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(54) **PACKING UNIT**

(57) To improve the draw-out property of a linear material without the need to prepare such structures as arms, a packing unit according to the present disclosure includes a linear material, and a packing body configured to house the linear material. The packing body is transformable between a first configuration for packing the linear material, and a second configuration for drawing out the linear material. In the second configuration, an outlet through which the linear material is drawn out from the packing body is located in a higher position than an uppermost part of the packing body in the first configuration.

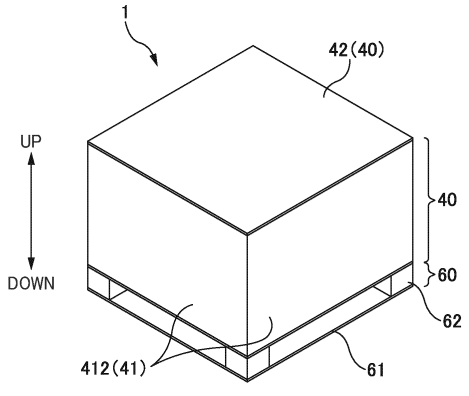

FIG. 1A

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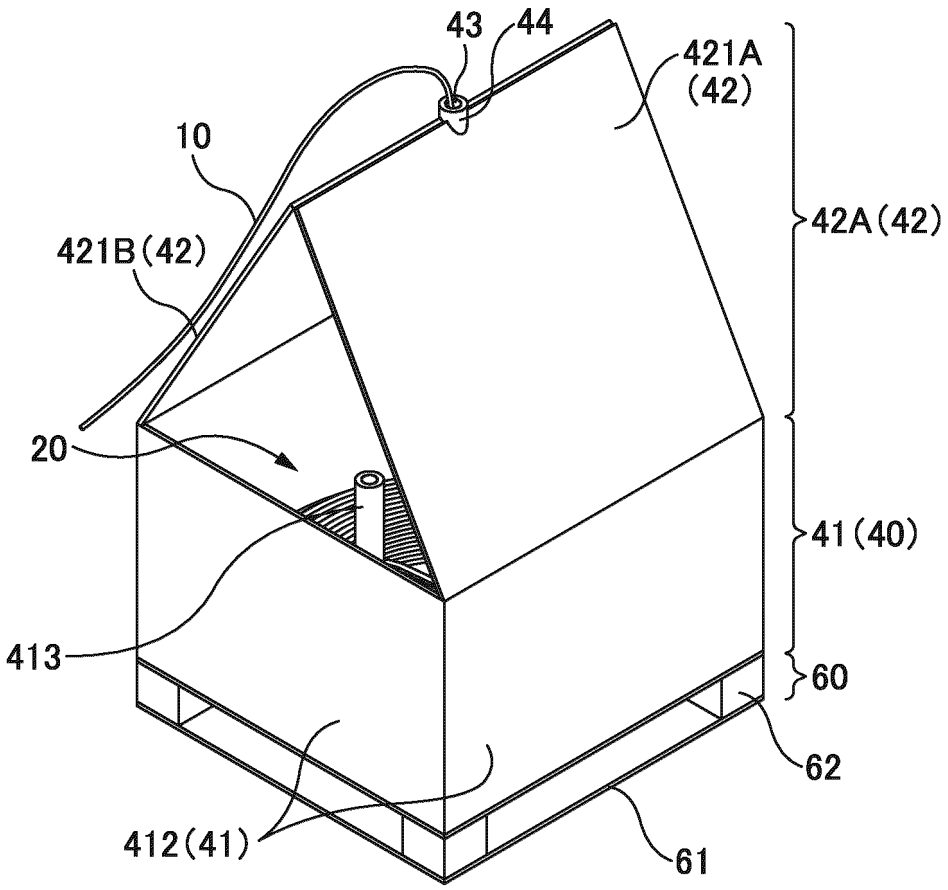
FIG. 1B



Description

TECHNICAL FIELD

[0001] The present invention relates to a packing unit.

[0002] The present application claims priority based on Japanese Patent Application No. 2022-106133 filed on June 30, 2022, the contents of which are incorporated herein by reference.

BACKGROUND ART

[0003] PTL 1 discloses a draw-out device for drawing out a wound-up linear body.

CITATION LIST

PATENT LITERATURE

[0004] PTL 1: Japanese Patent Application Laid-open Publication No. 2000-102821

SUMMARY

TECHNICAL PROBLEM

[0005] The draw-out device disclosed in PTL 1 has arms on a spin body which rotates about the winding center of the linear body. The arms prevent tangling and kinking of the linear body. Unfortunately, the draw-out device disclosed in PTL 1 requires a rotatable spin body and arms, thus leading to complicated structure and increased size.

[0006] An objective of the present invention is to improve the draw-out property of a linear material without the need to prepare such structures as arms.

SOLUTION TO PROBLEM

[0007] An aspect of the invention to achieve the aforementioned objective relates to a packing unit including a linear material, and a packing body configured to house the linear material. The packing body is transformable between a first configuration for packing the linear material, and a second configuration for drawing out the linear material. In the second configuration, an outlet through which the linear material is drawn out from the packing body is located in a higher position than an uppermost part of the packing body in the first configuration.

[0008] Other features of the invention will become apparent from the following description and drawings.

EFFECTS OF INVENTION

[0009] With the present invention, the draw-out property of a linear material can be improved without the need to prepare such structures as arms.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

[Fig. 1] Figs. 1A and 1B are explanatory diagrams of a packing unit 1 of a first embodiment.
[Fig. 2] Figs. 2A and 2B are explanatory diagrams of the interior of the packing unit 1.
[Fig. 3] Fig. 3A is an explanatory diagram of an example of a wound body 20. Fig. 3B is an explanatory diagram of another example of a wound body.
[Fig. 4] Fig. 4 is a schematic diagram of a linear material 10, holding parts 413, and an outlet 43.
[Fig. 5] Figs. 5A and 5B are explanatory diagrams of a first modified example of the packing unit 1 of the first embodiment.
[Fig. 6] Figs. 6A and 6B are explanatory diagrams of a second modified example of the packing unit 1 of the first embodiment.
[Fig. 7] Figs. 7A and 7B are explanatory diagrams of a third modified example of the packing unit 1 of the first embodiment.
[Fig. 8] Figs. 8A and 8B are explanatory diagrams of a fourth modified example of the packing unit 1 of the first

embodiment.

[Fig. 9] Figs. 9A and 9B are explanatory diagrams of a fifth modified example of the packing unit 1 of the first embodiment.

[Fig. 10] Figs. 10A and 10B are explanatory diagrams of a sixth modified example of the packing unit 1 of the first embodiment.

[Fig. 11] Figs. 11A and 11B are explanatory diagrams of a packing unit 1 of a second embodiment.

[Fig. 12] Figs. 12A to 12C are explanatory diagrams of an ascending/descending unit 50.

[Fig. 13] Fig. 13 is an explanatory diagram of an example of a structure of an extension/contraction member 52.

[Fig. 14] Figs. 14A to 14C are explanatory diagrams of modified examples of an ascending/descending unit 50.

DESCRIPTION OF EMBODIMENTS

[0011] At least the following aspects are disclosed in the following description and drawings.

[0012] Aspect 1 is a packing unit including: a linear material; and a packing body configured to house the linear material, wherein the packing body is transformable between a first configuration for packing the linear material, and a second configuration for drawing out the linear material, and in the second configuration, an outlet through which the linear material is drawn out from the packing body is located in a higher position than an uppermost part of the packing body in the first configuration. In this way, the draw-out property of the linear material can be improved without the need to prepare such structures as arms.

[0013] Aspect 2 is a packing unit of aspect 1, wherein the packing body includes a holding part protruding upward from a bottom surface of the packing body. It is particularly effective in cases where there is such a holding part.

[0014] Aspect 3 is a packing unit of aspect 2, wherein a distance from the bottom surface to the outlet in the second configuration is at least 1.5 times of a distance from the bottom surface to a tip end of the holding part. In this way, the linear material can be drawn out easily.

[0015] Aspect 4 is a packing unit of aspect 2 or 3, wherein the holding part is fixed at two locations separated from one another in an up-down direction. In this way, the holding part will have a structure that is less likely to fall over.

[0016] Aspect 5 is a packing unit of any one of aspects 1 to 4, wherein the packing body includes a plurality of lid parts, and in the second configuration, the outlet is disposed in a hood part assembled by the lid parts. In this way, the outlet can be located in a high position by using a lid.

[0017] Aspect 6 is a packing unit of aspect 5, wherein a tubular member constituting the outlet is disposed in a part where the lid parts are connected. In this way, the linear material can be inhibited from entering a part where the lid parts are connected.

[0018] Aspect 7 is a packing unit of aspect 5 or 6, wherein the lid part includes a coupling part to be coupled with another member when assembling the hood part. This increases the strength of the hood part.

[0019] Aspect 8 is a packing unit of aspect 7, wherein the coupling part includes a projection and a depression, and the projection and the depression of the coupling parts are engageable by an opening/closing operation of the lid parts. This facilitates the task of assembling the hood part.

[0020] Aspect 9 is a packing unit of any one of aspects 1 to 4, further including: a moving body including the outlet; and an extension/contraction member configured to make the moving body ascend/descend. In this way, the outlet can be located in a high position by extending the extension/contraction member.

[0021] Aspect 10 is a packing unit of aspect 9, wherein the packing body includes a holding part protruding upward from a bottom surface, and in the first configuration, the moving body is located below a tip end of the holding part. In this way, the linear material can be inhibited from falling out from the holding part in the first configuration.

[0022] Aspect 11 is a packing unit of aspect 10, wherein in the first configuration, the moving body is in contact with an upper surface of a wound body made by winding the linear material. In this way, the wound body can be inhibited from collapsing.

FIRST EMBODIMENT:

[0023] Figs. 1A and 1B are explanatory diagrams of a packing unit 1 of a first embodiment. Fig. 1A is an explanatory diagram of the packing unit 1 in a first configuration. Fig. 1B is an explanatory diagram of the packing unit 1 in a second configuration. Figs. 2A and 2B are explanatory diagrams of the interior of the packing unit 1. Fig. 2A is an explanatory diagram of the interior of the packing unit 1 viewed laterally. Fig. 2B is an explanatory diagram illustrating the interior of the packing unit 1, without illustrating side plate parts 412 and lid 42.

[0024] In the description below, the direction perpendicular to the bottom surface of the packing body 40 (the upper surface of bottom part 411; the surface supporting wound body 20) is referred to as "up-down direction", wherein "up" is the side of the wound body 20 as viewed from the bottom surface of the packing body 40, and "down" is the opposite side therefrom. When the packing unit 1 is placed on a horizontal surface, the up-down direction matches the vertical direction.

In the description below, the direction perpendicular to the up-down direction may be referred to as "lateral direction".

[0025] The packing unit 1 is a member (unit) configured to pack a linear material 10. As illustrated in Figs. 1A and 1B, the configurations of the packing unit 1 are transformable. As illustrated in Fig. 1A, a configuration for packing the linear material 10 is referred to as "first configuration". As illustrated in Fig. 1B, a configuration for drawing out the linear material 10 is referred to as "second configuration". The packing unit 1 includes a linear material 10, a packing body 40, and a pallet 60.

