sandwiched between the elastic tube member 12 and the cable can be removed by pulling it out after the core ribbon 111. Therefore, using the covering tool 61, it is possible to obtain a covering tool with a simpler structure. In other words, the grip member 62 is attached at the first end portion 11A side which is the gripping side, so compared with the case in which the grip member 62 is attached to the second end portion 11B side, the grip member 62 can be made shorter, and it is possible to reduce the material cost.

[0056]

Also, the grip member 13 can be made in strip form or sheet-like form, but this is not a limitation, for example, it may be in plate form, and in this case, it is possible to increase the strength of

the grip member 13.

[0057]

Also, the core member 11 is formed by, for example, rotating the core ribbon 111 into a spiral, but the method of forming is not limited to this, and any method of forming may be used provided that, after forming, the core member 11 is unwound from the second end when the core ribbon 111 is pulled out from the first end. Also, it is not necessary that the core member 11, which is a hollow tubular member, has a uniform diameter from the first end portion to the second end portion, for example, an intermediate portion may be formed as partially tapering, to provide a core member in which at a first end the diameter is small and at a second end the diameter is large.

[0058]

Also, the unwinding line of the core member 11 may be provided in an SZ form so that it gradually progresses in the longitudinal axial direction while rotating and reversing, as in the covering tool 91 illustrated in FIG. 10 (SZ form unwinding line 210). When the unwinding line is an SZ form unwinding line 210, the problem of entangling the core ribbon 111 and the cable when pulling out the core ribbon 111 does not occur. Therefore, it is not necessary to rotate the core ribbon 111 while pulling it out, so the operability is further improved. When the SZ form unwinding line 210 is adopted as the unwinding line, it is possible to reduce shift in position of the core member 11 during unwinding by gripping the grip member 13, so it is possible to simply carry out accurate positioning.

What is Claimed is:

1. A covering tool for covering a cable connecting portion, comprising:
a hollow tubular core member having an unwinding line formed on a wall surface thereof; and
5 an elastic tube member that is maintained in an enlarged diameter state on an outer periphery side of the core member;
the unwinding line being provided so as to gradually progress in a longitudinal axial direction of the core member while looping around, or looping around and reversing around, the longitudinal axis of the core member;
10 the core member being able to be pulled out along the unwinding line as a cord-like body, the core member including a first end portion that is a starting end side for pulling out the cord-like body, and a second end portion that is a terminus end side, a long grip member being attached to the second end portion side of the core member.
- 15 2. The covering tool according to claim 1, wherein the grip member is fixed and attached to the second end portion side.
3. The covering tool according to claim 1, wherein the grip member is removably attached to the second end portion side.
- 20 4. The covering tool according to any one of claims 1 to 3, wherein the grip member has a strip form.
5. The covering tool according to any one of claims 1 to 3, wherein the grip member has a sheet form.
- 25 6. A method of covering a cable connecting portion using a covering tool that includes a hollow tubular core member having an unwinding line formed on a wall surface thereof, and that can be pulled out along the unwinding line as a cord-like body, and
30 an elastic tube member that is maintained in an enlarged diameter state on an outer periphery side of the core member,
the unwinding line being provided so as to gradually progress in a longitudinal axial direction of the core member while looping around, or looping around and reversing around, the longitudinal axis of the core member,
35 the method comprising the steps of:
placing the core member on the cable connecting portion;
gripping, at a first end portion side that is a starting end side where the core member is pulled out along the unwinding line as the cord-like body, a long grip member, which is attached to a second end

portion side that is a terminus end side for pulling out as the cord-like body, and a cable; and
pulling out the cord-like body through an inner side of the core member from the second end
portion side, in a state where the grip member and the cable are gripped together.

- 5 7. The method of covering a cable connecting portion according to claim 6, further comprising a
step of attaching the grip member to the second end portion side.

