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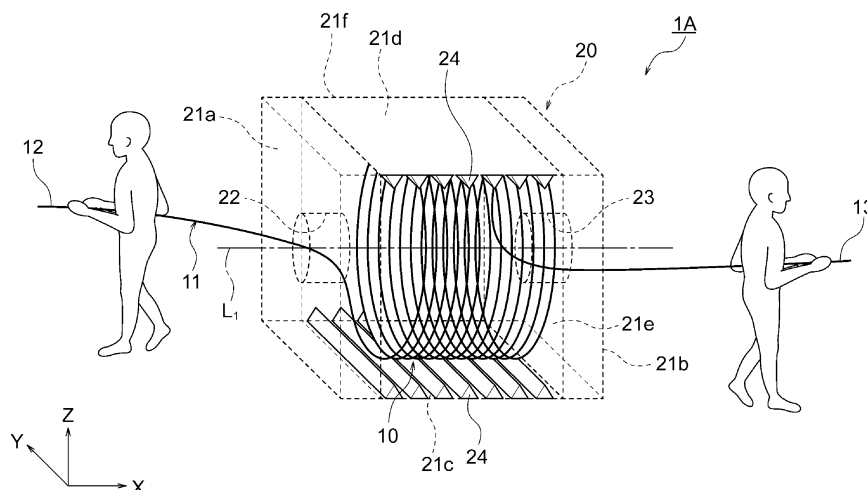
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(54) **CABLE ACCOMMODATING BODY**

(57) A cable accommodating body 1A includes: a cable bundle 10 that is formed by winding a cable 11 and has no winding core; and a container 20 that accom-

modates the cable bundle, and the container 20 has first and second outlets 22 and 23 through which the cable 11 is pulled out from the inside of the container 20.

Fig. 1



Description**[TECHNICAL FIELD]**

[0001] The present invention relates to a cable accom- 5
modating body in which a cable bundle is accommodated
in a container.

[0002] For designated countries that are permitted to
be incorporated by reference in the literature, the con- 10
tents of Patent Application No. 2022-22471 filed with
Japan Patent Office on February 16, 2022 is incorporated
herein by reference and is regarded as a part of the
description of this specification.

[BACKGROUND ART] 15

[0003] As an air blown optical cable installing method
for increasing a feeding distance of an optical cable unit,
for example, a method described in Patent Document 1 is
known. In this method, first, a reel in which both end side 20
parts of the optical fiber unit are simultaneously wound
while the intermediate part of the optical fiber unit is fixed
to the cylinder is prepared. Next, the reel is disposed
between two pipes laid in advance, and the reel is rotated
to feed both end side parts of the optical fiber unit into two 25
pipes.

[CITATION LIST]**[PATENT DOCUMENT]** 30

[0004] PATENT DOCUMENT 1: JP H10-45322 A1

[SUMMARY OF THE INVENTION] 35**[Problems to be solved by Invention]**

[0005] In the above-described method, one of both end
side parts of the optical fiber unit is unwound from the
upper side of the reel and is fed into one pipe, and the 40
other of both end side parts of the optical fiber unit is
unwound from the lower side of the reel and fed into the
other pipe. In this way, since both end side parts of the
optical fiber unit are simultaneously unwound in the
above-described method, it is necessary to prepare 45
two jetting machines, and it is necessary to synchronize
the feeding operation into the two pipes.

[0006] The problem to be solved by the present inven- 50
tion is to provide a cable accommodating body capable of
independently unwinding both ends of a cable from a
cable bundle.

[MEANS FOR SOLVING PROBLEM]**[0007]** 55

[1] A cable accommodating body according to the
present invention is a cable accommodating body

comprising: a cable bundle that is formed by winding
a cable and has no winding core; and a first container
that accommodates the cable bundle, wherein the
first container has a first outlet and a second outlet
through which the cable is pulled out from an inside of
the first container.

[2] In the above invention, the cable may be a single
continuous cable.

[3] In the above invention, a first end side of the
optical fiber cable may pass through the first outlet,
and a second end side of the optical fiber cable may
pass through the second outlet.

[4] In the above invention, the first container may
comprise a first plane and a second plane that are
substantially perpendicular to a winding axial direc-
tion of the cable bundle and are opposite to each
other, the first outlet may be formed in the first plane,
and the second outlet may be formed in the second
plane.

[5] In the above invention, the first container may
comprise a convex part or an inclined surface that is
disposed on a plane substantially parallel to the
winding axial direction of the cable bundle and con-
tacts the cable bundle.

[6] In the above invention, the cable accommodating
body may comprise the cable bundles connected
together.

[7] In the above invention, the cable bundles may be
continuously connected together by a single cable.

[8] In the above invention, the first container may
comprise a partition plate that partitions an inner
space of the first container into accommodating
rooms, and the cable bundles may be individually
accommodated in the accommodating rooms.

[9] In the above invention, the cable accommodating
body may comprise the first containers that indivi-
dually accommodate the cable bundles.

[10] In the above invention, the first containers may
be stacked on each other so that winding axial direc-
tion of the cable bundles is in the vertical direction.

[11] In the above invention, the first containers may
include an upper container and a lower container that
are stacked on each other, the upper container and
the lower container may be stacked to be out of
alignment, and the first outlet or the second outlet
of the lower container may be exposed from the
upper container.

[12] In the above invention, the cable accommodat-
ing body may comprise a second container that
accommodates the first containers, and the second
container may have a third outlet and a fourth outlet
through which the cable is pulled out from an inside of
the second container.

[13] In the above invention, the first end side of the
optical fiber cable may pass through the third outlet,
and the second end side of the optical fiber cable
may pass through the fourth outlet.

[14] In the above invention, the cable bundles may

include: a first cable bundle having a first inner diameter; and a second cable bundle having a first outer diameter smaller than the first inner diameter, and the second cable bundle may be accommodated inside the first cable bundle.

[15] A method of installing a cable according to the present invention is a method of installing a cable comprising: a first step of preparing a first duct and a second duct; a second step of preparing the cable accommodating body; a third step of pulling out the cable through the first outlet and inserting the cable into the first duct; and a fourth step of pulling out the cable through the second outlet and inserting the cable into the second duct.

[16] In the above invention, the first step may comprise disposing the first duct and the second duct.

[EFFECT OF THE INVENTION]

[0008] According to the present invention, since the cable bundle has no winding core and the first container accommodating the cable bundle has the first and second outlets through which the cable is pulled out from the inside of the first container, it is possible to independently unwind both ends of the cable from the cable bundle.

[BRIEF DESCRIPTION OF DRAWING(S)]

[0009]

FIG. 1 is a transparent perspective view showing a cable accommodating body in the first embodiment of the present invention.

FIG. 2(a) to FIG. 2(d) are transparent perspective views showing the first to fourth modifications of the cable accommodating body in the first embodiment of the present invention.

FIG. 3 is a cross-sectional view showing the fifth modification of the cable accommodating body viewed from the side in the first embodiment of the present invention.

FIG. 4(a) to FIG. 4(d) are diagrams showing a cable installing method in the first embodiment of the present invention.

FIG. 5(a) is a cross-sectional view showing a cable accommodating body viewed from the side in the second embodiment of the present invention, and FIG. 5(b) is a cross-sectional view taken along VB-VB of FIG. 5(a).

FIG. 6(a) to FIG. 6(c) are diagrams showing a winding method of a cable bundle in the second embodiment of the present invention.

FIG. 7(a) is a cross-sectional view showing a cable accommodating body viewed from the side in the third embodiment of the present invention, and FIG. 7(b) is a diagram showing a state in which the inner containers shown in FIG. 7(a) are taken out from the outer container.

FIG. 8 is a cross-sectional view showing a cable accommodating body viewed from the side in the fourth embodiment of the present invention.

FIG. 9 is a transparent perspective view showing a cable accommodating body in the fifth embodiment of the present invention.

[MODE(S) FOR CARRYING OUT THE INVENTION]

[0010] Hereinafter, the embodiments of the present invention will be described with reference to the drawings.

<<First Embodiment>>

[0011] FIG. 1 is a transparent perspective view showing a cable accommodating body in the first embodiment of the present invention. In FIG. 1 and FIG. 2(a) to FIG. 2(d) described later, a part of the container 20 or the entire container 20 is shown transparently in order to facilitate understanding of the inside of the container 20.

[0012] As shown in FIG. 1, the cable accommodating body 1A of the present embodiment includes a cable bundle 10 and a container 20 that accommodates the cable bundle 10. The cable accommodating body 1A is used, for example, for the transporting work to the installation site and the installing work itself at the time of the installing construction of the cable 11.

[0013] The cable bundle 10 is formed by winding a single continuous cable 11 in an annular shape (coil shape). In the present embodiment, the cable 11 constituting the cable bundle 10 has no connection points between one end (first end) 12 and the other end (second end) 13. The single continuous cable 11 may be configured by connecting a plurality of cables, for example, by fusion bonding, connectors, or the like. That is, as long as the cable is continuously connected without being divided between the one end 12 and the other end 13, the "single continuous cable 11" in the present embodiment may have no connection point between the ends 12 and 13 or may have one or more connection points between the ends 12 and 13. Although an optical fiber cable can be exemplified as a specific example of the cable 11, the cable 11 is not particularly limited thereto. For example, a metal cable for power transmission, communication, or a combination of these may be used as the cable 11.

[0014] As an example of the method of winding the cable 11 when forming the cable bundle 10, a traverse winding can be exemplified. The method of winding the cable 11 is not particularly limited to the above, and the cable bundle 10 may be configured by winding the cable 11 using other winding methods such as a figure-8 (eight) winding. For example, the cable 11 may be wound to form the cable bundle 10 while applying the opposite twist in the direction opposite to the twist at the time of unwinding of the cable 11 every time one winding of the cable 11 by the winding method as described in JP Utility Model

Registration No. 3035145 and JP2000-255659A.

[0015] The cable bundle 10 of the present embodiment is formed, for example, by winding the cable 11 using a parasol drum type winding device. In the winding device of this type, the completed cable bundle 10 is removed from the winding device by contracting the parasol drum after the winding of the cable 11. Therefore, the cable bundle 10 of the present embodiment has a so-called drumless structure in which the cable bundle 10 has no winding core such as a drum or a reel. As long as the cable bundle 10 does not have a winding core, the cable bundle 10 may be formed using a winding device of a type other than the parasol drum type described above.