[0026] The linear material 10 is a linear member. Examples of the linear material 10 may include cables (electric cables, optical cables, etc.), wires, tubes, etc. In this example, the linear material 10 is an optical cable. The linear material 10 is packed in a bent state. In this example, the linear material 10 is packed in a wound state. For example, a thick stiff cable having an outer diameter of 3 mm or greater and having a length of 1000 m or longer is housed in a wound state inside the packing body 40 in a manner capable of being drawn out therefrom. Note that, in cases where a cable has an outer diameter of 7 to 11 mm, 2000 m worth the cable can be housed inside a $1\times1\times1$ m packing body 40. In the description below, a structure made by winding a linear material 10 may be referred to as "wound body". Note, however, that the linear material 10 does not have to be packed in a wound state.

[0027] Fig. 3A is an explanatory diagram of an example of a wound body 20. Fig. 3B is an explanatory diagram of another example of a wound body. The wound body 20 is made by winding the linear material 10 while repeatedly inverting the winding directions. By repeatedly inverting the winding directions of the linear material 10, the linear material 10 can be inhibited from getting twisted when the linear material 10 is drawn out from the wound body 20 as illustrated in Fig. 1B. The wound body 20 includes an inversion part 22 where the linear material 10 wound in an S-shape and the linear material 10 wound in an inverted S-shape are stacked alternately. The wound body 20 illustrated in Fig. 3A includes a spirally-wound part 21 in which the linear material 10 is spirally wound, located around the outer periphery of the inversion part 22. Note that, as illustrated in Fig. 3B, the wound body 20 does not have to include a spirally-wound part 21. Further, the wound body 20 may be made by winding the linear material 10 without inverting the winding direction of the linear material 10. The configuration of the wound body 20 can be changed as appropriate depending on the demand.

[0028] The packing body 40 is a structure configured to pack the linear material 10 (wound body 20). The packing body 40 has a housing space for housing the linear material 10 (wound body 20). The packing body 40 is transformable between the first configuration and the second configuration. In this example, the packing body 40 is made in a box shape. Note, however, that the packing body 40 is not limited to a box-shaped structure, and may be a skeletal (framelike) structure. In other words, the packing body 40 includes a member forming a housing space. For example, the member forming a housing space may be a member covering the bottom, side surfaces, and upper surface of the housing space, or may be a skeleton/frame. Examples of materials usable for the member forming a housing space may include wood, paper such as cardboard, metal, FRP, plastic, or a combination thereof. Particularly, employing cardboard for the member forming a housing space is suitable in contributing to a sustainable society compared to a drum made of metal or wood, because cardboard is lightweight and easy to disassemble, and has excellent recyclability, and also does not use chemicals such as preservatives. The packing body 40 of the first embodiment includes a main body part 41 and a lid 42. Note, however, that the packing body 40 does not have to include a lid, as will be described further below.

[0029] The main body part 41 is a part constituting the main body of the packing body 40. The main body part 41 is a part configured to pack the linear material 10 (wound body 20). The main body part 41 includes a bottom part 411 and holding parts 413.

[0030] The bottom part 411 constitutes the bottom of the main body part 41. The bottom part 411 serves as a member for supporting the wound body 20 from below. In this example, the bottom part 411 is a plate-like member, but it is not limited to a plate-like member as long as it is capable of supporting the wound body 20.

[0031] Side plate parts 412 are disposed in a manner standing up toward the upper side from the peripheral edge of the bottom part 411. The side plate parts 412 constitute the side surfaces of the main body part 41. Note, however, that in cases where the main body part 41 has a skeletal structure, the main body part 41 does not have to include side plate parts 412. In this example, the bottom part 411 and a plurality of (in this example, four) side plate parts 412 form a housing space for housing the linear material 10. Note, however, that the number of side plate parts 412 is not limited to four, and it may be six or eight, for example.

[0032] The holding part 413 is a member configured to hold the linear material 10 in a wound form. Stated differently, the holding part 413 is a member configured to hold the wound body 20. The holding part 413 is a rod-like (tubular) member along the up-down direction. The holding part 413 extends upward from the bottom part 411. The linear material 10 contacts the holding parts 413, and thus movement of the linear material 10 is restricted. As a result, when the linear material 10 is drawn out (or, for example, when packed, when being drawn out, when stored, or when being transported), the wound body 20 can be inhibited from collapsing. Note, however, that the holding part 413 only needs to be installed as necessary, and the holding part 413 does not necessarily have to be installed.

[0033] An example illustrated in Fig. 3 will be described. A pair of holding parts 413 is disposed, respectively, close to the fore and aft of the inversion part 22 of the wound body 20. Note that, in order to inhibit the linear material 10 from getting twisted when the linear material 10 is drawn out, the wound body 20 includes an inversion part 22 where the winding

direction of the linear material 10 is inverted between an S-shape and an inverted S-shape (Z-shape), and at this inversion part 22, the posture of the linear material 10 tends to become unstable and may easily collapse. In view thereof, by disposing the pair of holding parts 413 close to the fore and aft of the inversion part 22 (i.e., by locating the inversion part 22 of the wound body 20 between the pair of holding parts 413), the shape of the inversion part 22 can be inhibited from collapsing.

[0034] The lid 42 is a part which covers the main body part 41. The lid 42 is configured so as to be openable/closable. As illustrated in Fig. 1A, in a state where the lid 42 is closed (in a state where the lid 42 is folded), the lid 42 is in a state covering an upper part of the main body part 41, and the packing body 40 is in the first configuration (configuration for packing the wound body 20 in the packing body 40). When the linear material 10 is to be drawn out from the packing body 40, as illustrated in Fig. 1B, the lid 42 is unfolded and developed, and a hood part 42A is assembled by the lid 42. The configuration wherein the hood part 42A has been assembled corresponds to the second configuration (configuration for drawing out the linear material 10) of the packing body 40.

[0035] The hood part 42A is a part assembled by the lid 42 (a plurality of lid parts 421 described below). The hood part 42A is disposed at an upper part of the main body part 41, and is located in a higher position than the uppermost part of the packing body 40 (a part located in the highest position of the packing body 40; in this example, the upper surface of the lid 42) in the first configuration. An outlet 43 is disposed at a top part of the hood part 42A. In this way, the outlet 43 can be located in a high position. Note, however, that the outlet 43 only needs to be located in a higher position than the uppermost part of the packing body 40 in the first configuration, and does not have to be disposed at the top part of the hood part 42A. For example, the outlet 43 may be disposed in a sloped surface of the hood part 42A.

[0036] The outlet 43 is a part through which the linear material 10 packed inside the main body part 41 is drawn out. The outlet 43 is designed so that it is larger in dimension than the cross section of the linear material 10, and thus, the linear material 10 can be passed through the outlet 43 and the linear material 10 can be drawn outside. The outlet 43 is located in a higher position than the uppermost part of the packing body 40 in the first configuration. The outlet 43 of the first embodiment is disposed in the hood part 42A constituted by the lid 42. Note, however, that the outlet 43 does not have to be disposed in the hood part 42A, nor does it have to be disposed in the lid 42 (see, for example, the later-described second embodiment).

[0037] As illustrated in Fig. 1B, the lid 42 has two lid parts 421 (first lid part 421A and second lid part 421B). The first lid part 421A is a plate-like member, is disposed on the upper edge (upper side) of one of the side plate parts 412, and rotates (opens/closes) about the upper edge of the side plate part 412. The second lid part 421B is a plate-like member, is disposed on an upper edge of a side plate part 412 opposing the side plate part 412 where the first lid part 421A is disposed, and rotates (opens/closes) about the upper edge of the side plate part 412. As illustrated in Fig. 1A, in the first configuration, the first lid part 421A and the second lid part 421B cover the upper part of the main body part 41 in a superposed state. As illustrated in Fig. 1B, in the second configuration, a gable roof-like hood part 42A is assembled by the lid 42 (first lid part 421A and second lid part 421B). In the second configuration, the respective end-side edges of the first lid part 421A and the second lid part 421B are connected with one another, and thus, the posture of the first lid part 421A and the second lid part 421B is stabilized.

[0038] In the first embodiment, the outlet 43 is disposed in the hood part 42A. In this example, as illustrated in Fig. 1B, a tubular member 44 is attached to the central part of the respective end-side edges of the first lid part 421A and the second lid part 421B, and this tubular member 44 constitutes the outlet 43. That is, the tubular member 44 is disposed in a part where the first lid part 421A and the second lid part 421B are connected. Note that a recess part is provided in advance in the central part of the respective end-side edges of the first lid part 421A and the second lid part 421B, and the tubular member 44 is attached to an opening formed by this recess part. By attaching the tubular member 44 to a part where the first lid part 421A and the second lid part 421B are connected, the linear material 10 can be inhibited from entering between the first lid part 421A and the second lid part 421B. Note, however, that the outlet 43 does not have to be constituted by a tubular member 44 (described later; see Fig. 5B).

[0039] Next, the reason why the outlet 43 is located in a high position will be described. Fig. 4 is a schematic diagram of the linear material 10, the holding parts 413, and the outlet 43.

[0040] When the packing unit 1 is viewed laterally, the pair of holding parts 413 is disposed symmetrically. That is, the holding parts 413 are disposed at an equidistant position from the center of the packing body 40 (see the dotted line in the figure). In this example, the distance between the respective outer edges of the holding parts 413 is defined as X. The outlet 43 is located on an extension of the center of the packing body 40 (see the dotted line in the figure). Therefore, the distance, in the lateral direction, between the outer edge of one holding part 413 and the outlet 43 is X/2. Further, the distance from the bottom surface of the packing body 40 (the upper surface of the bottom part 411) to the tip end of the holding part 413 (i.e., the protrusion length by which the holding part 413 protrudes from the bottom surface; the height of the holding part 413) is defined as Y. The distance from the bottom surface of the packing body 40 (the upper surface of the bottom part 411) to the outlet 43 (i.e., the height of the outlet 43) is defined as Z.

[0041] In order to draw the linear material 10, which has been drawn out from the wound body 20, out from the outlet 43, the linear material needs to surmount the tip end of the holding part 413. In this example, the angle formed between the

lateral direction and the linear material 10 located above the tip end of the holding part 413 (i.e., the linear material 10 between the tip end of the holding part 413 and the outlet 43) when the linear material 10 surmounts the tip end of the holding part 413 is defined as θ_1, and the angle formed between the lateral direction and the linear material 10 located below the tip end of the holding part 413 (i.e., the linear material 10 being guided by the holding part 413; the linear material 10 between the wound body 20 and the tip end of the holding part 413) is defined as θ_2. The figure illustrates a state in which the angle θ_2 is the largest. The angle θ_2 becomes the largest when the linear material 10 on the bottom part 411 is drawn out. Thus, the maximum value of the angle θ_2 corresponds to the angle between the bottom surface of the packing body 40 (the upper surface of the bottom part 411) and a line connecting the outer edge of the tip end of one holding part 413 and the outer edge of the base end (i.e., the fixing end of the holding part 413 to the bottom part 411) of the other holding part 413.