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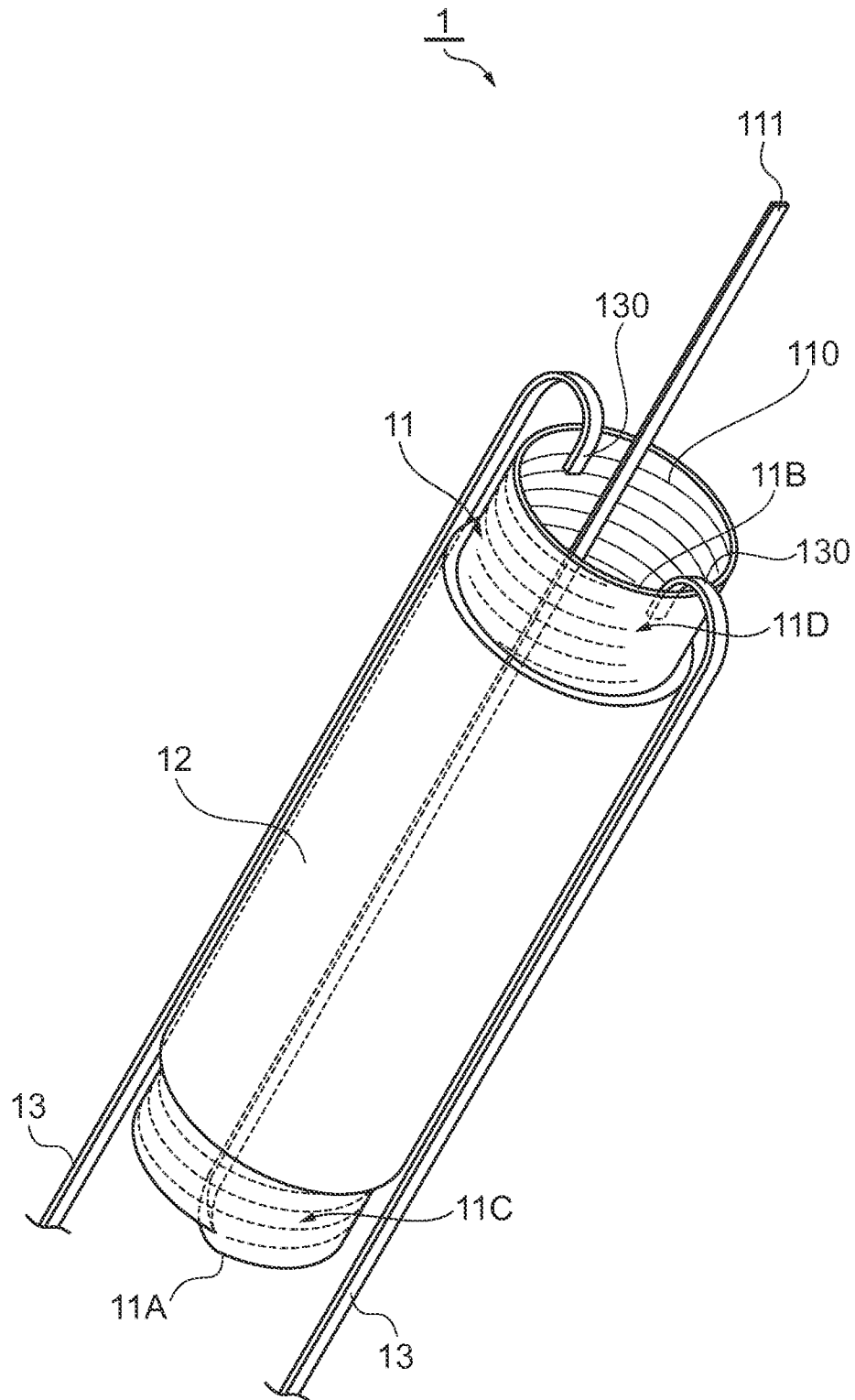