[0016] In the present embodiment, since the cable bundle 10 has no winding core, the first end 12 of the cable 11 and the second end 13 of the cable 11 can be simultaneously unwound from the cable bundle 10. That is, it is possible to be simultaneously unwind both ends 12 and 13 of the cable 11 from the cable bundle 10 in the present embodiment. On the other hand, if the cable bundle is wound around the drum, the end on the winding end side (E end, for example, one end) can be unwound from the cable bundle, but the end on the winding start side (S end, for example, the other end) cannot be unwound from the cable bundle because the end on the winding start side is fixed to the drum.

[0017] Further, in the present embodiment, since the cable bundle 10 has no winding core, it is not necessary to rotate the cable bundle 10 itself when unwinding the cable 11, and it is possible to independently unwind both ends 12 and 13 of the cable 11 from the cable bundle 10. On the other hand, in the method described in Patent Document 1 described above, since it is necessary to simultaneously unwind both ends of the cable with the rotation of the reel, it is impossible to independently unwind both ends of the cable.

[0018] The container 20 is, for example, a box having six planes 21a to 21f and accommodates the cable bundle 10 described above therein. The shape of the container 20 is not particularly limited to the above as long as the container 20 has a space that can accommodate the cable bundle 10. For example, the container 20 may have cylindrical shape. By accommodating the cable bundle 10 in such a container 20, it is possible to easily transport the cable bundle 10 and to suppress the occurrence of collapse of the cable bundle 10.

[0019] In the present embodiment, the cable bundle 10 is accommodated in the container 20 in a horizontal posture, and the cable bundle 10 is disposed in the container 20 with a posture (i.e., "horizontal posture") in which the winding axial L_1 of the cable bundle 10 is substantially parallel to the horizontal direction (XY plane direction in the drawing). In this way, by accommodating the cable bundle 10 in the container 20 in the horizontal posture, it is possible to suppress the occurrence of kinking in the cable 11 due to the weight of the cable bundle 10 or the like. In the second to fifth embodiments described later, the cable bundle 10 may be accommo-

dated in the container in the horizontal posture.

[0020] Although not particularly limited, for example, the container 20 is formed using cardboard made of paper. For example, the container 20 may be formed using a plastic cardboard made of a resin material such as polypropylene (PP), or the container 20 may be formed using a metallic box.

[0021] As shown in FIG. 1, the container 20 of the present embodiment has two outlets 22 and 23. The first outlet 22 is formed in a first plane 21a that is the left side plane of the box in FIG. 1. The first outlet 22 penetrates the first plane 21a in the thickness direction of the first plane 21a. On the other hand, the second outlet 23 is formed in the second plane 21b that is the right side plane of the box in FIG. 1. The second outlet 23 also penetrates the second plane 21b in the thickness direction of the second plane 21b.

[0022] Both of the first and second planes 21a and 21b are substantially perpendicular to the winding axial direction L_1 of the cable bundle 10, and the first and second outlets 22 and 23 are respectively formed in the first and second planes 21a and 21b that are opposite to each other. The cable 11 is pulled out from the container 20 through the first outlet 22, and the first end 12 side of the cable 11 passes through the first outlet 22. On the other hand, the cable 11 is also pulled out from the container 20 through the second outlet 23, and the second end 13 side of the cable 11 passes through the second outlet 23.

[0023] The posture of the cable bundle 10 in the container 20 and the planes in which the first and second outlets 22 and 23 are formed are not particularly limited to the above. FIG. 2(a) to FIG. 2(d) are transparent perspective views showing the first to fourth modifications of the cable accommodating body in the first embodiment of the present invention.

[0024] For example, as shown in FIG. 2(a), the cable accommodating body 1A shown in FIG. 1 may be used with being rotated 90 degrees clockwise. In this case, since the first plane 21a is the lid plane of the box in the drawing and the second plane 21b is the bottom plane of the box in the drawing, the first outlet 22 is located above the cable bundle 10 and the second outlet 23 is located below the cable bundle 10. Further, the cable bundle 10 is accommodated in the container 20 in a vertical posture, the cable bundle 10 is disposed in the container 20 with a posture (i.e., "vertical posture") in which the winding axial direction L_1 of the cable bundle 10 is substantially parallel to the vertical direction (Z direction in the drawing).

[0025] Alternatively, as shown in FIG. 2(b), the first and second outlets 22 and 23 may be formed in the third and fourth planes 21c and 21d. Alternatively, as shown in FIG. 2(c), the first outlet 22 may be formed in the first plane 21a, and the second outlet 23 may be formed in the fourth plane 21d. Alternatively, as shown in FIG. 2(d), both the first and second outlets 22 and 23 may be formed in the same plane 21a. In FIG. 2(a) to FIG. 2(d), the third and fourth planes 21c and 21d are the side planes of the box in the drawing. Although the third plane 21c and the fourth

plane 21d are opposite to each other in FIG. 2(b), it is not particularly limited thereto. For example, the third plane 21c and the fourth plane 21d may be planes adjacent to each other.

[0026] In the second and fifth embodiments, the first and second outlets 22 and 23 may be formed in the planes shown in FIG. 2(a) to FIG. 2(c). Alternatively, in the third and fourth embodiments, the first and second outlets 22 and 23 may be formed in the planes shown in FIG. 2(b) to FIG. 2(d).

[0027] Returning to FIG. 1, the container 20 of the present embodiment may have protrusions 24 on the inner wall of the container 20. Each of the protrusions 24 has a triangular cross-sectional shape and extends in a direction (Y direction in the drawing) substantially perpendicular to the winding axis L_1 of the cable bundle 10. Each of the protrusions 24 is formed of, for example, a cardboard having an L-shaped cross-sectional shape and is formed by being attached to the inner surface of the container 20. The cross-sectional shape of the protrusion 24 is not particularly limited to the above as long as it protrudes in a convex shape and may be, for example, a rectangular shape or an arc shape. The protrusion 24 may be formed of a plastic cardboard or a metal member instead of a cardboard made of paper.

[0028] The protrusions 24 is disposed on the third and fourth planes 21c and 21d connecting the first plane 21a and the second plane 21b described above. The protrusions 24 are disposed on the inner surface of the third plane 21c and are disposed on the inner surface of the fourth plane 21d. The third plane 21c is the bottom plane of the box in FIG. 1, while the fourth plane 21d is the lid plane of the box in FIG. 1. The protrusions 24 are arranged in parallel to each other on the upper surface (inner surface) of the third plane 21c to form a wave-shaped structure. Similarly, the protrusions 24 are arranged in parallel to each other on the lower surface (inner surface) of the fourth plane 21d to form a wave-shaped structure. The number of protrusions 24 disposed on one plane is not particularly limited and may be arbitrarily set.

[0029] By forming such a wave-shaped structure consisting of the protrusions 24 on the planes 21c and 21d substantially parallel to the axial direction L_1 of the cable bundle 10, it is possible to insert the protrusions 24 between the cable 11 constituting the cable bundle 10 and to hold the cable 11 by the protrusions 24. Thus, even when the cable bundle 10 is accommodated in the container 20 in a horizontal posture, it is possible to suppress the cable bundle 10 from falling down or collapsing.

[0030] The plane on which the wave-shaped structure consisting of the protrusions 24 is formed is not particularly limited to the above as long as the plane is substantially parallel to the axial L_1 of the cable bundle 10. For example, the protrusions 24 may be disposed on the fifth and sixth planes 21e and 21f. The fifth plane 21e is the front plane of the box in FIG. 1, and the sixth plane 21f is the back plane of the box in FIG. 1. Alternatively, the

protrusions 24 may be disposed on the third to sixth planes 21c to 21f (that is, all the planes of the box substantially parallel to the axial direction L_1 of the cable bundle 10). In the second to fifth embodiments, for example, when the cable bundle is accommodated in the container in the horizontal posture, the container may have the convex protrusions 24.

[0031] FIG. 3 is a cross-sectional view showing the fifth modification of the cable accommodating body viewed from the side in the first embodiment of the present invention.

[0032] Instead of the protrusions 24 described above, as shown in FIG. 3, the inclined surfaces 25a and 25b may be disposed on the planes 21c to 21f substantially parallel to the axial direction L_1 of the cable bundle 10. The first inclined surface 25a is inclined with respect to the direction axial L_1 of the cable bundle 10 and has a tapered funnel shape in which the accommodating space narrows as approaching the first outlet 22. The second inclined surface 25b is also inclined with respect to the axial direction L_1 of the cable bundle 10 and has a tapered funnel shape in which the accommodating space narrows as approaching the second outlet 23.

[0033] By holding the entire cable bundle 10 by the inclined surfaces 25a and 25b, even when the cable bundle 10 is accommodated in the container 20 in a horizontal posture, it is possible to suppress the cable bundle 10 from falling down or collapsing. In the case of the example shown in FIG. 3, the shape of the cable bundle 10 can be matched to the inclined surfaces 25a and 25b, for example, by varying the number of windings of the cable 11 in the axial direction L_1 of the cable bundle 10. In the second to fifth embodiments, for example, when the cable bundle is accommodated in the container in the horizontal position, the container may have inclined surfaces 25a and 25b.

[0034] For example, when there is no possibility of the cable bundle 10 falling down or collapsing, or when the cable bundle 10 is disposed in the container 20 in the vertical posture as shown in FIG. 2 (a) to FIG. 2 (d), the container 20 may not have the protrusions 24 or the inclined surfaces 25a and 25b.

[0035] Below, the method of installing the cable 11 by the air blown cable installing method using the cable accommodating body 1A described above will be explained with reference to FIG. 4 (a) to FIG. 4 (d). FIG. 4(a) to FIG. 4(d) are diagrams showing a cable installing method in the first embodiment of the present invention.

[0036] First, as shown in FIG. 4(a), two ducts 51 and 52 are laid. The ducts 51 and 52 may be ducts already laid. Next, the above-described cable accommodating body 1A is placed between the two ducts 51 and 52, and the jetting machine 60 is set at one end of the first duct 51. Next, the operator (see FIG. 1) pulls out the first end 12 of the cable 11 through the first outlet 22 of the container 20 and inserts it into the jetting machine 60.

[0037] Next, as shown in FIG. 4(b), the air subjected to the drying process is supplied from the compressor 70 to

the jetting machine 60. The jetting machine feeds the cable 11 into the first duct 51, for example, by the air and pushing with a caterpillar, and the first end 12 side of the cable 11 is sequentially fed out from the container 20 through the first outlet 22 along with this feeding. Then, when the first end 12 of the cable 11 is exposed from the opposite end of the first duct 51, the jetting machine 60 is stopped. As a result, the installing work of the cable 11 into the first duct 51 is completed.

[0038] Next, as shown in FIG. 4(c), the jetting machine 60 is removed from the end of the first duct 51 and is set at one end of the second duct 52. Then, the operator (see FIG. 1) pulls out the second end 13 of the cable 11 through the second outlet 23 of the container 20 and inserts the cable 11 into the jetting machine 60.