[0042] The greater the angle θ_1 is, the easier it is for the linear material 10 to surmount the tip end of the holding part 413. Therefore, it is preferable that the height Z of the outlet 43 is as great as possible. Stated differently, it is preferable that the outlet 43 is located in a high position. For this reason, the outlet 43 of the present embodiment is located in a higher position than the uppermost part of the packing body 40 (the upper surface of the lid 42 in the first embodiment) in the first configuration (see Fig. 1B).

[0043] Further, the greater the angle θ_1 is compared to the angle θ_2, the easier it is for the linear material 10 to surmount the tip end of the holding part 413. Therefore, it is preferable that the angle θ_1 is greater than or equal to the angle θ_2. As illustrated in Fig. 4, when the height Z of the outlet 43 is 1.5 times the height Y of the holding part 413, the angle θ_1 becomes equal to the maximum value of the angle θ_2. Therefore, it is preferable that the height Z of the outlet 43 is at least 1.5 times the height Y of the holding part 413.

[0044] As illustrated in Fig. 4, because the linear material 10 needs to surmount the tip end of the holding part 413, it is preferable that the tip end of the holding part 413 has a shape that is easily surmountable by the linear material 10. So, the holding part 413 may have a shape that becomes gradually narrower toward the tip end side. Also, the tip end of the holding part 413 may be rounded when viewed laterally.

[0045] Note that the main body part 41 does not have to include holding parts 413. Even in cases where the main body part 41 does not include a holding part 413, by locating the outlet 43 in a high position, it is possible to reduce the angle between the linear material 10 and the central line of the outlet 43, which makes it easier to draw out the linear material 10 from the outlet 43. So, even in cases where the main body part 41 does not include a holding part 413, it is advantageous to locate the outlet 43 in a high position. Therefore, it is preferable that the outlet 43 is located in a higher position than the uppermost part of the packing body 40 in the first configuration.

[0046] The pallet 60 is a member serving as a base of the packing body 40. For example, the pallet 60 serves as a loading platform used when moving the packing unit 1 with a forklift. The pallet 60 may include a lower plate part 61 and a spacer 62. The lower plate part 61 is a plate-like part constituting the lower surface of the pallet 60. The spacer 62 is a member located between the packing body 40 (bottom part 411) and the lower plate part 61. The spacer 62 forms a gap between the bottom part 411 and the lower plate part 61, and the forks of a forklift will be inserted into this gap. Note, however, that the gap may be formed below the packing body 40 only by the spacer 62, without providing the lower plate part 61. Further, the packing unit 1 does not have to include the pallet 60.

[0047] As illustrated in Fig. 2A, the holding part 413 penetrates the bottom part 411 of the packing body 40, and the lower end of the holding part 413 is fixed to the lower plate part 61 of the pallet 60. The holding part 413 is fixed at two locations, i.e., the bottom part 411 of the packing body 40 and the lower plate part 61 of the pallet 60. Since the bottom part 411 and the lower plate part 61 are separated in the up-down direction by the spacer 62, the holding part 413 is fixed at two locations separated from one another in the up-down direction. In this way, the holding part 413 will have a structure that is less likely to fall over. Note, however, that the lower end of the holding part 413 may be fixed to the bottom part 411 of the packing body 40, without making the holding part 413 penetrate the bottom part 411 of the packing body 40.

Modified Examples:

[0048] Figs. 5A and 5B are explanatory diagrams of a first modified example of the packing unit 1 of the first embodiment. Fig. 5A is a top view of the packing unit 1 in a state where the lid 42 is open. Fig. 5B is an explanatory diagram of the packing unit 1 in the second configuration.

[0049] Also in the first modified example, the lid 42 includes a first lid part 421A and a second lid part 421B, and a recess part is provided in the central part of the respective end-side edges of the first lid part 421A and the second lid part 421B. In the first modified example, after forming a hood part 42A by assembling the first lid part 421A and the second lid part 421B, no tubular member 44 is attached to the recess part, and instead, the recess part of the first lid part 421A and the second lid part 421B forms the outlet 43. As in this example, the outlet 43 does not have to be constituted by a tubular member 44.

[0050] Figs. 6A and 6B are explanatory diagrams of a second modified example of the packing unit 1 of the first embodiment.

[0051] Also in the second modified example, the lid 42 includes a first lid part 421A and a second lid part 421B. In the second modified example, the end-side edge of the first lid part 421A and the second lid part 421B includes coupling parts

422. The coupling part 422 is a part to be coupled with another member when assembling the hood part 42A. By coupling the coupling parts 422 of the first lid part 421A with the coupling parts 422 of the second lid part 421B, the posture of the first lid part 421A and the second lid part 421B is stabilized, and the strength of the hood part 42A is increased.

[0052] In this example, the coupling part 422 is configured in a projecting-and-depressed shape, and the projections and depressions of the first lid part 421A engage with the projections and depressions of the second lid part 421B, and thereby, the respective end-side edges of the first lid part 421A and the second lid part 421B are coupled with one another. Note, however, that the coupling part 422 is not limited to a projecting-and-depressed shape. For example, the coupling part of one of the first lid part 421A or the second lid part 421B may be an insert tab, and the coupling part of the other may be a slit, and the tab may be inserted into the slit, to couple the respective end-side edges of the first lid part 421A and the second lid part 421B with one another. Note, however, that in cases where the coupling part 422 is formed in a projecting-and-depressed shape as illustrated in Figs. 6A and 6B, the coupling parts 422 of the first lid part 421A can be coupled with the coupling parts 422 of the second lid part 421B simply by an opening/closing operation of the first lid part 421A and the second lid part 421B, and there is no need for other operations, such as inserting a tab into a slit. Therefore, it is possible to facilitate the task of assembling the hood part 42A.

[0053] Figs. 7A and 7B are explanatory diagrams of a third modified example of the packing unit 1 of the first embodiment.

[0054] Also in the third modified example, the lid 42 includes a first lid part 421A and a second lid part 421B. Further, in the third modified example, the lid 42 includes flap parts 423. The flap part 423 is a plate-like part for covering a gap in the hood part 42A. The flap part 423 is disposed on the upper edge (upper side) of a side plate part 412 that does not have the first lid part 421A or the second lid part 421B, and rotates (opens/closes) about the upper edge of the side plate part 412. When a gable roof-like hood part 42A is assembled by the first lid part 421A and the second lid part 421B, the lateral-side edges of the first lid part 421A and the second lid part 421B are connected respectively with the lateral-side edges of the flap parts 423. In this way, each gap formed in the lateral side of the gable roof-like hood part 42A can be covered by the flap part 423. Note that, also in the third modified example, a coupling part, similar to the coupling part 422 of the second modified example, may be provided on each lateral-side edge of the first lid part 421A and that of the second lid part 421B, and also on each lateral-side edge of the flap parts 423, and the coupling part of the first lid part 421A or the second lid part 421B may be coupled with the coupling part of the flap part 423. In this way, the strength of the hood part 42A can be increased.

[0055] Figs. 8A and 8B are explanatory diagrams of a fourth modified example of the packing unit 1 of the first embodiment.

[0056] In the fourth modified example, the lid 42 includes a plurality of (in this example, four) lid parts 421. Each lid part 421 is disposed on the upper edge (upper side) of one of the side plate parts 412 of the main body part 41. By connecting the lateral-side edges of the four lid parts 421 together, a pavilion roof-like (truncated pyramid-like) hood part 42A is assembled. In the fourth modified example, an outlet 43 is formed by the respective end-side edges of the plurality of lid parts 421. Note that a tubular member 44 may be attached to the opening formed by the respective end-side edges of the plurality of lid parts 421, and the outlet 43 may be formed by the tubular member 44. By forming the outlet 43 with the tubular member 44, the linear material 10 can be inhibited from entering between the lid parts 421. Note that, also in the fourth modified example, a coupling part, similar to the coupling part 422 of the second modified example, may be provided on each lateral-side edge of the respective lid parts 421, and the coupling parts of the respective lid parts 421 may be coupled together. In this way, the strength of the hood part 42A can be increased.

[0057] Figs. 9A and 9B are explanatory diagrams of a fifth modified example of the packing unit 1 of the first embodiment.

[0058] The fifth modified example is different from the fourth modified example (Figs. 8A and 8B) in that a recess part 424 is formed in the end-side edge of the lid part(s) 421 constituting the outlet 43. By forming the recess part 424 in the end-side edge of the lid part(s) 421, the recess part 424 will be located in the peripheral edge of the outlet 43. When the linear material 10 is drawn out from the outlet 43, the linear material 10 will enter the recess part 424, and thereby, the position of the linear material 10 being drawn out will be stabilized at the position of the recess part 424. In the fifth modified example, the linear material 10 can be inhibited from entering between the lid parts 421, even without using a tubular member 44.

[0059] Figs. 10A and 10B are explanatory diagrams of a sixth modified example of the packing unit 1 of the first embodiment.

[0060] Also in the sixth modified example, the lid 42 includes a plurality of (in this example, four) lid parts 421. Each lid part 421 has an upper surface part 425. The upper surface part 425 is a plate-like part which constitutes the upper surface of the hood part 42A. The upper surface part 425 is located on the lid part 421's end-side edge on the opposite side from the side plate part 412. A hole 425A is formed in the upper surface part 425, and the outlet 43 is constituted by the hole 425A. In this example, each of the four lid parts 421 has the upper surface part 425, and the four upper surface parts 425 are placed on one another to constitute the upper surface of the hood part 42A. Note, however, that it will suffice if at least one of the lid parts 421 has the upper surface part 425. According to the sixth modified example, the linear material 10 can be inhibited from entering between the lid parts 421.

[0061] In the first embodiment, including the aforementioned first to sixth modified examples, the outlet 43 in the second configuration is located in a higher position than the uppermost part of the packing body 40 in the first configuration. In this

way, the outlet 43 can be located in a high position by transforming the packing unit 1, and thus, the linear material 10 can be drawn out easily with a simple structure.

[0062] Further, in the first embodiment, including the aforementioned first to sixth modified examples, the packing body 40 includes a plurality of lid parts 421, and the outlet 43 is disposed in the hood part 42A assembled by the lid parts 421. In this way, the outlet 43 can be located in a high position by using the lid 42, and thus, it is possible to improve the draw-out property of the linear material without the need to prepare such structures as arms.

Test Examples:

[0063] Packing units 1, as illustrated in Figs. 1A and 1B, were prepared, and the draw-out property of an optical cable (corresponding to linear material 10) was evaluated. In these examples, packing units 1 were prepared such that the distance between the pair of holding parts 413 was 700 mm, the height Y of the holding part 413 was 720 mm, and the height Z of the outlet 43 was varied within a range from 810 to 1500 mm. The diameter of the optical cable was 7 mm. In the evaluation of the draw-out property, cases in which the optical cable could be drawn out from the outlet 43 without pulling the optical cable with undue force were rated as "Good (o)"; cases in which the optical cable could be drawn out from the outlet 43 if the optical cable was pulled with force were rated as "Acceptable (Δ)"; and cases in which the optical cable could not be drawn out were rated as "Fail (×)".

[0064] Table 1 shows the evaluation results of the draw-out property of each of the packing units 1 with different heights Z of the outlet 43.