FIG. 1

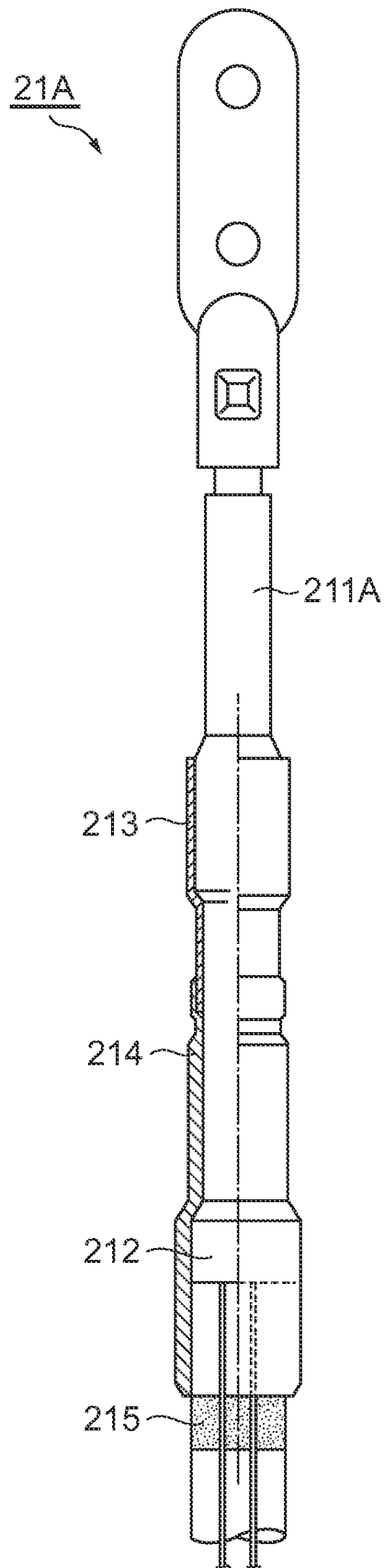


FIG. 2a

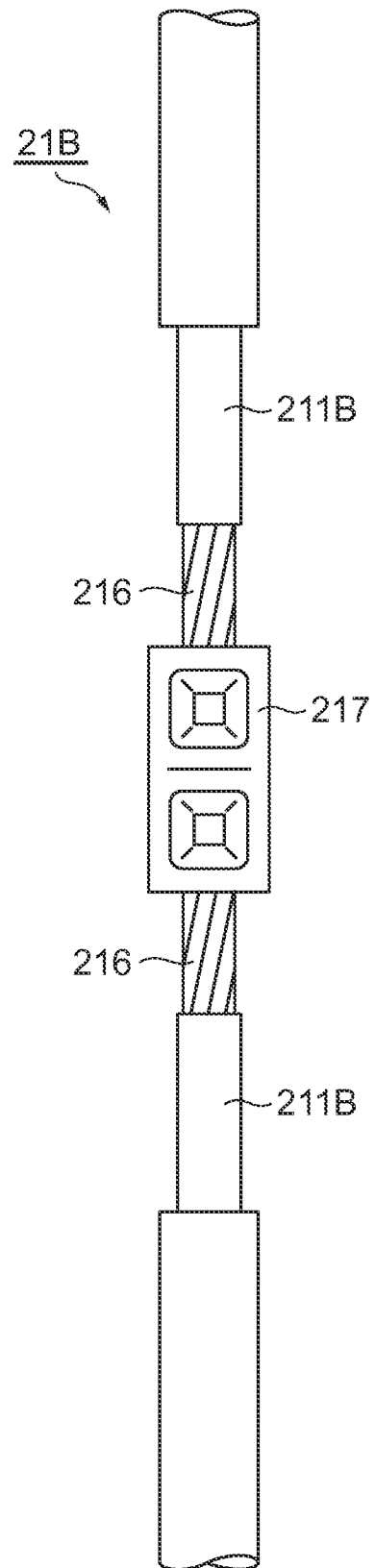


FIG. 2b

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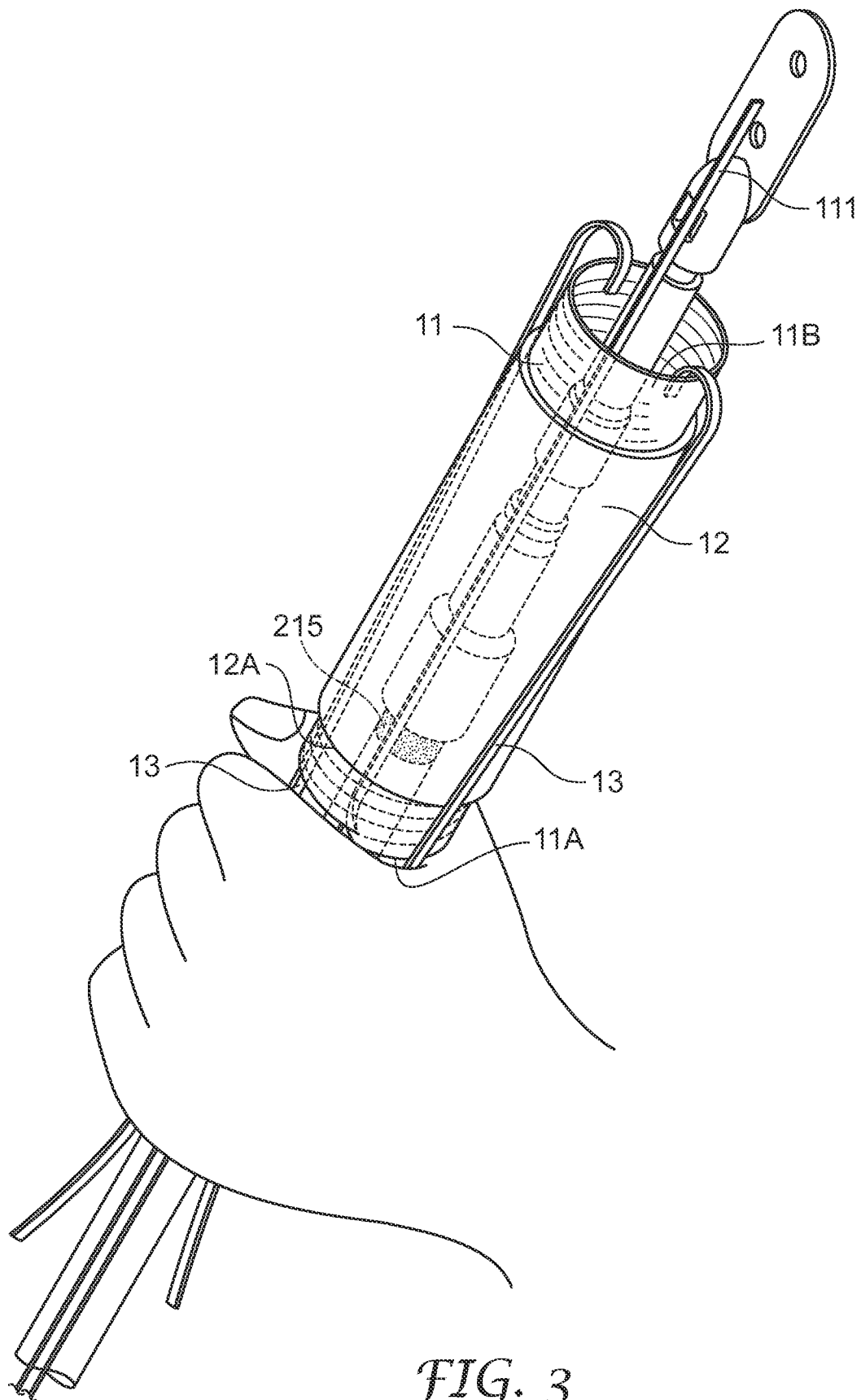