[0039] Next, as shown in FIG. 4(d), the air subjected to the drying process is supplied from the compressor 70 to the jetting machine. The cable 11 is fed into the second duct 52 by the air and pushing with the jetting machine 60 to sequentially feed out the second end 13 side of the cable 11 from the container 20 through the second outlet 23. Then, when the second end 13 of the cable 11 is exposed from the opposite end of the second duct 52, the jetting machine 60 is stopped. As a result, the installing work of the cable 11 into the second duct 52 is completed.

[0040] Next, after removing the container 20 of the cable accommodating body 1A from the cable 11, the installing work the cable 11 into the ducts 51 and 52 is completed by connecting the ends of the two ducts 51 and 52.

[0041] Although the installation of cable 11 into the other duct 52 is started after the installation of cable 11 into one duct 51 is completed in the above-described cable installing method, the timing of installation of two ducts 51 and 52 is not particularly limited to this. For example, when two jetting machines 60 can be prepared, the installing work of the cable 11 into one duct 51 and the installing work of the cable 11 to the other duct 52 may be carried out in parallel. In this case, since it is possible to individually and independently perform the installing work of the cable 11 into the two ducts 51 and 52 without synchronizing by using the cable accommodating body 1A of the present embodiment, it is excellent workability.

[0042] In the present embodiment, since the cable bundle 10 has no winding core and the container 20 accommodating the cable bundle 10 has the first and second outlets 22 and 23 through which the cable 11 is pulled out from the inside of the container 20, it is possible to independently unwind both ends 12 and 13 of the cable 11 from the cable bundle 10.

<<Second Embodiment>>

[0043] FIG. 5(a) is a cross-sectional view showing a cable accommodating body viewed from the side in the second embodiment of the present invention, and FIG. 5(b) is a cross-sectional view taken along VB-VB of FIG. 5(a). FIG. 6(a) to FIG. 6(c) are diagrams showing a

winding method of a cable bundle in the second embodiment of the present invention.

[0044] The present embodiment is different from the modification shown in FIG. 2(d) of the first embodiment described above mainly in that (a) the cable bundle is divided into a plurality of cable bundles 10A and 10B and (b) the container 20 has a partition plate 26. Hereinafter, the cable accommodating body 1B in the second embodiment will be described only with respect to differences from the first embodiment, parts having the same configuration as those in the first embodiment are denoted by the same reference numerals, and description thereof will be omitted.

[0045] As shown in FIG. 5(a), the cable accommodating body 1B of the present embodiment includes a plurality of (two in the present embodiment) cable bundles 10A and 10B. The cable bundles 10A and 10B are continuously connected together by a single cable 11. That is, the cables 11 constituting the cable bundles 10A and 10B has no connection points between the first end 12 and the second end 13. The single continuous cable 11 may be configured by connecting a plurality of cables, for example, by fusion bonding, connectors, or the like, and this cable 11 may be used to form a plurality of cable bundles 10A and 10B. In this case, the connection point is preferable located in the cable bundles 10A and 10B. Thus, even if stresses are applied to the part of the cable 11 between the cable bundles 10A and 10B (the part of the cable 11 that connects the cable bundles 10A and 10B), it is possible to suppress the occurrence of a defect at the connection point. The number of the cable bundles included in the cable accommodating body 1B is not particularly limited to the above as long as it is plural.

[0046] The cable bundle 10A and 10B is formed as follows.

[0047] That is, first, as shown in FIG. 6(a), the cable bundle 10B is formed by winding the cable 11 supplied from the supplying drum 80 using the above-described parasol drum type winding device. At this time, the second end 13 of the cable 11 is located below the cable bundle 10B.

[0048] Next, after removing the cable bundle 10B from the winding device, the cable bundle 10B is reversed as shown in FIG. 6(b). As a result, the second end 13 of the cable 11 is located above the cable bundle 10B.

[0049] Next, as shown in FIG. 6(c), the cable bundle 10A is formed by winding the cable 11 supplied from the supplying drum 80 using the above-described parasol drum type winding device. At this time, the first end 12 of the cable 11 is located above the cable bundle 10B. Since the cable bundle 10A is formed without cutting the cables 11 after forming the cable bundle 10B, the two cable bundles 10A and 10B are continuously connected by the single cable 11.

[0050] The method of forming the cable bundles 10A and 10B is not particularly limited to the above method. For example, the cable-bundles 10A and 10B may be formed by the following method. That is, after forming the

cable bundle 10B in the manner shown in FIG. 6(a), the cable bundle 10A is formed without removing the cable bundle 10B from the winding device. Then, after removing the two cable bundles 10A and 10B from the winding device, the cable bundle 10B may be reversed.

[0051] Returning to FIG. 5(a), the container 20 of the present embodiment has a partition plate 26, and the partition plate 26 divides the inner space of the container 20 into two accommodating rooms 27a and 27b. The two cable bundles 10A and 10B described above are individually accommodated in these two accommodating rooms 27a and 27b. Specifically, the cable bundle 10A is accommodated in the accommodating room 27a, and the cable bundle 10B is accommodated in the accommodating room 27b. At this time, both cable bundles 10A and 10B are accommodated in the accommodating rooms 27a and 27b in a vertical posture. The container 20 may have a plurality of partition plates 26 according to the number of the cable bundles included in the cable accommodating body 1B.

[0052] In the first, third, and fourth embodiments, the container may include a partition plate that partitions the inner space of the container into a plurality of accommodating rooms, and the cable accommodating body may have a plurality of cable bundles individually accommodated in the plurality of accommodating rooms.

[0053] The partition plate 26 has two through holes 28 and 29. Both of the two through holes 28 and 29 penetrate the partition plate 26 in the thickness direction thereof. The first end 12 of the cable 11 is pulled out from the inside of the container 20 through the first outlet 22 formed in the first plane 21a of the container 20. The part of the cable 11 between the cable bundles 10A and 10B passes through the first through hole 28 of the partition plate 26. The second through hole 29 is formed in the partition plate 26 so as to face the second outlet 23 formed in the first plane 21a of the container 20. The second end 13 of the cable 11 enters the upper accommodating room 27a from the lower accommodating room 27b through the second through hole 29 and is further pulled out from the inside of the container 20 through the second outlet 23.

[0054] In the present embodiment, since the cable bundles 10A and 10B have no winding core and the container 20 accommodating the cable bundles 10A and 10B has the first and second outlets 22 and 23 through which the cable 11 is pulled out from the inside of the container 20, it is possible to independently unwind both ends 12 and 13 of the cable 11 from the cable bundles 10A and 10B.

[0055] Further, in the present embodiment, the partition plate 26 partitions the inside of the container 20 into a plurality of accommodating rooms 27a and 27b, and the plurality of cable bundles 10A and 10B are individually accommodated in the plurality of accommodating rooms 27a and 27b. Therefore, even when the cable bundles 10A and 10B are disposed in the container 20 in the vertical posture, since the cable 11 can be pulled out upward for both cable bundles 10A and 10B, it is possible

to suppress the occurrence of kinking in the cable 11 due to the weight of the cable bundles 10A and 10B or the like. If there is no effect on the cable 11 such as the occurrence of kinking, the outlet 23 may be arranged on the accommodating room 27b side, and the through hole 29 may be omitted.

<<Third Embodiment>>

[0056] FIG. 7(a) is a cross-sectional view showing a cable accommodating body viewed from the side in the third embodiment of the present invention, and FIG. 7(b) is a diagram showing a state in which the inner containers shown in FIG. 7(a) are taken out from the outer container.

[0057] The present embodiment is different from the second embodiment described above mainly in that (a) the plurality of cable bundles 10A and 10B are accommodated in separate containers 20A and 20B and (b) the plurality of containers 20A and 20B are further accommodated in an outer container 30. Hereinafter, the cable accommodating body 1C in the third embodiment will be described only with respect to differences from the second embodiment, parts having the same configuration as those in the second embodiment are denoted by the same reference numerals, and description thereof will be omitted.

[0058] As shown in FIG. 7(a), the cable accommodating body 1C of the present embodiment includes a plurality of (two in the present embodiment) containers 20A and 20B. The two containers 20A are stacked in the vertical direction. The cable bundles 10A and 10B are individually accommodated in the two containers 20A and 20B. Specifically, one cable bundle 10A is accommodated in the upper container 20A, and the other cable bundle 10B is accommodated in the lower container 20B. At this time, both cable bundles 10A and 10B are accommodated in the containers 20A and 20B in the vertical posture. The number of containers included in the cable accommodating body 1C is not particularly limited to the above, and for example, the number of containers can be set according to the number of cable bundles included in the cable accommodating body 1C.

[0059] The first end 12 of the cable 11 is pulled out from the inside of the upper container 20A through the first outlet 22 of the upper container 20A. The part of the cable 11 between the cable bundles 10A and 10B passes through the second outlet 23 of the upper container 20A and the first outlet 22 of the lower container 20B. Further, the second end 13 of the cable 11 is pulled out from the inside of the lower container 20B through the second outlet 23 of the lower container 20B.

[0060] In the present embodiment, in the upper container 20A, the first outlet 22 is formed in the first plane 21a, and the second outlet 23 is formed in the second plane 21b. On the other hand, in the lower container 20B, the first outlet 22 is formed in the second plane 21b, and the second outlet 23 is formed in the first plane 21a. The second outlet 23 of the upper container 20A may be

formed in the side plane of the upper container 20A. The first outlet 22 of the lower container 20B may be formed in the side plane of the lower container 20B.

[0061] Further, the cable accommodating body 1C of the present embodiment includes an outer container 30. The two containers 20A and 20B are accommodated in the outer container 30 in a state where the containers 20A and 20B are stacked on each other. At this time, the upper container 20A and the lower container 20B are stacked to be out of alignment, and the second outlet 23 of the lower container 20B is exposed from the upper container 20A. The container 20B may be stacked on the container 20A. In this case, the containers 20A and 20B are stacked to be out of alignment so that the first outlet 22 of the container 20A is exposed from the container 20B.

[0062] Third and fourth outlets 32 and 33 are formed in the upper plane 31a of the outer container 30. The third outlet 32 faces the first outlet 22 of the upper container 20A. The first end 12 of the cable 11 is pulled out from the inside of the upper container 20A to the outside of the outer container 30 through the first outlet 22 of the upper container 20A and the third outlet 32 of the outer container 30. Similarly, the fourth outlet 33 faces the second outlet 23 of the lower container 20B. The second end 13 of the cable 11 is pulled out from the inside of the lower container 20B to the outside of the outer container 30 through the second outlet 23 of the lower container 20B and the fourth outlet 33 of the outer container 30. The plane of the outer container 30 in which the third and fourth outlets 32 and 33 are formed is not limited to the upper plane 31a, and the third and fourth outlets 32 and 33 may be formed in the side plane or the bottom plane of the outer container 30. The third and fourth outlets 32 and 33 may be formed in different planes of the outer container 30.