[Table 1]

Outlet height [mm]	Guide part height [mm]	Z/Y	Evaluation result
Z	Y		
810	720	1.13	×
1050	720	1.46	Δ
1100	720	1.53	○
1500	720	2.08	○
Δ: Cable could be drawn out if pulled with force. ○: Cable could be drawn out without pulling with undue force.			

[0065] As shown in Table 1, in cases where the height Z of the outlet 43 was at least 1.5 times the height Y of the holding part 413, the optical cable could be drawn out from the outlet 43 without pulling the optical cable with undue force. It was thus verified that when the height Z of the outlet 43 was at least 1.5 times the height Y of the holding part 413, the linear material 10 could easily surmount the tip end of the holding part 413. Note that, even in the case of Z/Y = 1.46, the optical cable could be drawn out from the outlet 43. It is thus found that the optical cable can be drawn out from the outlet 43 even if the height Z of the outlet 43 is less than 1.5 times the height Y of the holding part 413, as long as the optical cable can go against getting caught by the holding part 413. It was verified, however, that when the height Z of the outlet 43 was at least 1.5 times the height Y of the holding part 413, the optical cable did not have to go against getting caught by the holding part 413 and could thus be drawn out easily, compared to cases where the height Z of the outlet 43 was less than 1.5 times the height Y of the holding part 413. Note that, taking into consideration that the linear material 10 can easily surmount the tip end of the holding part 413 when the height Z of the outlet 43 is at least 1.5 times the height Y of the holding part 413 as illustrated in Fig. 4, it can be said that, also in cases of other packing units 1 different from the packing unit 1 illustrated in Figs. 1A and 1B, if the height Z of the outlet 43 is at least 1.5 times the height Y of the holding part 413, the linear material can be drawn out easily as with the packing unit 1 illustrated in Figs. 1A and 1B, compared to cases where the height Z of the outlet 43 is less than 1.5 times the height Y of the holding part 413.

SECOND EMBODIMENT:

[0066] Figs. 11A and 11B are explanatory diagrams of a packing unit 1 of a second embodiment. Fig. 11A is an explanatory diagram of the packing unit 1 in a first configuration. Fig. 11B is an explanatory diagram of the packing unit 1 in a second configuration. Figs. 12A to 12C are explanatory diagrams of an ascending/descending unit 50. Fig. 12A is a top view of the packing unit 1. Fig. 12B is an explanatory diagram of the ascending/descending unit 50 in the first configuration. Fig. 12C is an explanatory diagram of the ascending/descending unit 50 in the second configuration. Note that in Figs. 12B and 12C, the side plate parts 412 are not illustrated in order to illustrate the ascending/descending unit 50 (and wound body

20).

[0067] Also in the second embodiment, the packing unit 1 includes a wound body 20, a packing body 40, and a pallet 60. Note that, also in the second embodiment, an ascending/descending unit 50 does not have to include a pallet 60. The packing body 40 of the second embodiment further includes an ascending/descending unit 50. Note that, as in the first embodiment, the packing body 40 of the second embodiment may include a lid 42 or may not include a lid 42.

[0068] The ascending/descending unit 50 is a member configured to make the outlet 43 ascend/descend. When the packing body 40 is in the first configuration (configuration for packing the wound body 20 inside the packing body 40), the ascending/descending unit 50 is in a state where the outlet 43 is lowered, and is housed in the packing body 40 (main body part 41). Note that, in cases where the packing body 40 includes a lid 42, the ascending/descending unit 50 can be packed inside the packing body 40 by closing the lid 42 (not illustrated) in a state where the ascending/descending unit 50 has lowered the outlet 43. When the packing body 40 is in the second configuration (configuration for drawing out the linear material 10), the ascending/descending unit 50 is in a state where the outlet 43 is raised, and the outlet 43 is located in a higher position than the uppermost part of the packing body 40 (a part located in the highest position of the packing body 40; in cases where there is a lid 42, the upper surface of the lid 42; in cases where there is no lid 42, the upper edge of the main body part 41) in the first configuration. Note that, in cases where the packing body 40 includes a lid 42, when the packing body 40 is transformed from the first configuration to the second configuration, the lid 42 is first opened, and in this state, the outlet 43 is brought to a high position using the ascending/descending unit 50.

[0069] The ascending/descending unit 50 includes a moving body 51 including the outlet 43, and extension/contraction members 52.

[0070] The moving body 51 is a member that moves (ascends/descends) in the up-down direction. When the packing body 40 is in the first configuration (configuration for packing the linear material 10), the moving body 51 is in a lowered position and is packed inside the main body part 41. When the packing body 40 is in the second configuration (configuration for drawing out the linear material 10), the moving body 51 is in a raised position and is located in a higher position than the uppermost part of the packing body 40 in the first configuration. The moving body 51 includes the outlet 43 and connection parts 511. In the second embodiment, the outlet 43 is not disposed in the lid 42 of the packing body 40, but is disposed in the moving body 51. The connection part 511 is a part which connects the outlet 43 and the extension/contraction member 52. One end of the connection part 511 is connected to the outlet 43, and the other end of the connection part 511 is connected to the extension/contraction member 52 (more specifically, the tip end of the extension/contraction member 52). The outlet 43 and the connection part 511 illustrated in Figs. 12A to 12C are constituted by the same member (rod-like member) . Note, however, that the member constituting the outlet 43 and the member constituting the connection part 511 may be constituted by separate members (described below; see Fig. 14C).

[0071] As illustrated in Fig. 11A, when the packing body 40 is in the first configuration (configuration for packing the linear material 10), the moving body 51 is located below the tip end of the holding part 413. In this way, the linear material 10 of the wound body 20 can be inhibited from falling out from the holding part 413 in the first configuration. Note, however, that in the first configuration, the moving body 51 may be located above the holding part 413 (but below the uppermost part of the packing body 40 in the first configuration).

[0072] Further, as illustrated in Fig. 11A, when the packing body 40 is in the first configuration (configuration for packing the linear material 10), the moving body 51 is in contact with the upper surface of the wound body 20 (i.e., in contact with the linear material 10 constituting the upper surface of the wound body 20). In this way, the linear material 10 in the wound body 20 can be constrained in the first configuration, and the wound body 20 can be inhibited from collapsing. Note, however, that even if the moving body 51 is not in contact with the linear material 10 of the wound body 20, it is still possible to inhibit the linear material 10 of the wound body 20 from falling out from the holding part 413, as long as the moving body 51 is located below the tip end of the holding part 413.

[0073] The extension/contraction member 52 is a member that extends/contracts in the up-down direction. The extension/contraction member 52 is a member configured to make the moving body 51 move (ascend/descend) in the up-down direction. The extension/contraction member 52 is a member along the up-down direction and extends upward from the bottom part 411. The lower end of the extension/contraction member 52 illustrated in the figure is fixed to the bottom part 411. Note, however, that, like the aforementioned holding part 413, the extension/contraction member 52 may penetrate the bottom part 411 of the packing body 40, and the extension/contraction member 52 may be fixed at two locations, i.e., the bottom part 411 and the lower plate part 61 of the pallet 60. In this way, the extension/contraction member 52 will have a structure that is less likely to fall over. The moving body 51 (more specifically, the connection part 511) is fixed to the upper end of the extension/contraction member 52. By extending/contracting the extension/contraction member 52, the moving body 51 moves (ascends/descends) in the up-down direction. A plurality of the extension/contraction members 52 are located outside the wound body 20 and are located with intervals therebetween in the circumferential direction so as to surround the wound body 20. In this example, four extension/contraction members 52 are located at 90-degree intervals around the outer periphery of the wound body 20.

[0074] Fig. 13 is an explanatory diagram of an example of a structure of the extension/contraction member 52.

[0075] The extension/contraction member 52 includes an upper member 521, a lower member 522, and a fixing part

523. The upper member 521 and the lower member 522 are members along the up-down direction. By sliding the upper member 521 upward relative to the lower member 522, the extension/contraction member 52 extends. Note that, instead of sliding the upper member 521 and the lower member 522, the upper member 521 and the lower member 522 may be coupled with a hinge, and the extension/contraction member 52 may be extended by widening the angle of the hinge (in other words, by unfolding the upper member 521 and the lower member 522 held in a folded state). The structure illustrated in Fig. 13 may be provided in a plurality of stages, and in this way, the extension/contraction member 52 may be made extendable/contractible in multiple stages. In this example, the upper member 521 and the lower member 522 have a tubular structure. The outer diameter of the upper member 521 is smaller than the inner diameter of the lower member 522, and the upper member 521 is located inside the lower member 522. The fixing part 523 fixes the upper member 521 and the lower member 522 and fixes the extension/contraction member 52 in its extended state. In the figure, the fixing part 523 is disposed on the upper member 521 and includes a protrusion which is biased outwardly by a spring. When the upper member 521 moves upward relative to the lower member 522, the protrusion of the fixing part 523 enters a fitting hole in the lower member 522, and thereby, the upper member 521 and the lower member 522 are fixed. As described here, it is preferable that the fixing part 523 is configured such that, when the upper member 521 is moved to a predetermined position relative to the lower member 522, the upper member 521 and the lower member 522 are automatically fixed. This facilitates the operation of fixing the extension/contraction member 52 in its extended state, compared, for example, to a case in which the upper member 521 and the lower member 522 are fixed with a screw. Particularly in cases where there is a need to simultaneously extend a plurality of the extension/contraction members 52 at the time of raising the moving body 51 (outlet 43), by configuring the fixing part 523 such that the upper member 521 and the lower member 522 can be fixed automatically, it is possible to facilitate the operation of fixing the moving body 51 (outlet 43) in a raised state.

[0076] Note, however, that the fixing part 523 is not limited to the structure illustrated in Fig. 13. For example, the fixing part may be disposed on the lower member 522 and may include a protrusion which is biased inwardly, and the protrusion of the fixing part may enter a fitting hole in the upper member 521, thereby fixing the upper member 521 and the lower member 522. Further, the fixing part 523 is not limited to a structure in which a protrusion is biased by a spring as illustrated in Fig. 13. For example, a taper may be formed on the outer surface of the upper member 521 and the inner surface of the lower member 522, and the outer surface of the upper member 521 and the inner surface of the lower member 522 may be fitted together by sliding the upper member 521 upward relative to the lower member 522, to thereby fix the extension/-contraction member 52 in its extended state. Even with this configuration wherein the tapered surfaces are fitted together, the upper member 521 and the lower member 522 can be automatically fixed when the upper member 521 is moved to a predetermined position relative to the lower member 522. Note, however, that the fixing part 523 does not necessarily have to be configured such that the upper member 521 and the lower member 522 are automatically fixed, and for example, the upper member 521 and the lower member 522 may be fixed together with a screw, a pin, a bolt, etc. Further, the upper member 521 and the lower member 522 are not limited to tubular members, and may be, for example, rod-like or plate-like members. Furthermore, the fixing part 523 does not have to be provided to the ascending/descending unit 50 itself. However, providing the fixing part 523 to the ascending/descending unit 50 can facilitate the operation of fixing the extension/contraction member 52 in its extended state.

[0077] Figs. 14A to 14C are explanatory diagrams of modified examples of an ascending/descending unit 50.