FIG. 3

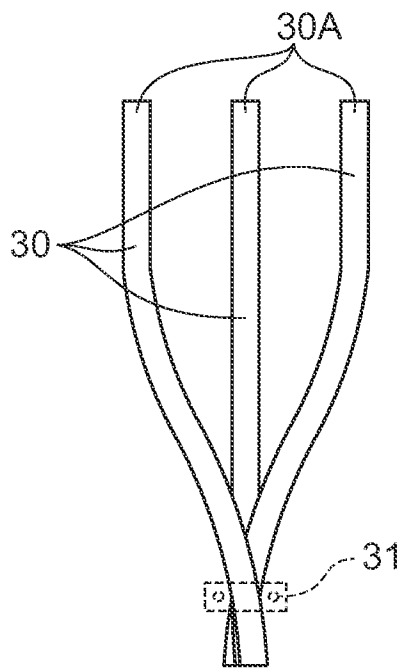


FIG. 4a

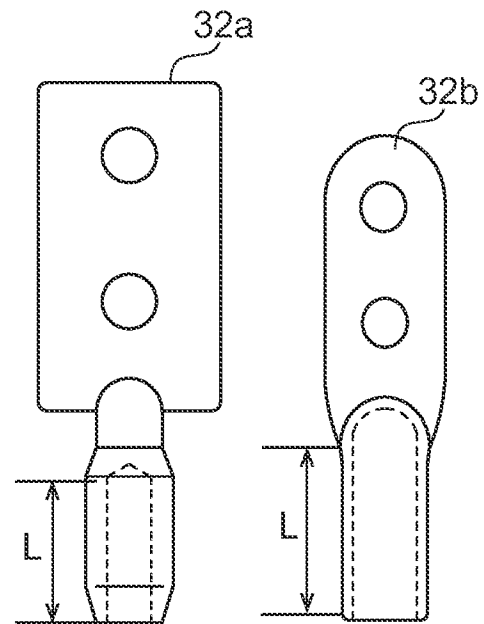


FIG. 4b

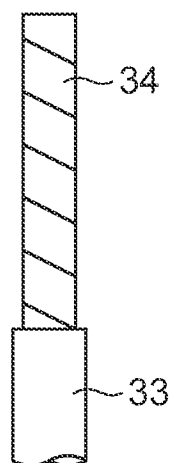


FIG. 4c

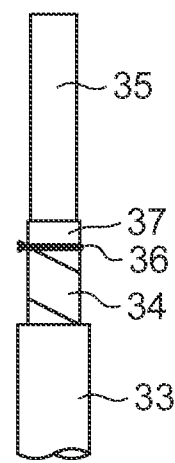


FIG. 4d

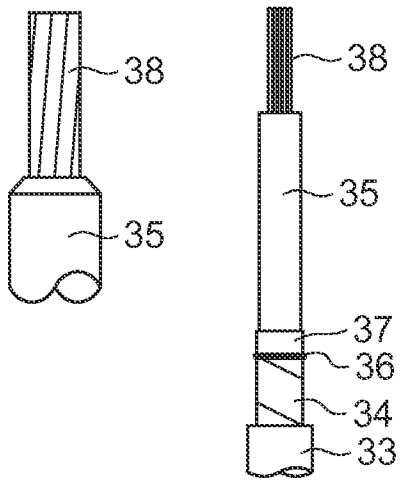


FIG. 5a

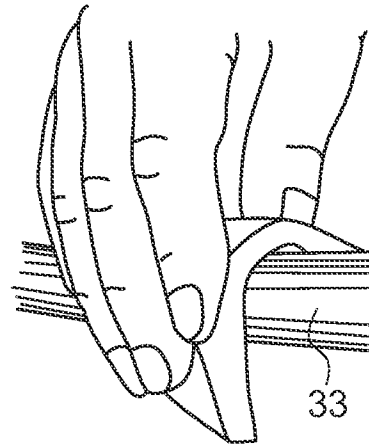


FIG. 5b

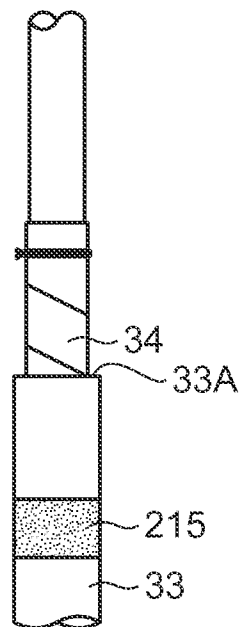


FIG. 5c

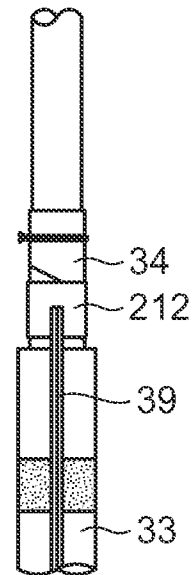