[0063] In the first, second, and fifth embodiments, the cable accommodating body may include a plurality of containers. In this case, a plurality of containers may be stacked on each other such that the winding axial direction of the cable bundle is in the vertical direction. In the first, second, and fifth embodiments, the cable accommodating body may include an outer container that accommodates the plurality of containers.

[0064] When the cable 11 is installed using the cable accommodating body 1C of the present embodiment, the first end 12 side of the cable 11 is fed out from the first outlet 22 of the upper container 20A into the first duct 51. On the other hand, the second end 13 side of the cable 11 is fed out from the second outlet 23 of the lower container 20B into the second duct 52.

[0065] As shown in FIG. 7(b), the cable accommodating body 1C may be placed at the installation site in a state in which the inner containers 20A and 20B are taken out from the outer container 30. Therefore, it is possible to facilitate the short distance transporting of the cable accommodating body 1C at the installation site. Further, even when the space for placing the cable accommodating body at the installation site is small, it is possible to

cope with the site by taking out the inner containers 20A and 20B from the outer container 30 and dividing the cable accommodating body 1C into the containers 20A and 20B.

[0066] In the present embodiment, since the cable bundles 10A and 10B have no winding core and the containers 20A and 20B accommodating the cable bundles 10A and 10B respectively have the first and second outlets 22 and 23 through which the cable 11 is pulled out from the inside of the containers 20A and 20B, it is possible to independently unwind both ends 12 and 13 of the cable 11 from the cable bundles 10A and 10B.

[0067] Further, in the present embodiment, the plurality of cable bundles 10A and 10B are individually accommodated in the plurality of containers 20A and 20B. Therefore, even when the cable bundles 10A and 10B are disposed in the containers 20A and 20B in the vertical posture, since the cable 11 can be pulled out upward for both cable bundles 10A and 10B, it is possible to suppress the occurrence of kinking in the cable 11 due to the weight of the cable bundles 10A and 10B or the like.

[0068] Further, in the present embodiment, since the two containers 20A and 20B are accommodated in one outer container 30, it is possible to efficiently transport the cable accommodation body 1C.

<<Fourth Embodiment>>

[0069] FIG. 8 is a cross-sectional view showing a cable accommodating body viewed from the side in the fourth embodiment of the present invention.

[0070] The present embodiment is different from the third embodiment described above mainly in that the cable accommodating body 1D includes four cable bundles 10A to 10D and four containers 20A to 20D. Hereinafter, the cable accommodating body 1D in the fourth embodiment will be described only with respect to differences from the third embodiment, parts having the same configuration as those in the third embodiment are denoted by the same reference numerals, and description thereof will be omitted.

[0071] As shown in FIG. 8, the cable accommodating body 1D of the present embodiment includes two cable bundles 10C and 10D in addition to the two cable bundles 10A and 10B. That is, the cable accommodating body 1D includes four cable bundles 10A to 10D. The cable bundles 10A to 10D are continuously connected together by a single cable 11, and the cables 11 constituting the cable bundles 10A to 10D has no connection points between the first end 12 and the second end 13. The single continuous cable 11 may be configured by connecting a plurality of cables, for example, by fusion bonding, connectors, or the like, and this cable 11 may be used to form a plurality of cable bundles 10A to 10D. In this case, the connection point is preferable located in the cable bundles 10A to 10D.

[0072] Further, the cable accommodating body 1D includes two containers 20C and 20D in addition to the two

containers 20A and 20B in order to individually accommodate the cable bundles 10A to 10D. That is, the cable accommodating body 1D includes four containers 20A to 20D. Specifically, the cable bundle 10A is accommodated in the container 20A, the cable bundle 10B is accommodated in the container 20B, the cable bundle 10C is accommodated in the container 20C, and the cable bundle 10D is accommodated in the container 20D. At this time, all cable bundles 10A to 10D are accommodated in containers 20A to 20D in the vertical posture.

[0073] In the present embodiment, the four containers 20A to 20D are stacked in the vertical direction. Specifically, the containers 20C and 20D are stacked between containers 20A and 20B. The four containers 20A to 20D are accommodated in the outer container 30 in a state where the containers 20A to 20D are stacked on each other. At this time, the container 20D and the container 20B are stacked to be out of alignment, and the second outlet 23 of the container 20B is exposed from the container 20D.

[0074] The first end 12 of the cable 11 is pulled out from the inside of the container 20A to the outside of the outer container 30 through the first outlet 22 of the container 20A and the third outlet 32 of the outer container 30. On the other hand, the second end 13 of the cable 11 is pulled out from the inside of the container 20B to the outside of the outer container 30 through the second outlet 23 of the container 20B and the fourth outlet 33 of the outer container 30.

[0075] The part of the cable 11 between the cable bundles 10A and 10C passes through the second outlet 23 of the container 20A and the first outlet 22 of the container 20C. Similarly, the part of the cable 11 between the cable bundles 10C and 10D passes through the second outlet 23 of the container 20C and the first outlet 22 of the container 20D. Further, the part of the cable 11 between the cable bundles 10D and 10B also passes through the second outlet 23 of the container 20D and the first outlet 22 of the container 20B.

[0076] When the cable 11 is installed using the cable accommodating body 1D of the present embodiment, the first end 12 side of the cable 11 is sequentially fed out from the first outlets 22 of the containers 20A, 20C and 20D into the first duct 51. On the other hand, the second end 13 side of the cable 11 is fed out from the second outlet 23 of the container 20B into the second duct 52.

[0077] That is, in the present embodiment, since the first duct 51 is longer than the second duct 52, the cable 11 of the three upper cable bundles 10A, 10C and 10D in the outer container 30 is installed in the first duct 51, and the cable 11 of only the lowest one cable bundle 10B is installed in the second duct 52. In this way, in the present embodiment, it is possible to set the number of the cable bundles in which the cable 11 installed in the first duct 51 is wound and the number of the cable bundles in which the cable 11 installed in the second duct 52 is wound according to the length of each of the ducts 51 and 52.

[0078] Although not particularly shown, at the installation site, the cable accommodating body 1D may be placed in a state where the inner containers 20A to 20D are taken out from the outer container 30. Therefore, it is possible to facilitate the short distance transporting of the cable accommodating body 1D at the installation site, and it is also possible to cope with the installation site having a small space.

[0079] In the present embodiment, since the cable bundles 10A to 10D have no winding core and the containers 20A to 20D accommodating the cable bundles 10A to 10D respectively have the first and second outlets 22 and 23 through which the cable 11 is pulled out from the inside of the containers 20A to 20D, it is possible to independently unwind both ends 12 and 13 of the cable 11 from the cable bundles 10A to 10D.

[0080] Further, in the present embodiment, the plurality of cable bundles 10A to 10D are individually accommodated in the plurality of containers 20A to 20D. Therefore, even when the cable bundles 10A to 10D are disposed in the containers 20A to 20D in the vertical posture, since the cable 11 can be pulled out upward for all the cable bundles 10A to 10D, it is possible to suppress the occurrence of kinking in the cable 11 due to the weight of the cable bundles 10A to 10D or the like.

[0081] Further, in the present embodiment, since the four containers 20A to 20D are accommodated in one outer container 30, it is possible to efficiently transport the cable accommodation body 1D.

«Fifth Embodiment»

[0082] FIG. 9 is a transparent perspective view showing a cable accommodating body in the fifth embodiment of the present invention. Similar to FIG. 2(a) to FIG. 2(d) described above, the entire container 20 is shown transparently in FIG. 9 in order to facilitate understanding of the inside of the container 20.

[0083] The present embodiment is different from the second embodiment described above mainly in that (a) the container 20 does not have the partition plate 26 and (b) the other cable bundle 10B is disposed inside one cable bundle 10A. Hereinafter, the cable accommodating body 1E in the fifth embodiment will be described only with respect to differences from the second embodiment, parts having the same configuration as those in the second embodiment are denoted by the same reference numerals, and description thereof will be omitted.

[0084] In the present embodiment, since the container 20 of the cable accommodating body 1E does not have a partition plate 26, one cable bundle 10A has the first inner diameter D_1 , whereas the other cable bundle 10B has the first outer diameter D_2 smaller than the first inner diameter D_1 ($D_2 < D_1$). The cable bundle 10B is disposed inside the cable bundle 10A. At this time, both cable bundles 10A and 10B are accommodated in the container 20 in the vertical posture. In the first to fourth embodiments, the cable accommodating body may include first

and second cable bundles, and the second cable bundle may be disposed inside the first cable bundle.

[0085] The number of the cable bundles included in the cable accommodating body 1E is not particularly limited to the above as long as it is plural. Also in this case, it is possible to accommodate the plurality of cable bundles in a nested manner by making the diameters of the plurality of cable bundles different from each other.

[0086] The first end 12 of the cable 11 is pulled out from the inside of the container 20 through the first outlet 22 formed in the upper plane 21a of the container 20. The second end 13 of the cable 11 is also pulled out from the inside of the container 20 through the second outlet 23 formed in the upper plane 21a of the container 20.

[0087] In the present embodiment, since the cable bundles 10A and 10B have no winding core and the container 20 accommodating the cable bundles 10A and 10B has the first and second outlets 22 and 23 through which the cable 11 is pulled out from the inside of the container 20, it is possible to independently unwind both ends 12 and 13 of the cable 11 from the cable bundles 10A and 10B. In the present embodiment, after the unwinding work of the first end 12 side of the cable 11 is completed, the unwinding work of the second end 13 side of the cable 11 is started.

[0088] It should be noted that the embodiment described above are described to facilitate understanding of the present disclosure and are not described to limit the present disclosure. It is therefore intended that the elements disclosed in the above embodiment include all design modifications and equivalents to fall within the technical scope of the present disclosure.

[EXPLANATIONS OF LETTERS OR NUMERALS]

[0089]

1A to 1E ... Cable accommodating body
 10 ... Cable bundle
 11 ... Cable
 12 ... First end
 13 ... Second end
 20, 20A to 20D ... Container
 21a to 21f ... First to sixth plane
 22 ... First outlet
 23 ... Second outlet
 24 ... Protrusion
 25a, 25b ... Inclined surface
 26 ... Partition plate
 27a, 27b ... Accommodating room
 28, 29 ... Through hall
 30 ... Outer container
 31a ... Upper surface
 32 ... Third outlet
 33 ... Fourth outlet
 51, 52 ... Duct
 60 ... Jetting machine
 70 ... Compressor

80 ... Supplying drum

Claims

1. A cable accommodating body comprising:

a cable bundle that is formed by winding a cable and has no winding core; and
 a first container that accommodates the cable bundle, wherein
 the first container has a first outlet and a second outlet through which the cable is pulled out from an inside of the first container.