[0078] The ascending/descending unit 50 of a first modified example illustrated in Fig. 14A includes a moving body 51 and extension/contraction members 52. As for the extension/contraction members 52, four extension/contraction members 52 are located at 90-degree intervals around the outer periphery of the wound body 20. The moving body 51 includes two mutually-intersecting bridge parts 512. The bridge part 512 is a part that bridges the respective tip ends of two mutually-opposing extension/contraction members 52. Each bridge part 512 is constituted by a pair of parallel rod members. An outlet 43 is constituted by a part where the two bridge parts 512 intersect with one another, and connection parts 511 are constituted by the remaining parts.

[0079] Also in the second modified example illustrated in Fig. 14B, the ascending/descending unit 50 includes a moving body 51 and extension/contraction members 52. In the second modified example, the ascending/descending unit 50 includes two extension/contraction members 52, and a bridge part 512 is disposed so as to bridge the respective tip ends of the two extension/contraction members 52. In the second modified example, an outlet 43 is formed in a central part of the bridge part 512, and connection parts 511 are constituted by the remaining parts. As illustrated in the second modified example, the extension/contraction members 52 do not have to be located at 90-degree intervals around the outer periphery of the wound body 20.

[0080] Also in the third modified example illustrated in Fig. 14C, the ascending/descending unit 50 includes a moving body 51 and extension/contraction members 52. The moving body 51 of the third modified example includes an outlet 43 constituted by a ring member 513, and cord members (corresponding to connection parts 511) for connecting the outlet 43 (ring member 513) and the extension/contraction members 52. As in this example, the outlet 43 and the connection parts 511 do not have to be constituted by rod-like members.

[0081] In the second embodiment including the aforementioned first to third modified examples, as in the first embodiment, the outlet 43 in the second configuration is located in a higher position than the uppermost part of the

packing body 40 in the first configuration. In this way, the outlet 43 can be located in a high position by transforming the packing unit 1, and thus, it is possible to improve the draw-out property of the linear material without the need to prepare such structures as arms.

[0082] Further, different from the first embodiment, in the second embodiment including the aforementioned first to third modified examples, the packing body 40 includes a moving body 51 including the outlet 43, and extension/contraction members 52. In this way, the outlet 43 can be located in a high position by extending the extension/contraction members 52. Note that, since the ascending/descending unit 50 is packed inside the packing body 40, there is no need to prepare a draw-out device configured separately from the packing unit 1 at the time of drawing out the linear material 10.

[0083] Note that, also in the second embodiment including the aforementioned first to third modified examples, it is preferable that the angle θ_1 is greater than or equal to the angle θ_2 as illustrated in Fig. 4. Therefore, also in the second embodiment including the aforementioned first to third modified examples, as in the first embodiment, it is preferable that the height Z of the outlet 43 is at least 1.5 times the height Y of the holding part 413.

OTHERS:

[0084] The foregoing embodiments are for facilitating the understanding of the present invention, and are not to be construed as limiting the present invention. The present invention may be modified and/or improved without departing from the gist thereof, and it goes without saying that the present invention encompasses equivalents thereof.

REFERENCE SIGNS LIST

[0085]

1: Packing unit;
10: Linear material;
20: Wound body;
21: Spirally-wound part;
22: Inversion part;
40: Packing body;
41: Main body part;
411: Bottom part;
412: Side plate part;
413: Holding part;
42: Lid;
42A: Hood part;
421: Lid part;
421A: First lid part;
421B: Second lid part;
422: Coupling part;
423: Flap part;
424: Recess part;
425: Upper surface part;
425A: Hole;
43: Outlet;
44: Tubular member;
50: Ascending/descending unit;
51: Moving body;
511: Connection part;
512: Bridge part;
513: Ring member;
52: Extension/contraction member;
521: Upper member;
522: Lower member;
523: Fixing part;
60: Pallet;
61: Lower plate part;
62: Spacer.

Claims

1. A packing unit comprising:

   a linear material; and
   a packing body configured to house the linear material,
   wherein
   the packing body is transformable between a first configuration for packing the linear material, and a second configuration for drawing out the linear material, and
   in the second configuration, an outlet through which the linear material is drawn out from the packing body is located in a higher position than an uppermost part of the packing body in the first configuration.

2. The packing unit according to claim 1, wherein
   the packing body includes a holding part protruding upward from a bottom surface of the packing body.

3. The packing unit according to claim 2, wherein
   a distance from the bottom surface to the outlet in the second configuration is at least 1.5 times of a distance from the bottom surface to a tip end of the holding part.

4. The packing unit according to claim 2 or 3, wherein
   the holding part is fixed at two locations separated from one another in an up-down direction.

5. The packing unit according to claim 1, wherein

   the packing body includes a plurality of lid parts, and
   in the second configuration, the outlet is disposed in a hood part assembled by the lid parts.

6. The packing unit according to claim 5, wherein
   a tubular member constituting the outlet is disposed in a part where the lid parts are connected.

7. The packing unit according to claim 5 or 6, wherein
   the lid part includes a coupling part to be coupled with another member when assembling the hood part.

8. The packing unit according to claim 7, wherein

   the coupling part includes a projection and a depression, and
   the projection and the depression of the coupling parts are engageable by an opening/closing operation of the lid parts.

9. The packing unit according to claim 1, further comprising:

   a moving body including the outlet; and
   an extension/contraction member configured to make the moving body ascend/descend.

10. The packing unit according to claim 9, wherein

    the packing body includes a holding part protruding upward from a bottom surface, and
    in the first configuration, the moving body is located below a tip end of the holding part.

11. The packing unit according to claim 10, wherein
    in the first configuration, the moving body is in contact with an upper surface of a wound body made by winding the linear material.

FIG. 1A

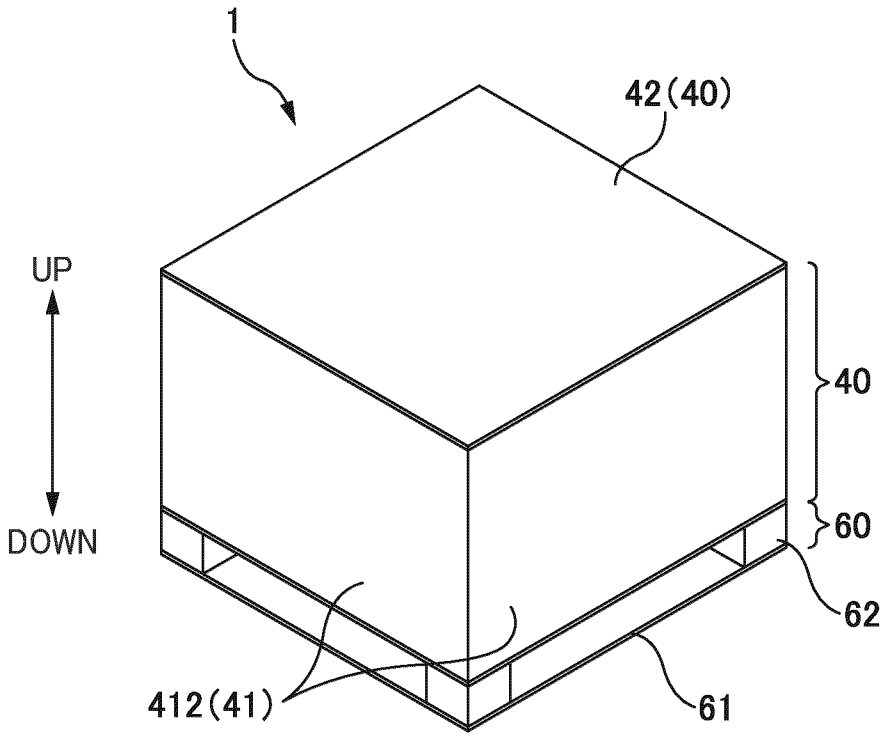
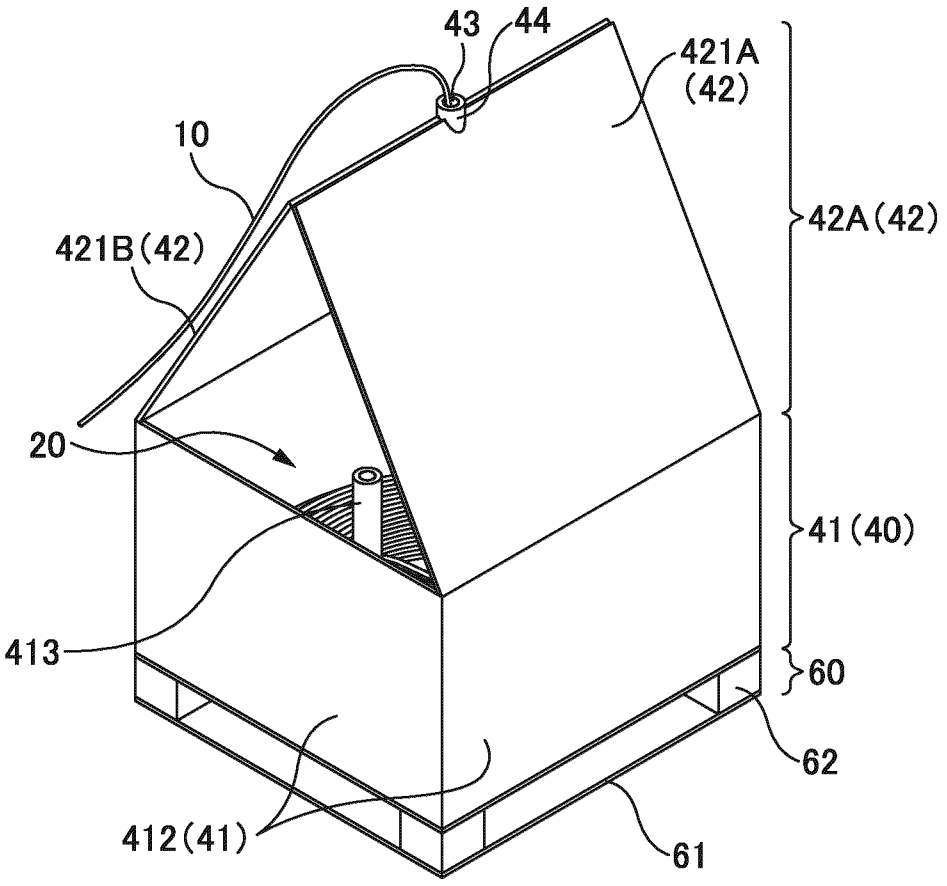