FIG. 5d

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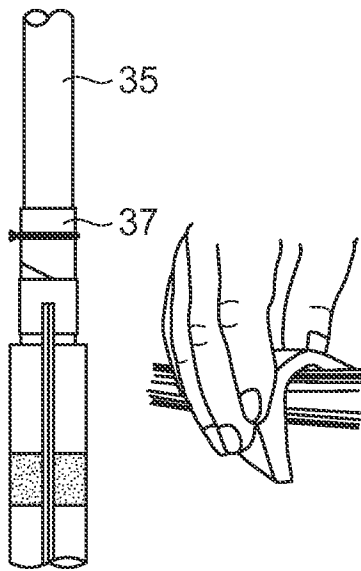


FIG. 6a

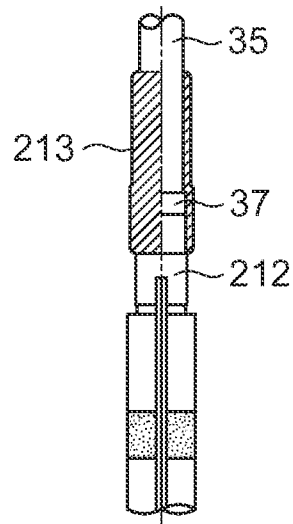


FIG. 6b

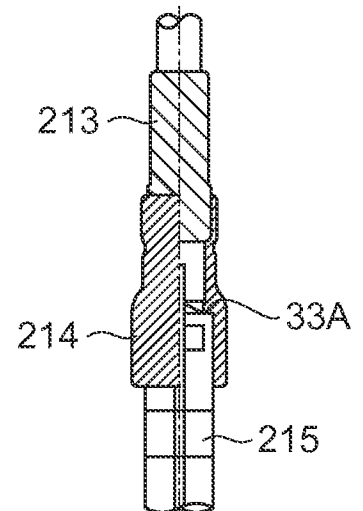


FIG. 6c

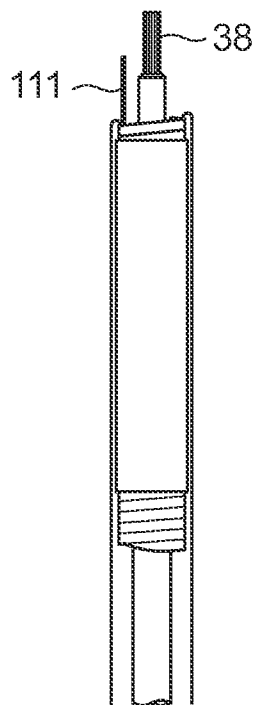


FIG. 6d

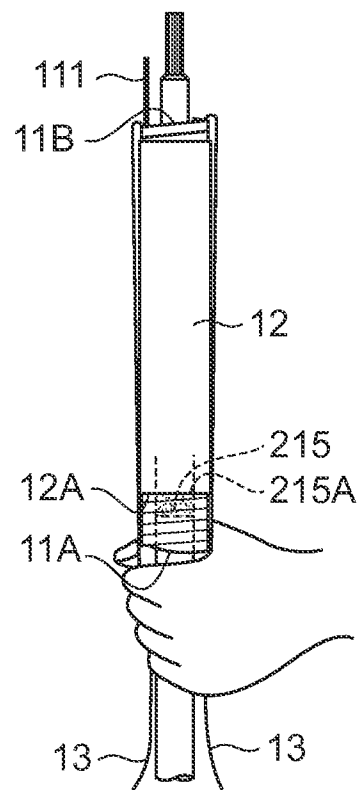


FIG. 6e

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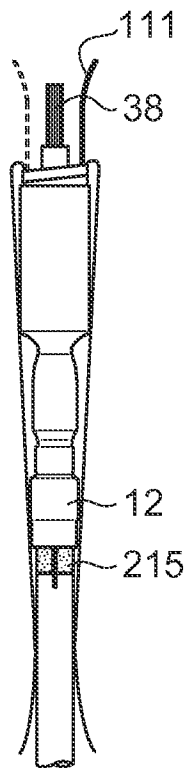