2. The cable accommodating body according to claim 1, wherein,

the first container comprises a first plane and a second plane that are substantially perpendicular to a winding axial direction of the cable bundle and are opposite to each other,
 the first outlet is formed in the first plane, and
 the second outlet is formed in the second plane.

3. The cable accommodating body according to claim 2, wherein,

the first container comprises a convex part or an inclined surface that is disposed on a plane substantially parallel to the winding axial direction of the cable bundle and contacts the cable bundle.

4. The cable accommodating body according to any one of claims 1 to 3, comprising the cable bundles connected together.

5. The cable accommodating body according to claim 4, wherein

the first container comprises a partition plate that partitions an inner space of the first container into accommodating rooms, and
 the cable bundles are individually accommodated in the accommodating rooms.

6. The cable accommodating body according to claim 4, comprising the first containers that individually accommodate the cable bundles.

7. The cable accommodating body according to claim 6, wherein

the first containers are stacked on each other so that winding axial directions of the cable bundles is in the vertical direction.

8. The cable accommodating body according to claim 7, wherein

the first containers include an upper container and a lower container that are stacked on each other,

the upper container and the lower container are stacked to be out of alignment, and

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the first outlet or the second outlet of the lower container is exposed from the upper container.

9. The cable accommodating body according to any one of claims 6 to 8, comprising a second container that accommodates the first containers, wherein the second container has a third outlet and a fourth outlet through which the cable is pulled out from an inside of the second container.

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10. The cable accommodating body according to claim 4, wherein the cable bundles include:

a first cable bundle having a first inner diameter; and

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a second cable bundle having a first outer diameter smaller than the first inner diameter, and the second cable bundle is accommodated inside the first cable bundle.