1
42(40)
UP
DOWN
40
60
62
412(41)
61

FIG. 1B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421A
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10
421B(42)
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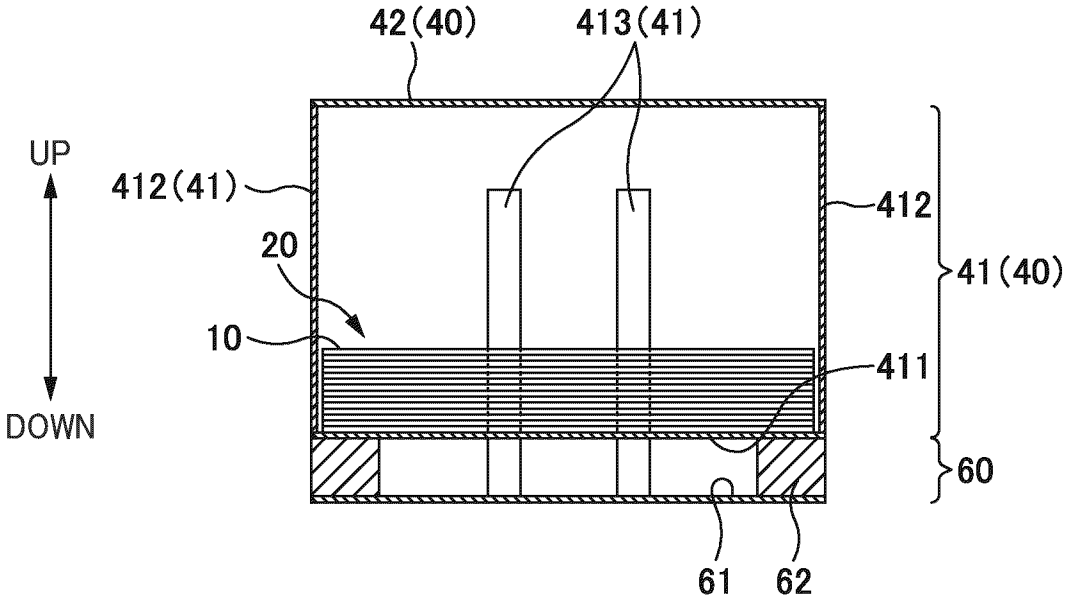
20
41(40)
413
60
62
412(41)
61


42(40)
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UP
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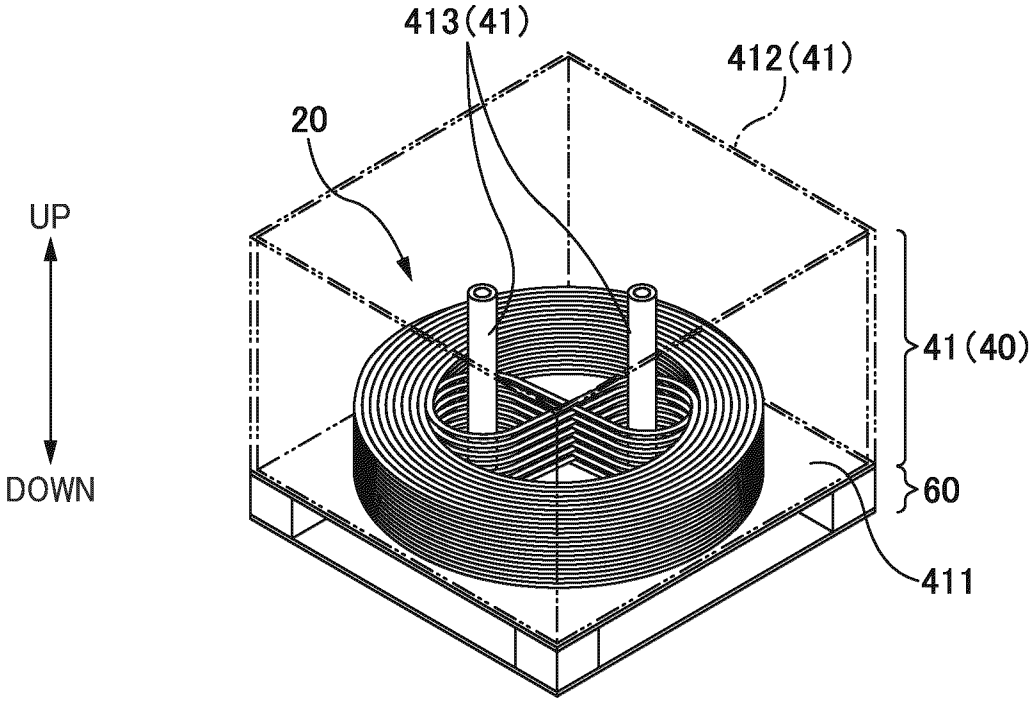
10
411
DOWN
60
61
62

FIG. 2A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20
UP
41(40)
DOWN
60
411

FIG. 2B

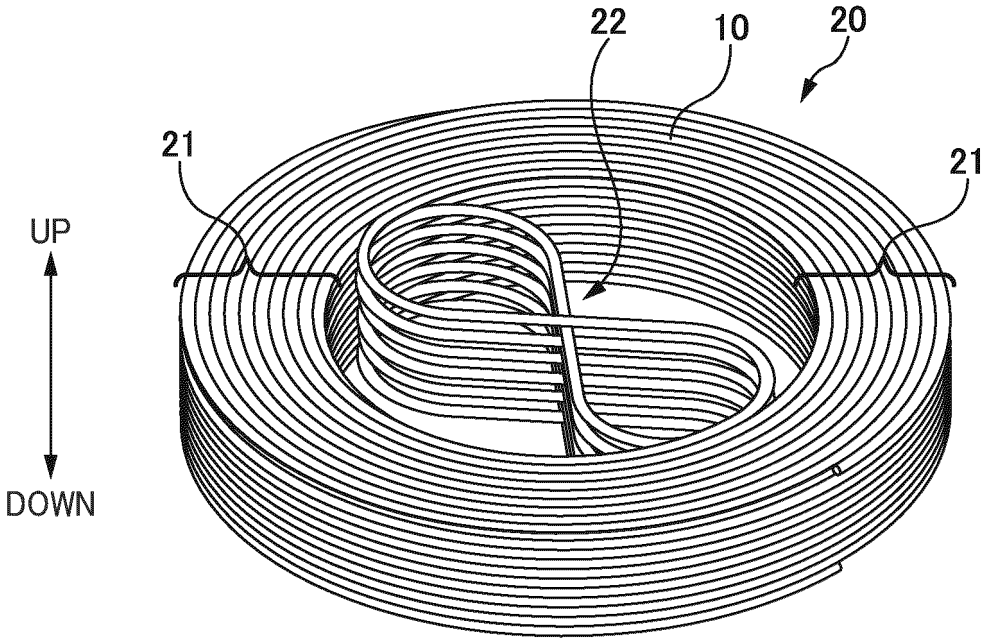


FIG. 3A

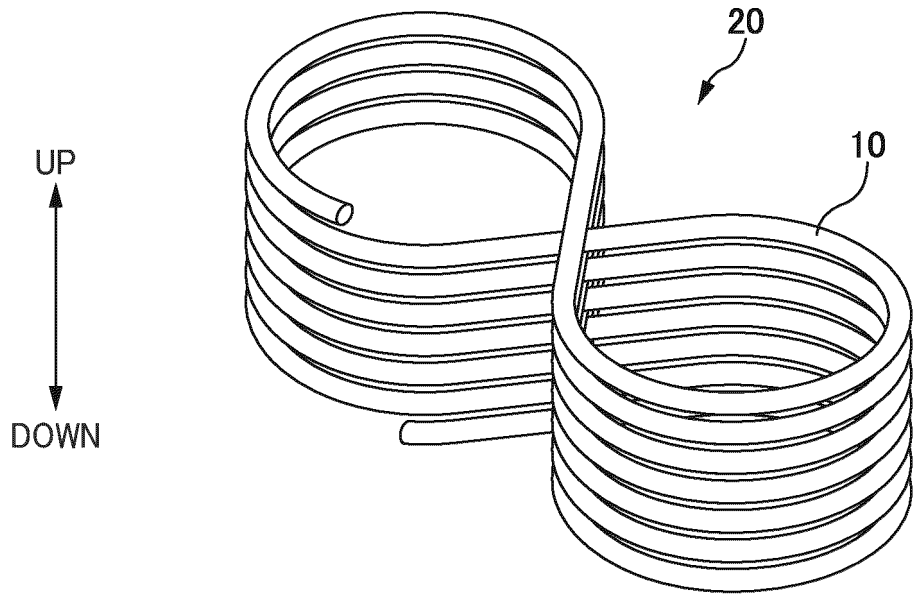
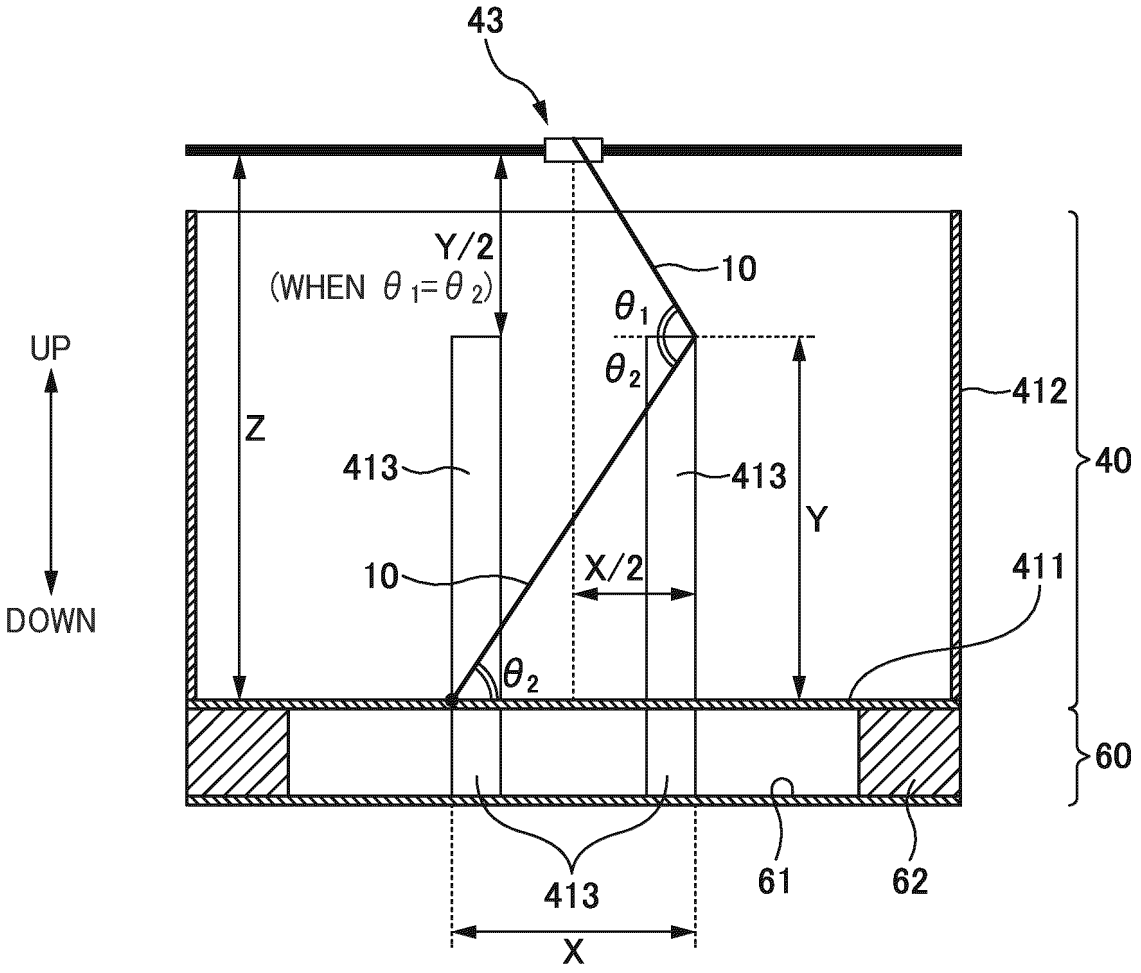