FIG. 7a

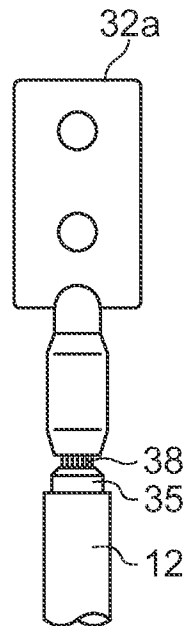


FIG. 7b

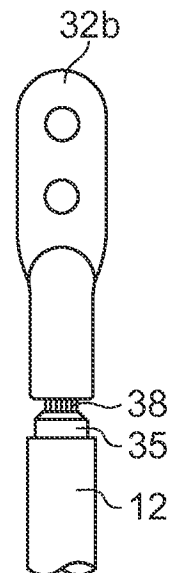


FIG. 7c

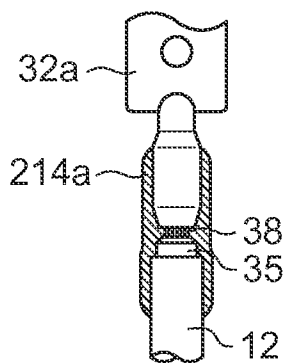


FIG. 7d

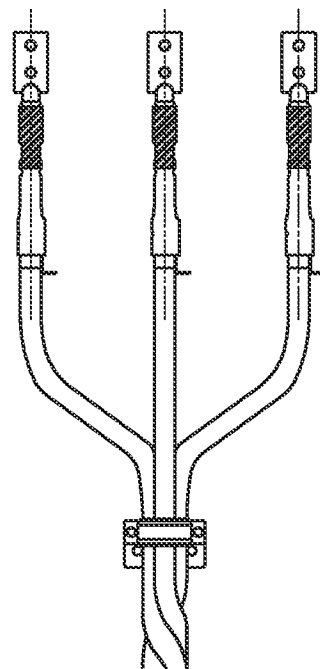


FIG. 7e

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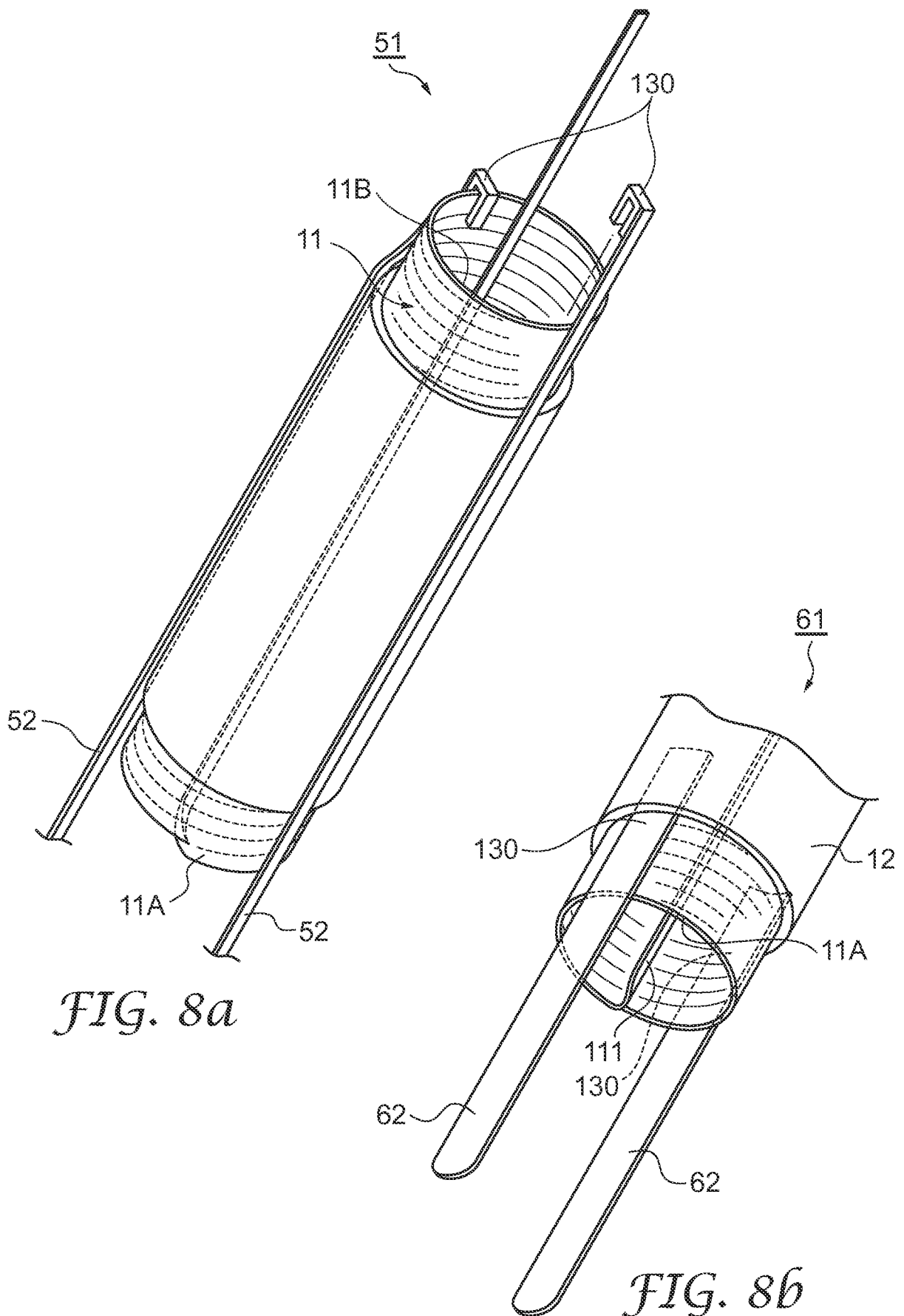