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Fig. 1

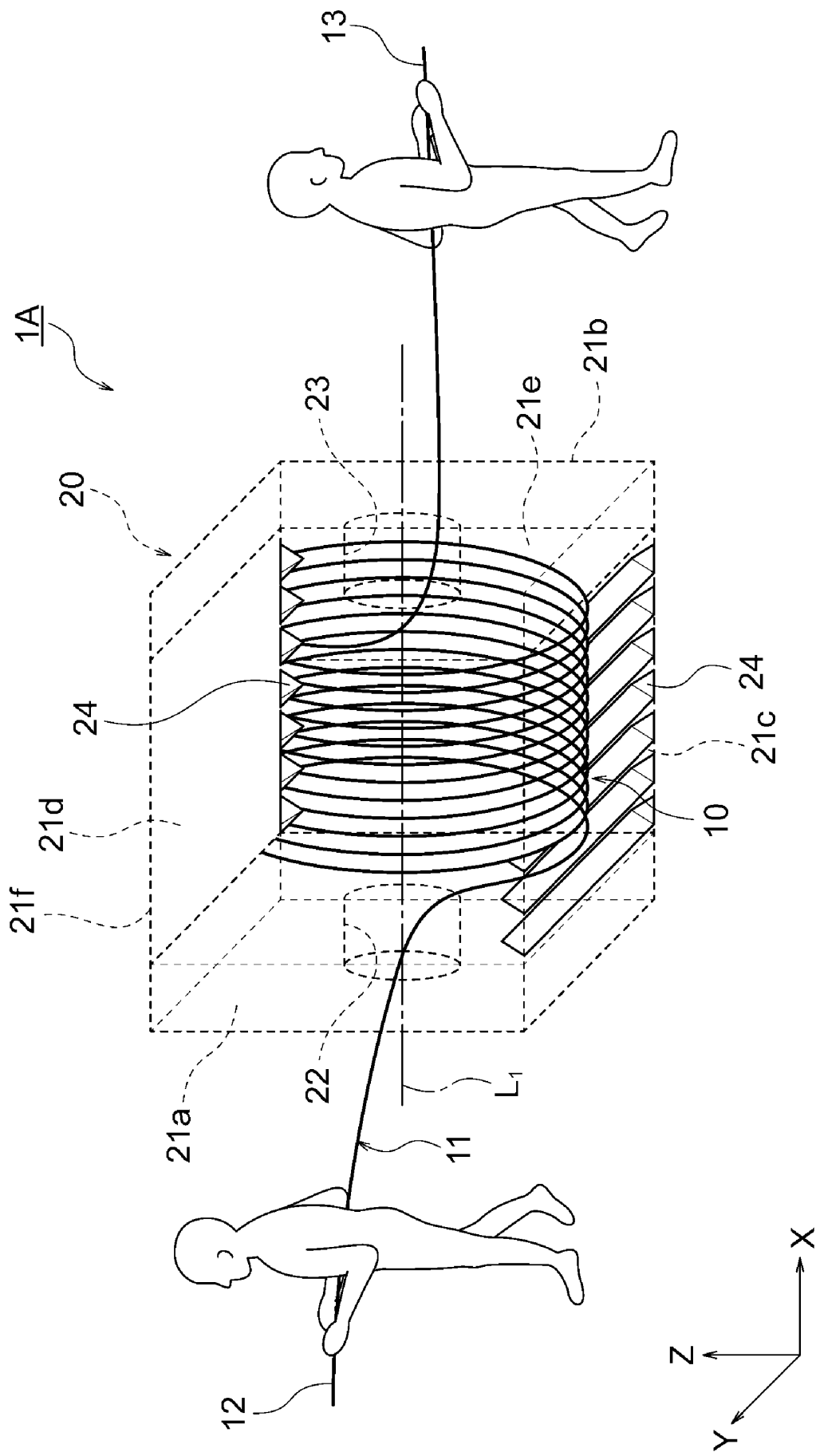


Fig. 2

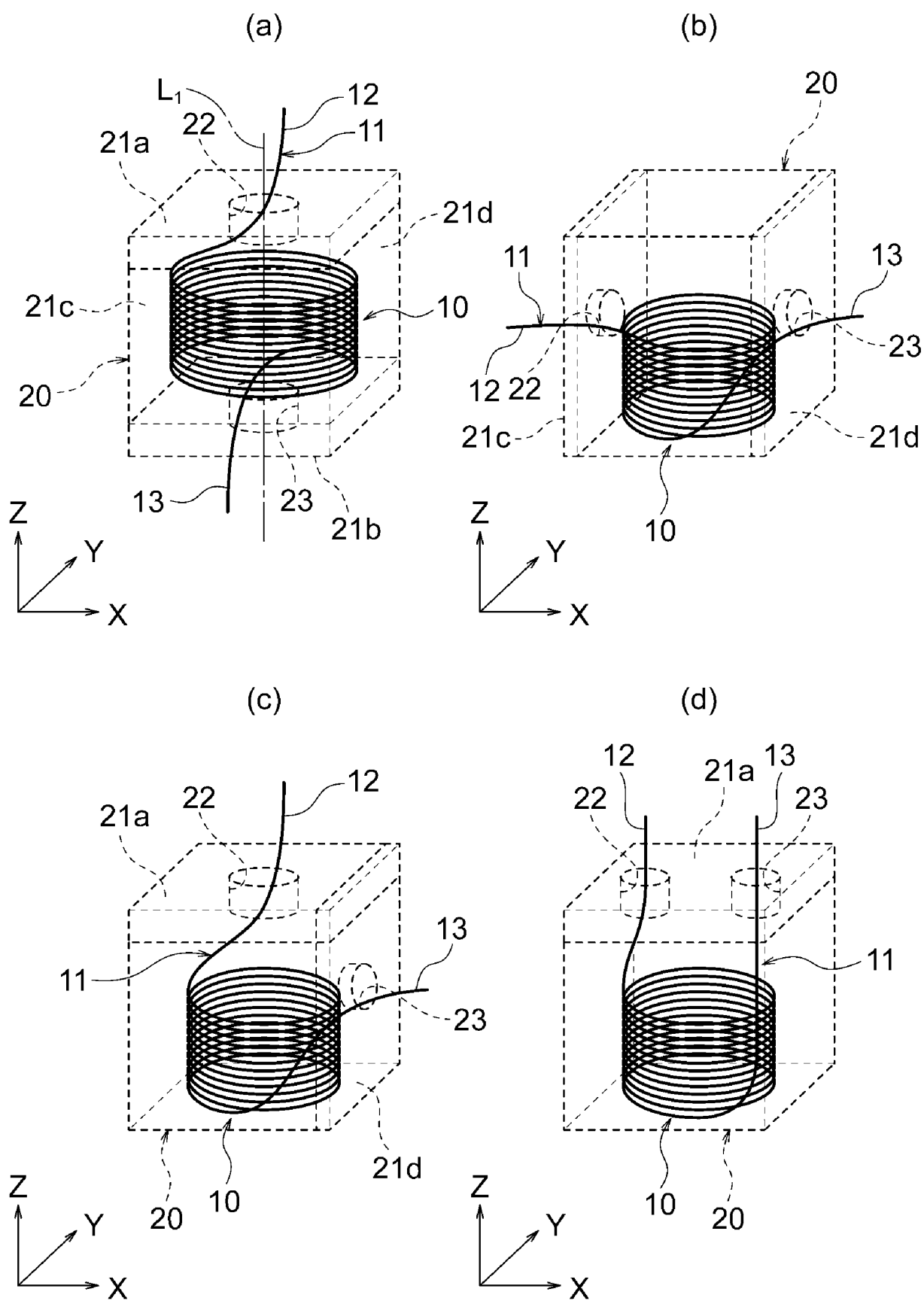


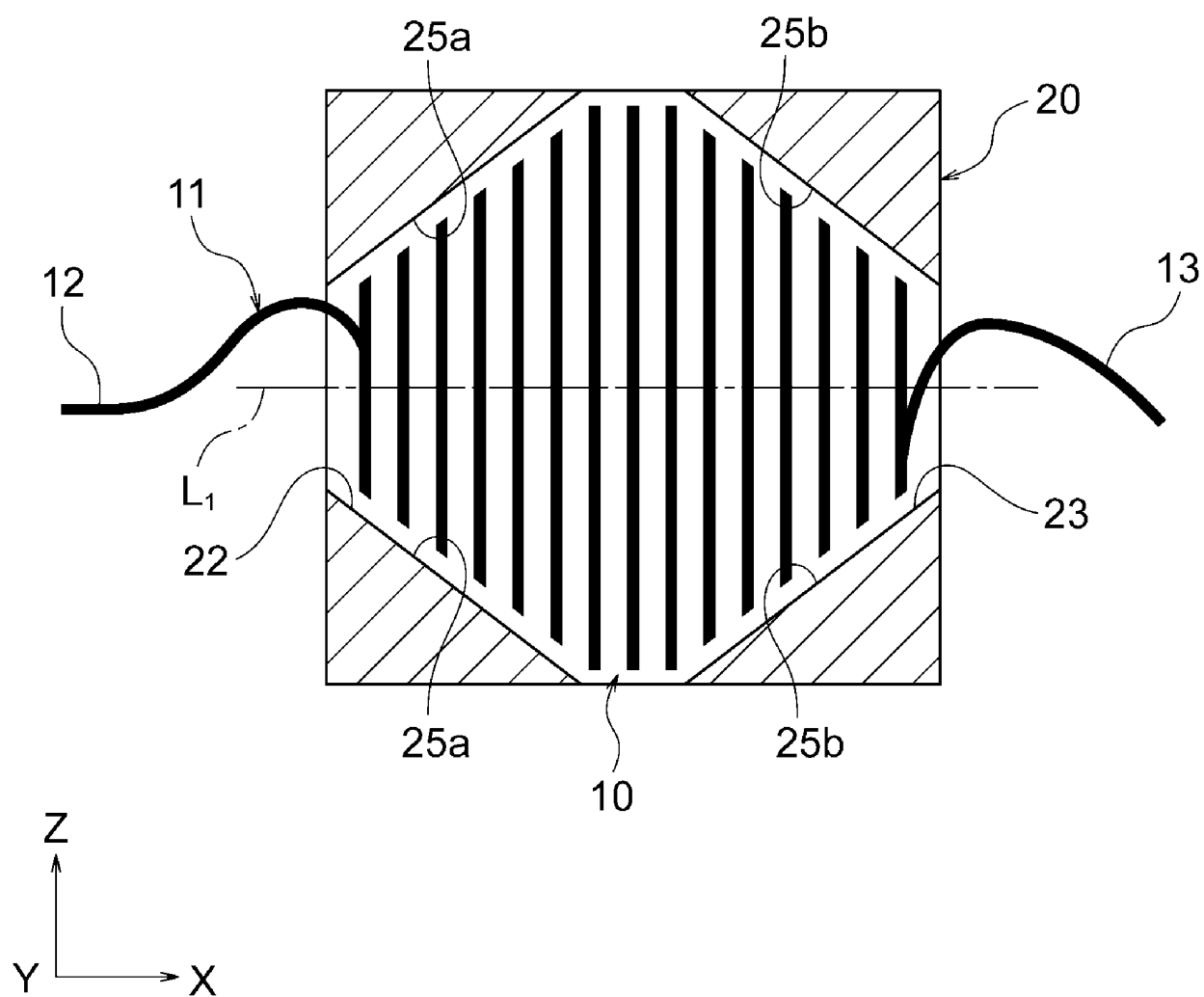
Fig. 3

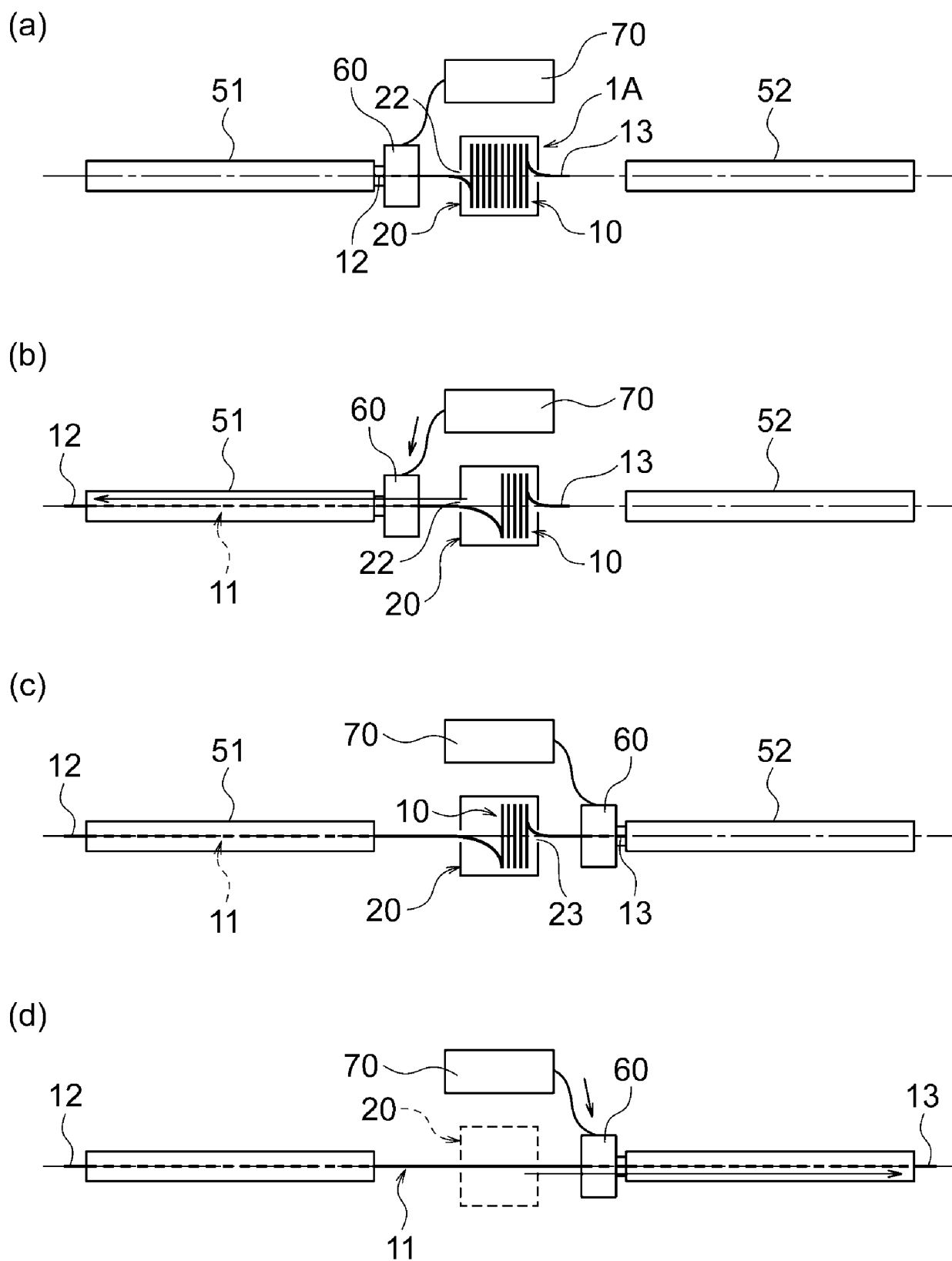
Fig. 4

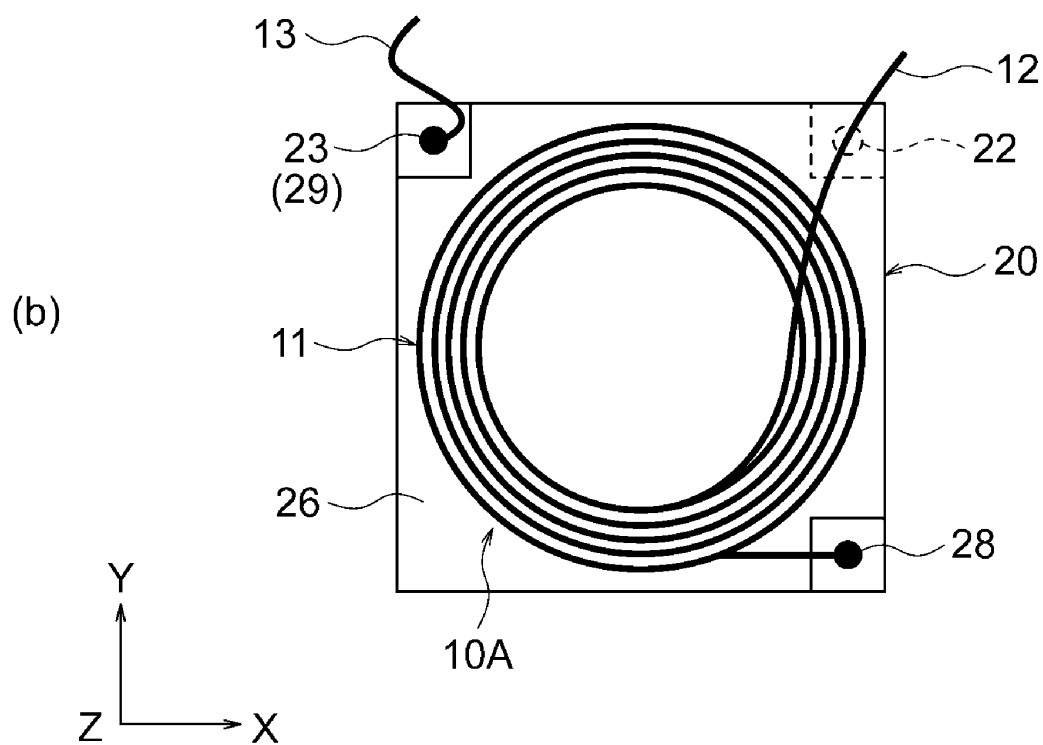
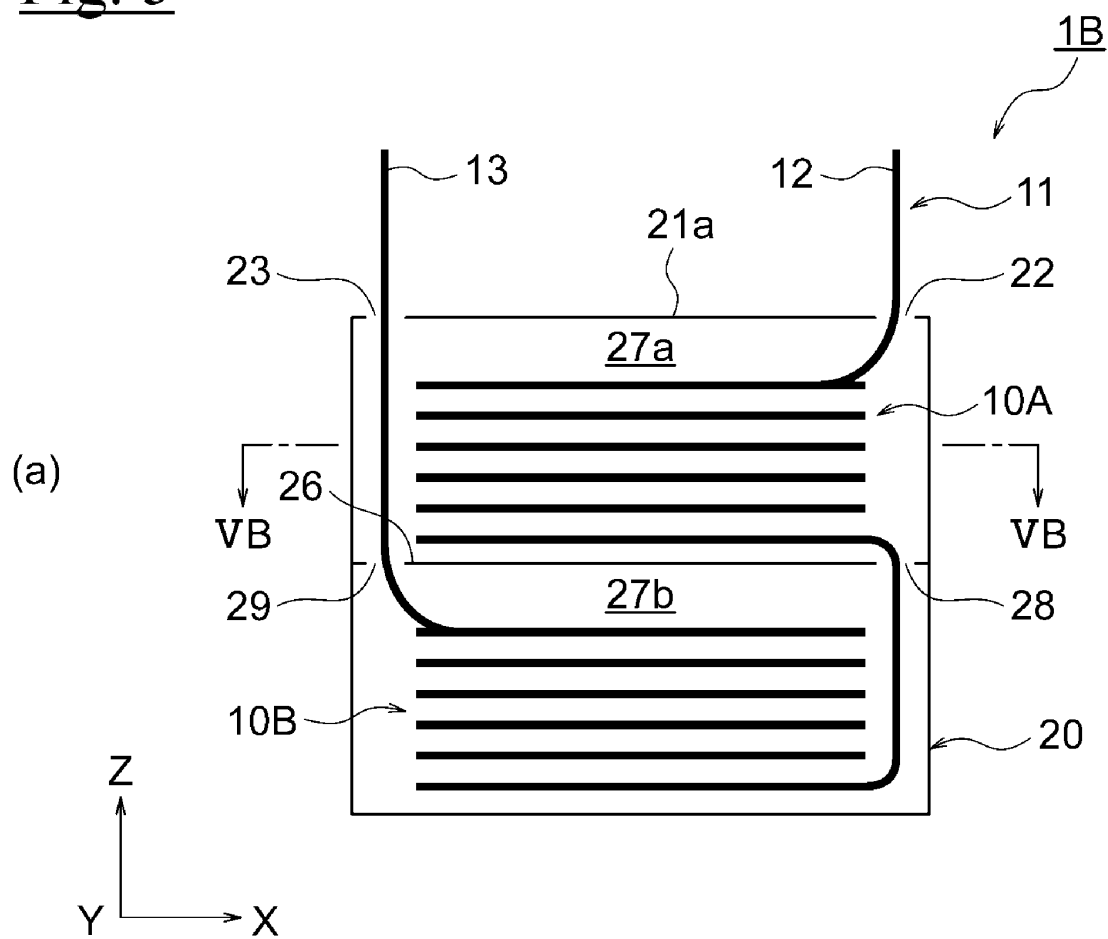
Fig. 5