FIG. 3B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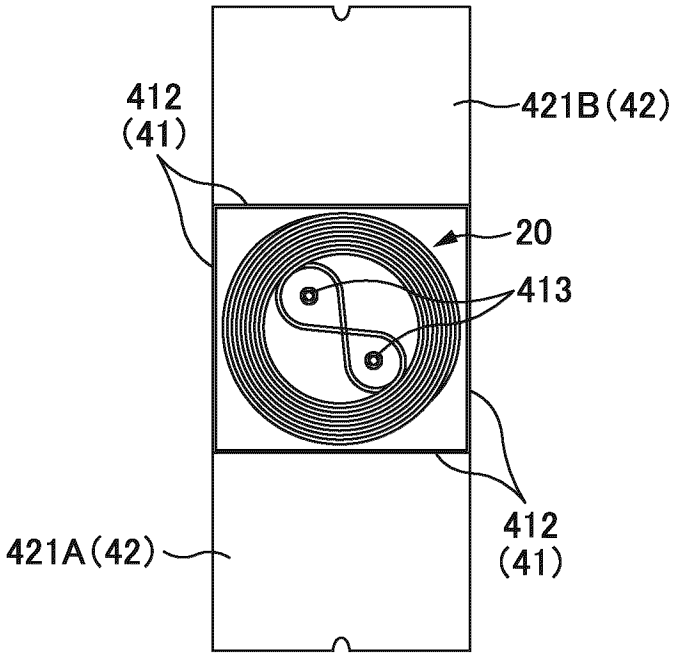
Y/2
(WHEN θ1=θ2)
10
θ1
θ2
UP
DOWN
Z
413
413
412
40
Y
10
X/2
411
θ2
60
413
61
62
X

FIG. 4

FIG. 5A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(41)
421B(42)
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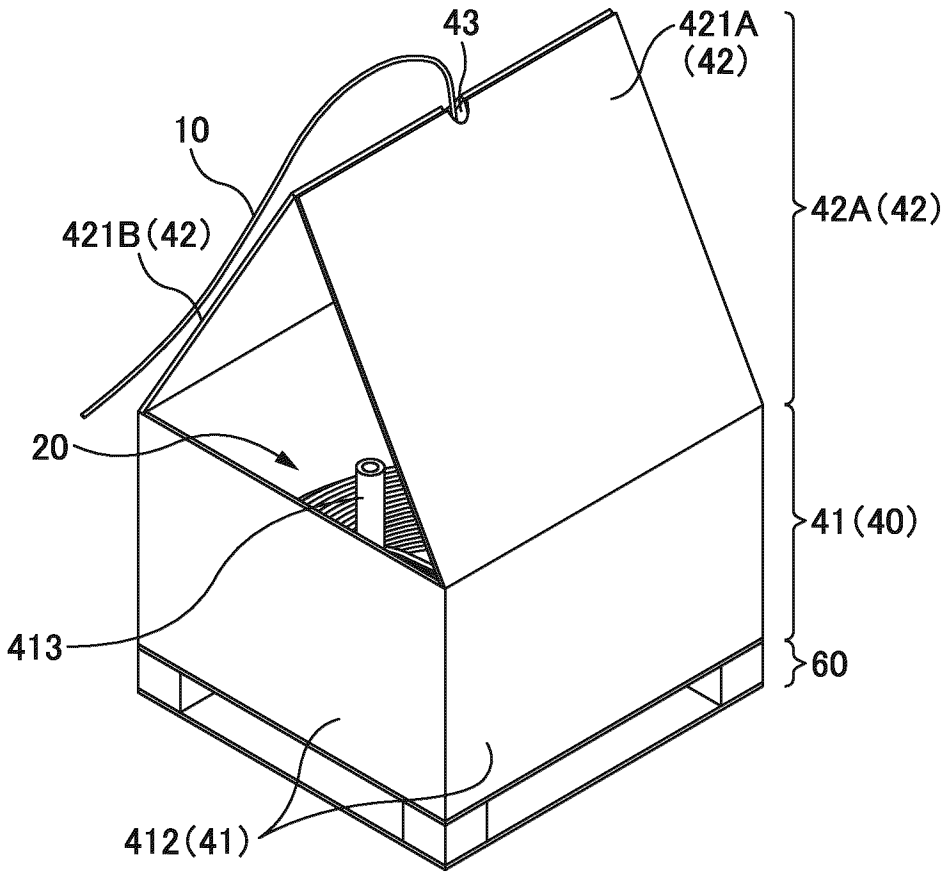
413
412
(41)
421A(42)

FIG. 5B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10
421B(42)
42A(42)
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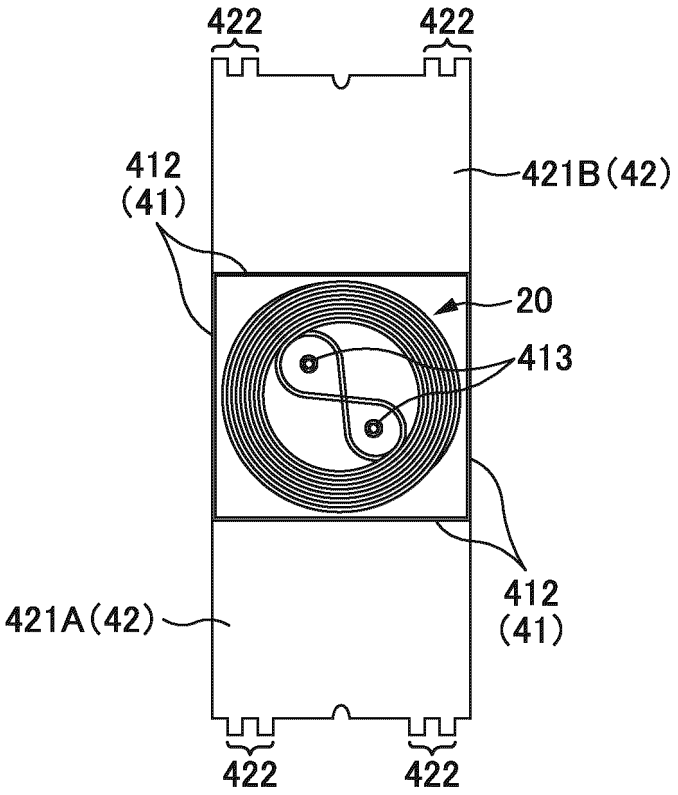
41(40)
413
60
412(41)

FIG. 6A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(41)
421B(42)
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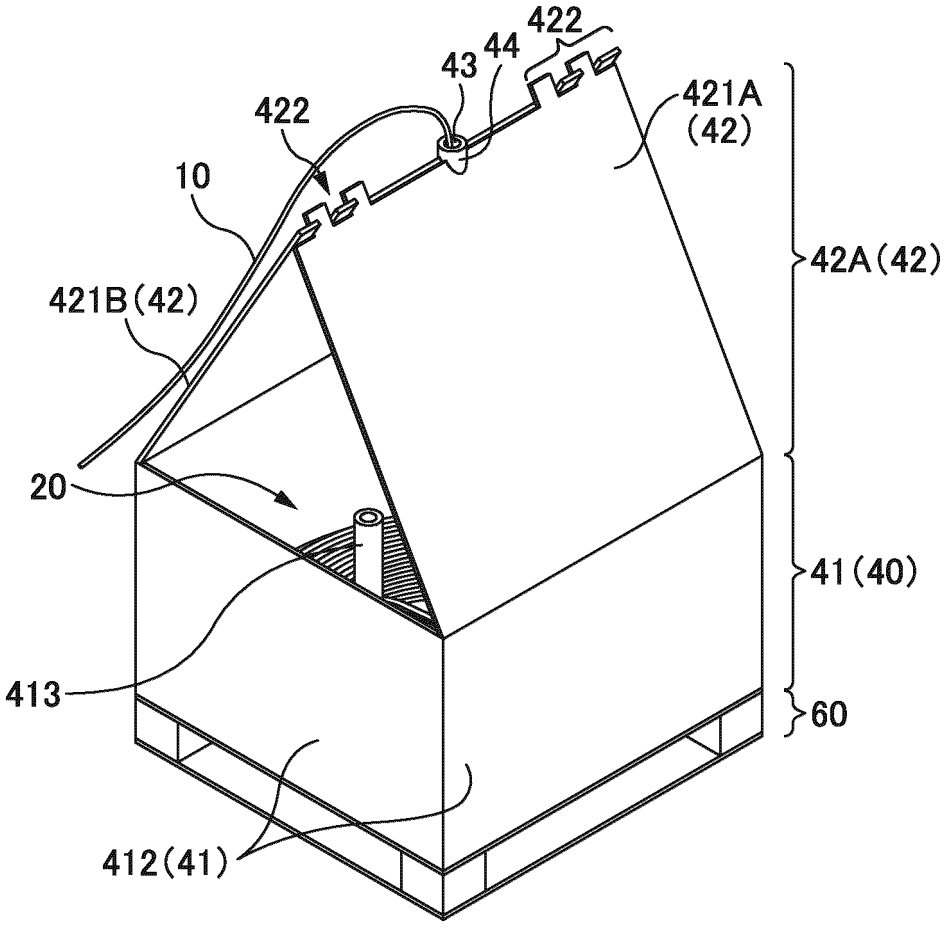
412
(41)
421A(42)
422
422

FIG. 6B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422
421A
(42)
422
10
421B(42)
42A(42)
20
41(40)
413
60
412(41)

FIG. 7A

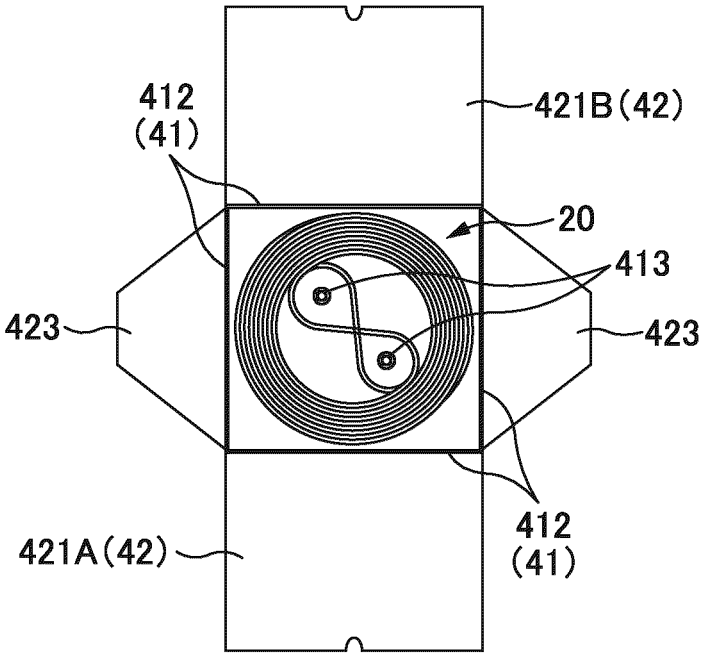

412
(41)
421B(42)
20
413
423
423
412
(41)
421A(42)