FIG. 8a

FIG. 8b

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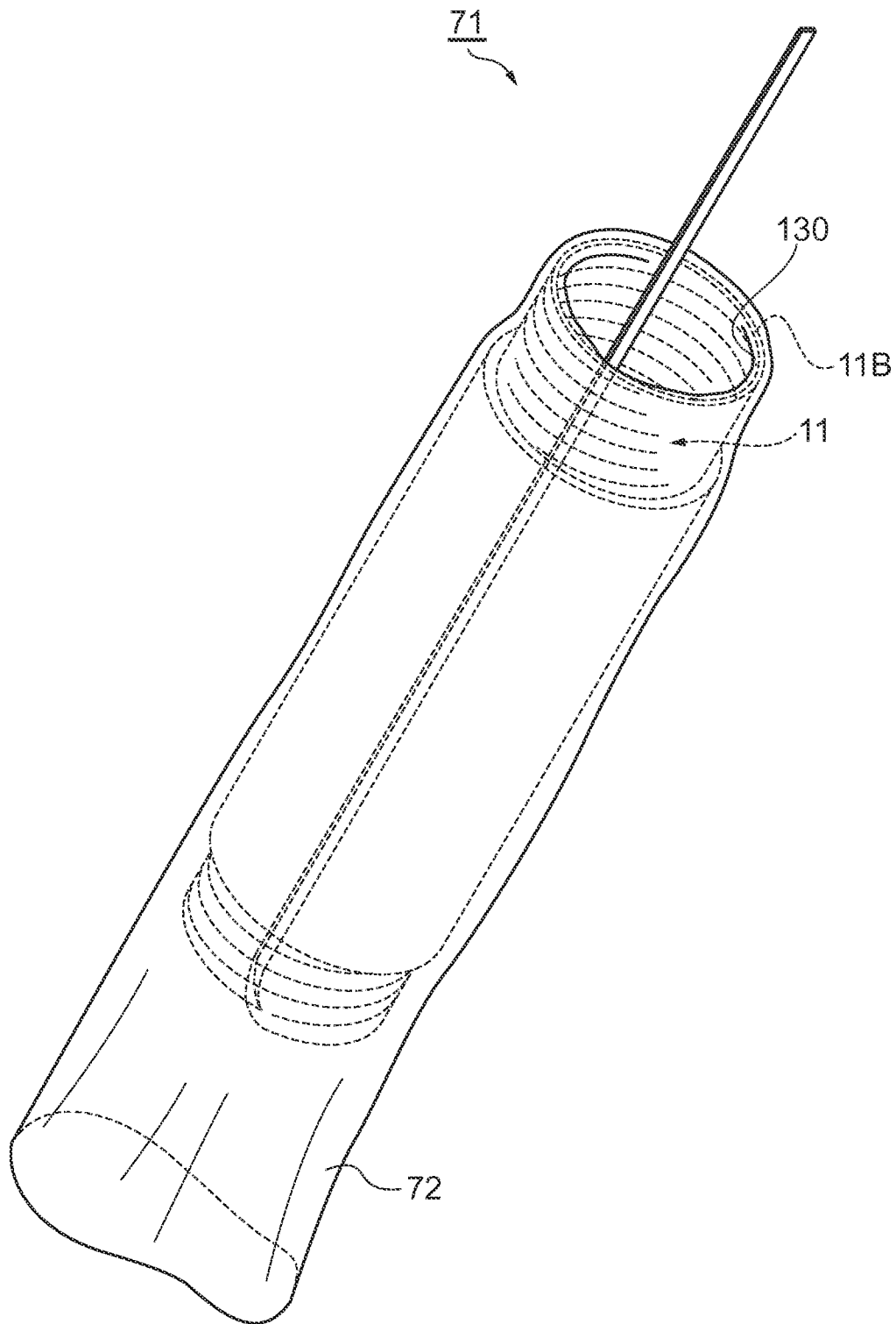