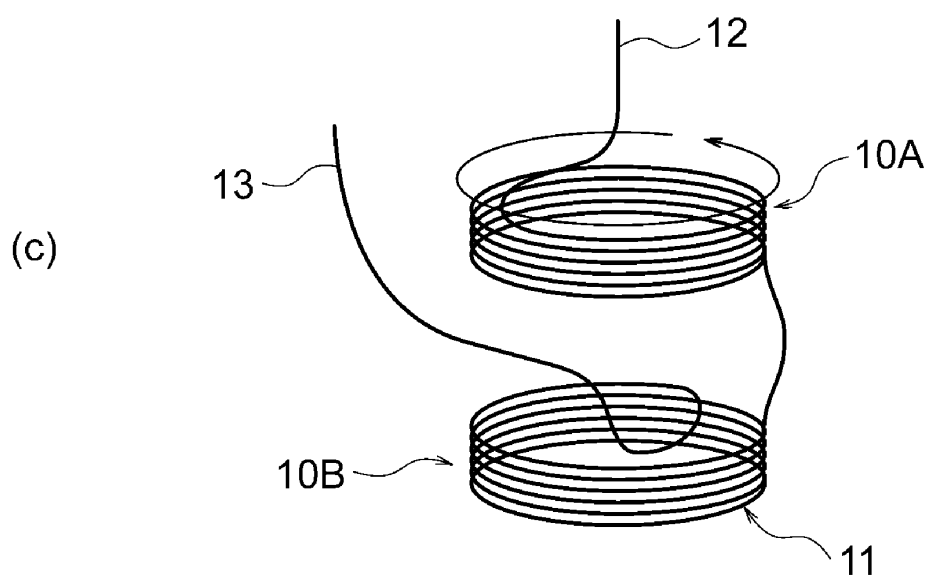
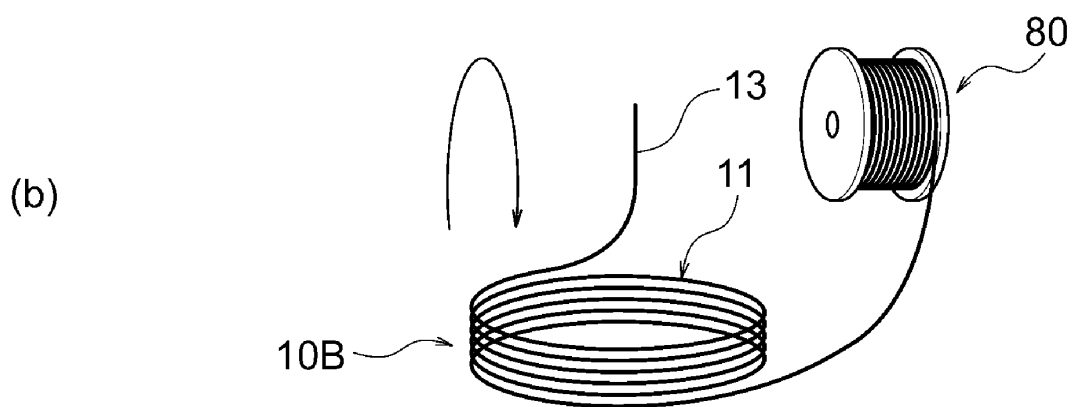
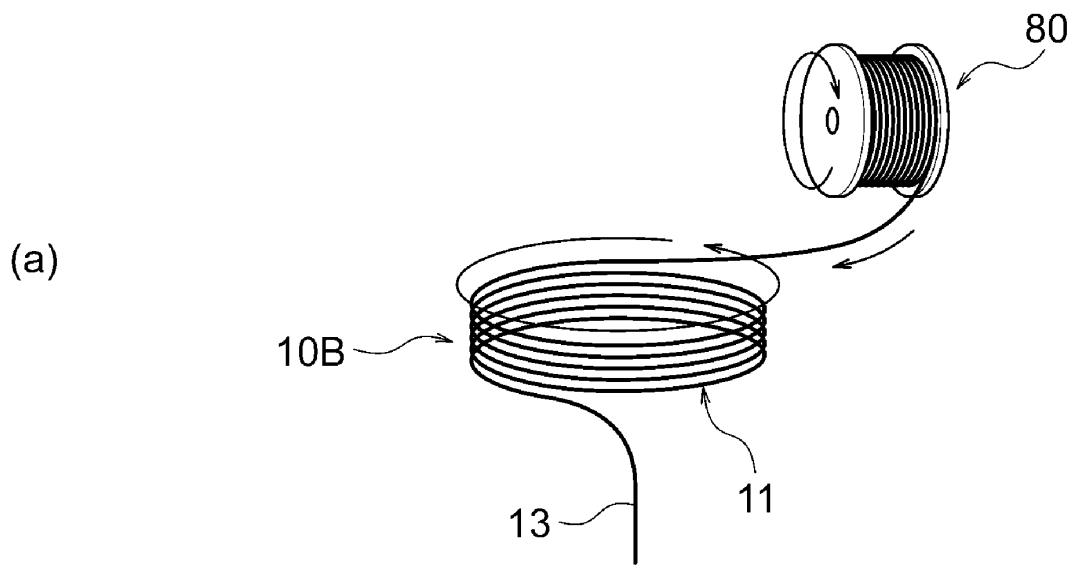
Fig. 6