FIG. 9

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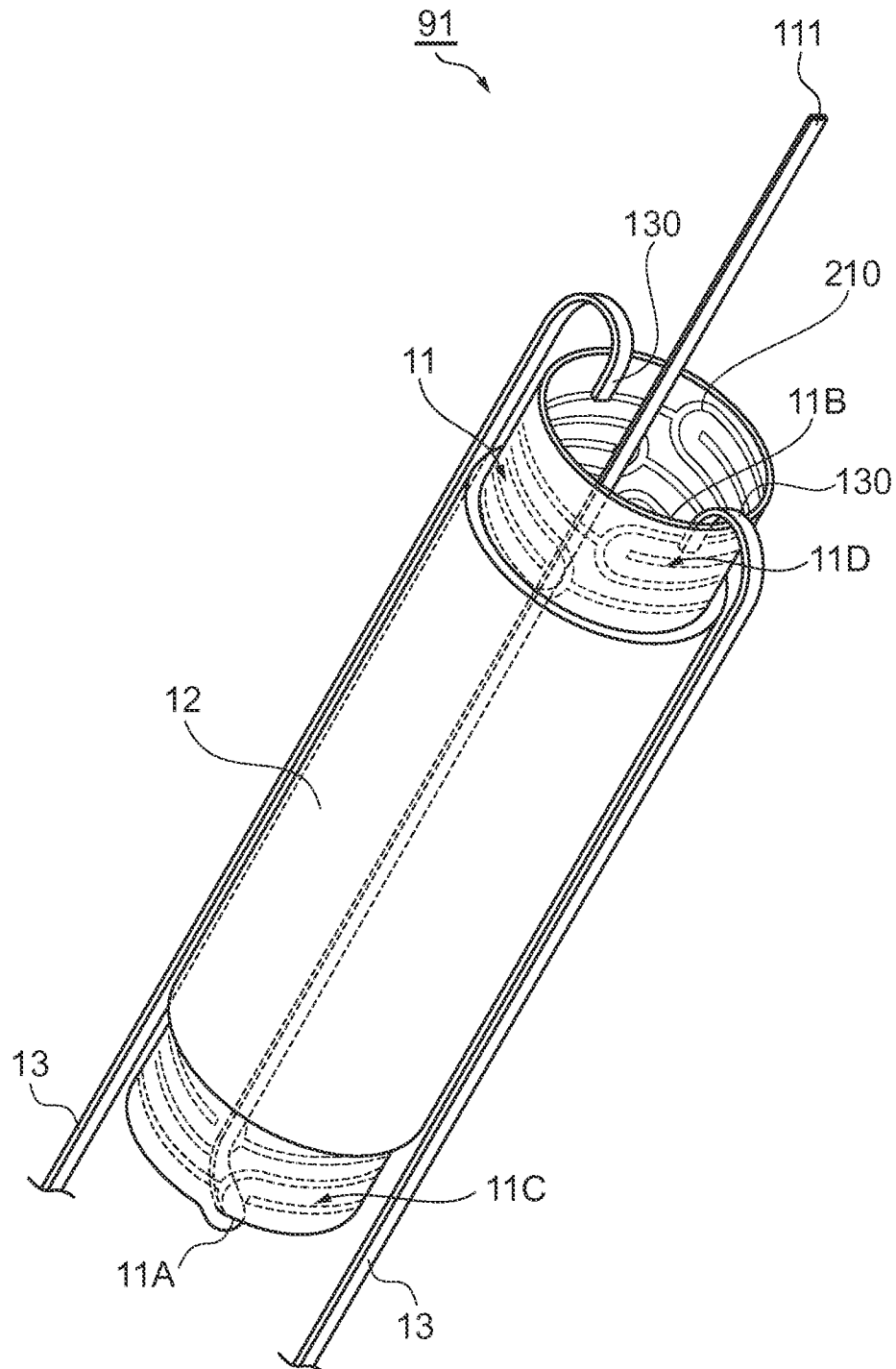


FIG. 10

A. CLASSIFICATION OF SUBJECT MATTER**H01B 7/18(2006.01)i**

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)

H01B 7/18; H01B 17/56; H01B 7/00; H02G 3/04; H01B 9/02; F02P 15/00; B23P 19/02; H01B 17/58; H01R 4/70; H01B 3/44; H01B 17/54

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: hollow tube, core, cable, elastic, long grip member

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4389440 A (ROGER H. KEITH) 21 June 1983 See abstract, column 1, lines 55-67, column 2, lines 1-7, column 3, lines 10-28 and figures 1-3.	1-7
A	JP 10-064607 A (NIPPON KOUATSU ELECTRIC CO.) 06 March 1998 See abstract, paragraphs [0002]-[0004] and figures 10,11.	1-7
A	JP 2002-343167 A (3M INNOVATIVE PROPERTIES COMPANY) 29 November 2002 See abstract, paragraphs [0036]-[0042] and figures 2,5.	1-7
A	US 2009-0283294 A1 (RUDOLF ROBERT BUKOVNIK) 19 November 2009 See abstract, paragraphs [0036]-[0044] and figures 1-7.	1-7
A	US 2006-0180111 A1 (CHARLES T. FLEETWOOD) 17 August 2006 See abstract, paragraphs [0011]-[0018] and figures 2A,2B.	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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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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 such 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

07 January 2014 (07.01.2014)

Date of mailing of the international search report

08 January 2014 (08.01.2014)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2013/060905

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