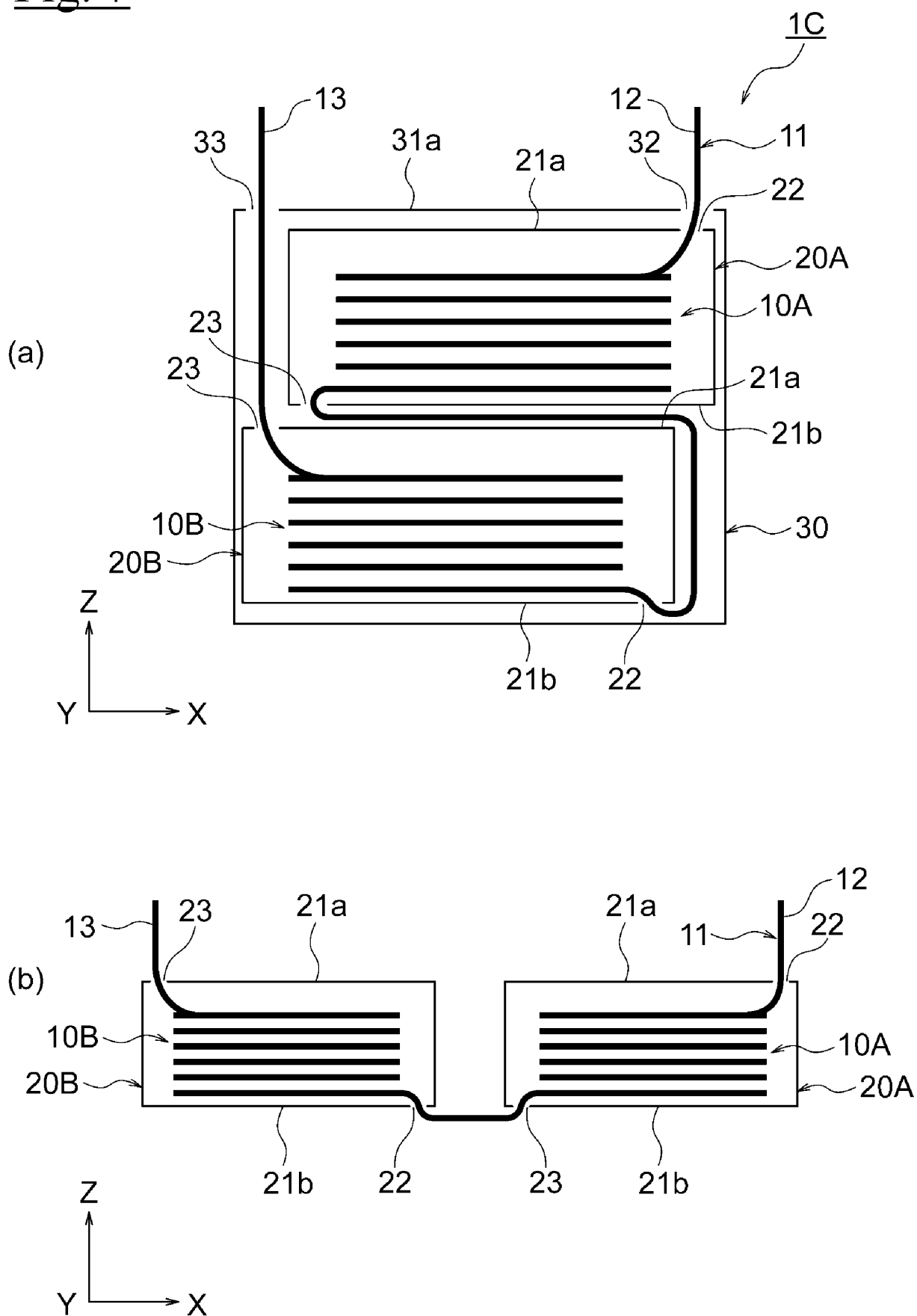
Fig. 7

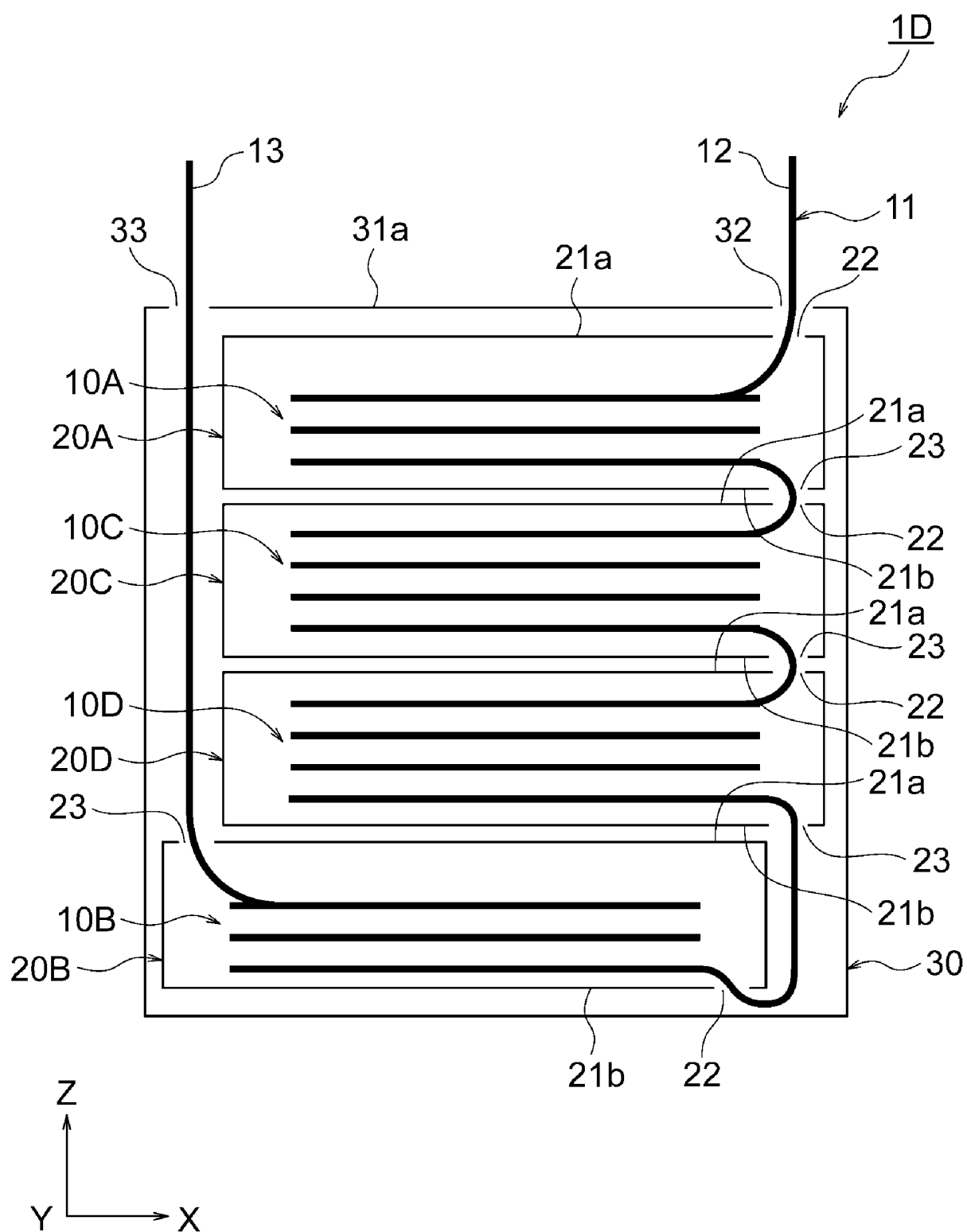
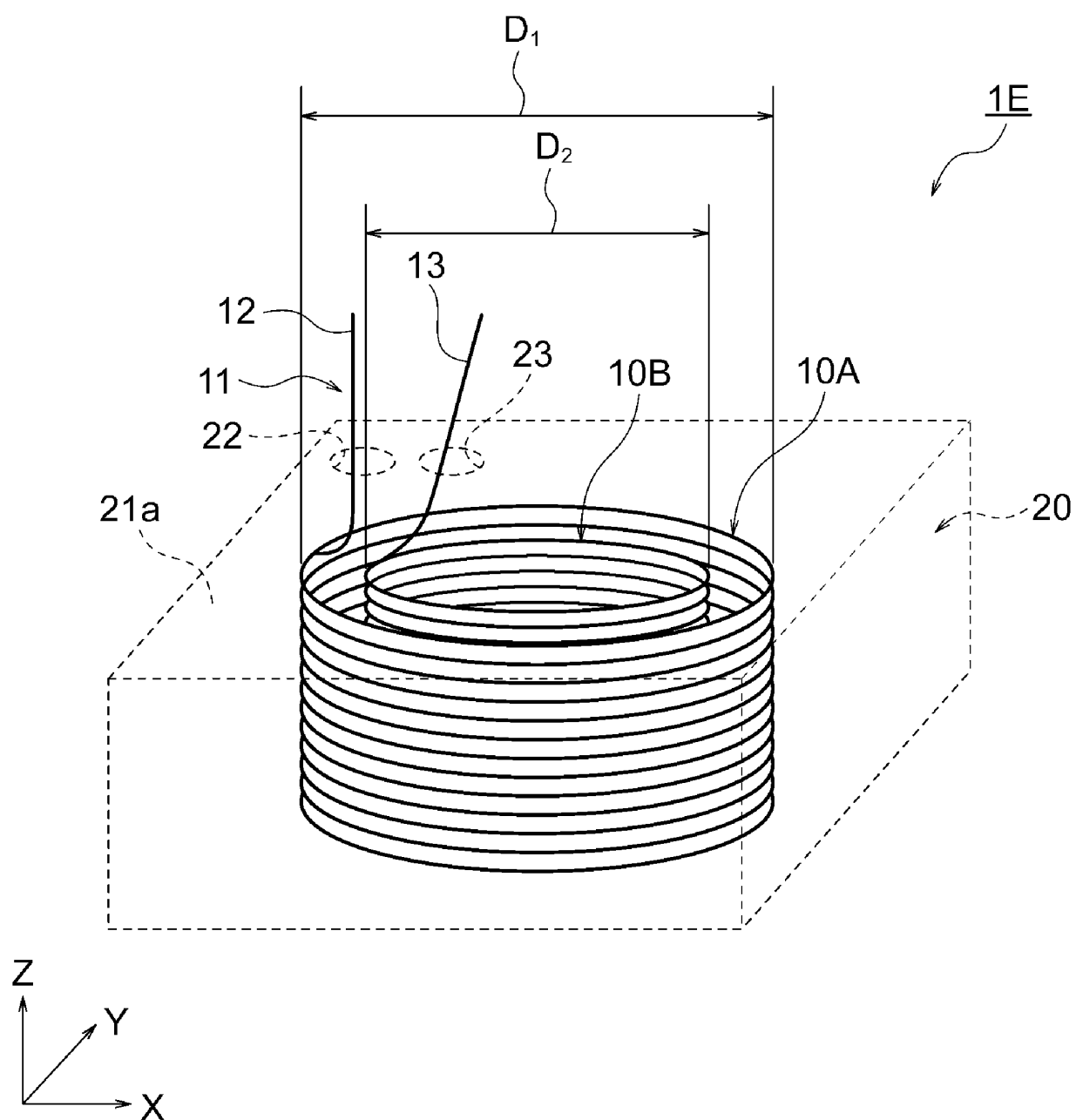
Fig. 8

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2023/003582

A. CLASSIFICATION OF SUBJECT MATTER**B65H 49/02**(2006.01)i; **B65H 75/36**(2006.01)i

FI: B65H75/36 G; B65H49/02

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)

B65H49/02; B65H75/36

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

Published examined utility model applications of Japan 1922-1996
 Published unexamined utility model applications of Japan 1971-2023
 Registered utility model specifications of Japan 1996-2023
 Published registered utility model applications of Japan 1994-2023

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 14469/1971 (Laid-open No. 11377/1972) (FUJIKURA CABLE LTD.) 11 October 1972 (1972-10-11), specification, p. 3, line 12 to p. 5, line 4, fig. 1	1-2, 4-5
Y		3, 6-7
Y	JP 43-17910 Y1 (TOTSUKA, Tadao) 24 July 1968 (1968-07-24) left column, line 4 to right column, line 13, drawings	3
Y	JP 42-12622 B1 (HITACHI CABLE) 18 July 1967 (1967-07-18) p. 1, right column, line 33 to p. 2, left column, line 12, fig. 1-3	6-7
A	JP 11-49435 A (FURUKAWA ELECTRIC CO LTD) 23 February 1999 (1999-02-23) paragraphs [0010]-[0032], fig. 1-4	1-10
A	JP 63-252883 A (EISHIN GIKEN KK) 19 October 1988 (1988-10-19) p. 2, lower left column, line 7 to p. 3, left column, line 8, fig. 1-4	1-10
A	JP 7-205317 A (POLYPLASTICS CO) 08 August 1995 (1995-08-08) paragraphs [0016]-[0025], fig. 1-4	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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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

01 March 2023

Date of mailing of the international search report

20 March 2023

Name and mailing address of the ISA/JP

Japan Patent Office (ISA/JP)
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 Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2023/003582

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 47-11377 U1	11 October 1972	(Family: none)	
JP 43-17910 Y1	24 July 1968	(Family: none)	
JP 42-12622 B1	18 July 1967	(Family: none)	
JP 11-49435 A	23 February 1999	(Family: none)	
JP 63-252883 A	19 October 1988	(Family: none)	
JP 7-205317 A	08 August 1995	US 5534210 A column 5, lines 38 to column 7, line 18, fig. 1-4	

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- JP H1045322 A [0004]
- JP 3035145 U [0014]
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