FIG. 7B

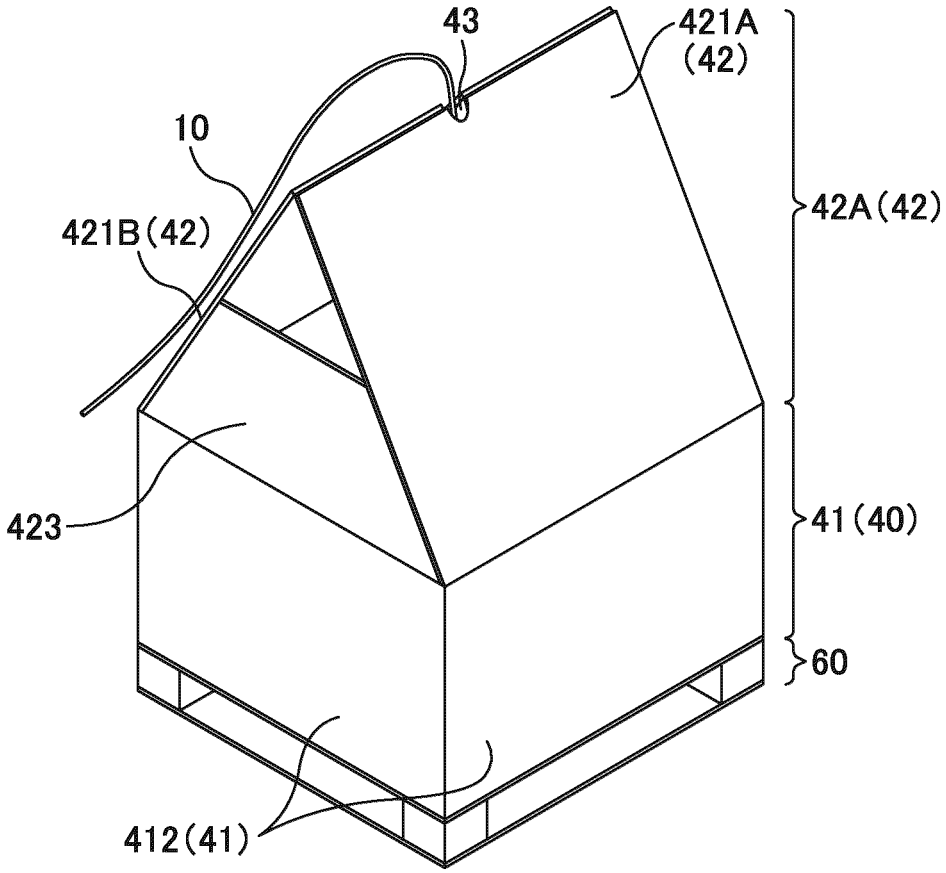

43
421A
(42)
10
421B(42)
42A(42)
423
41(40)
60
412(41)

FIG. 8A

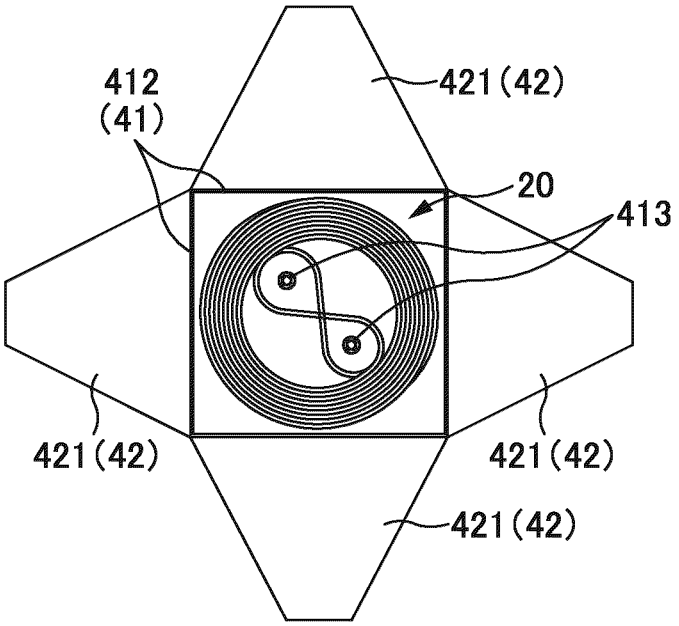
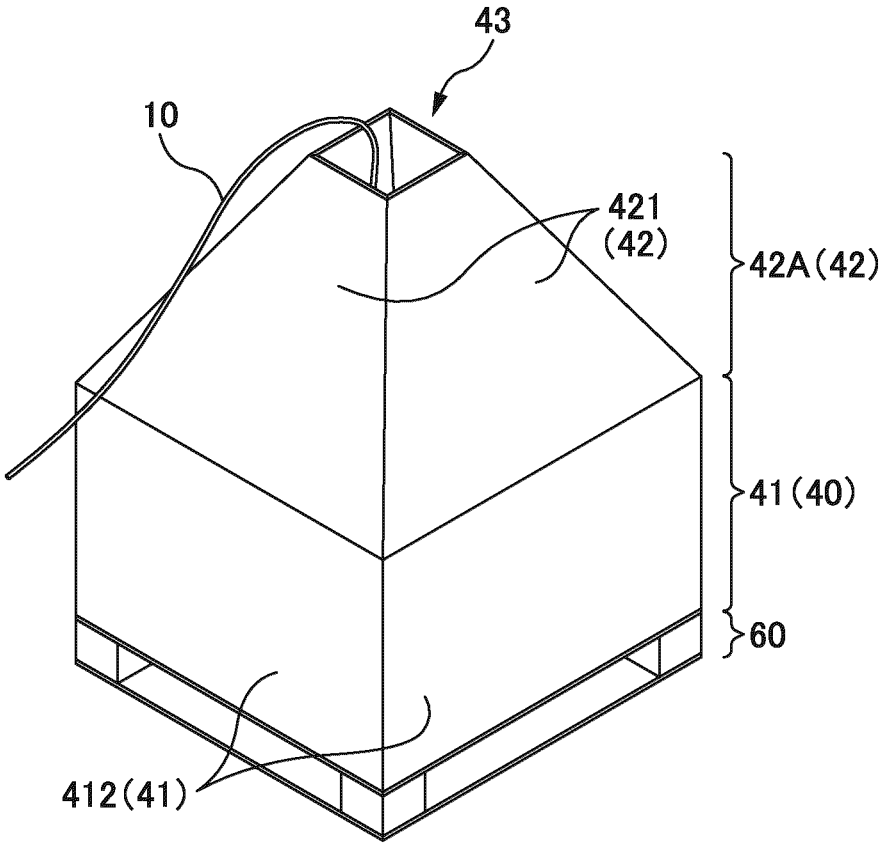

412
(41)
421(42)
20
413
421(42)
421(42)
421(42)

FIG. 8B


43
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421
(42)
42A(42)
41(40)
60
412(41)

FIG. 9A

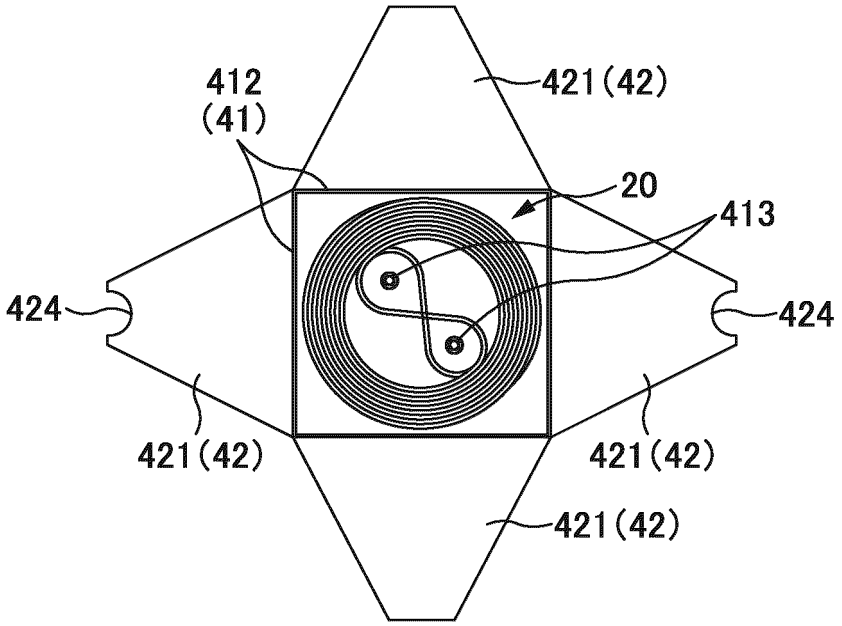
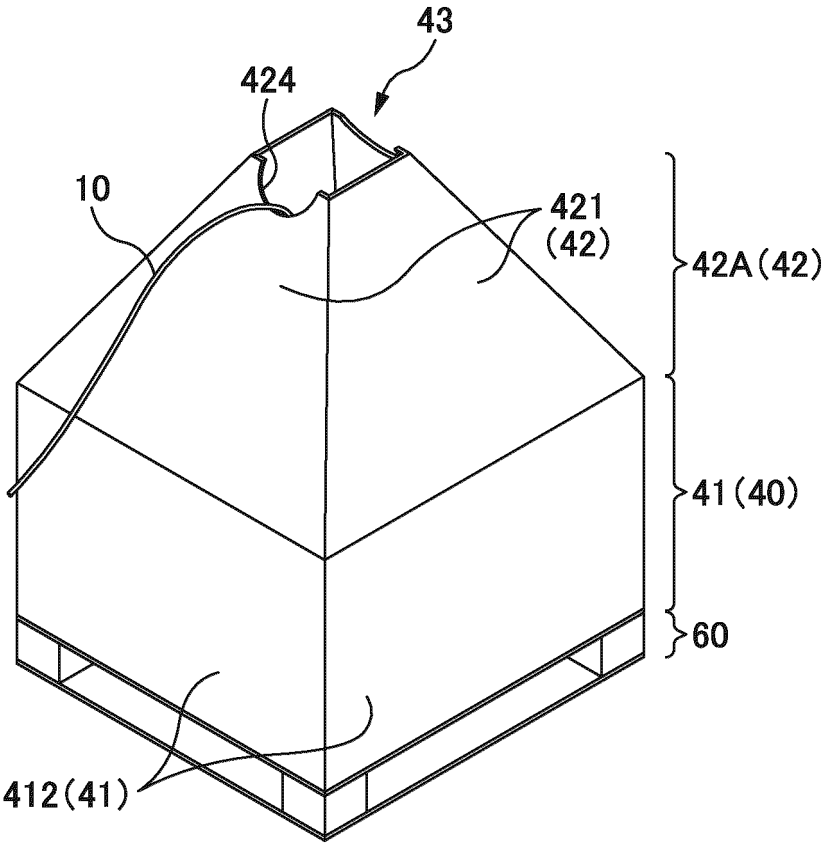

412
(41)
421(42)
20
413
424
424
421(42)
421(42)
421(42)

FIG. 9B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424
10
421
(42)
42A(42)
41(40)
60
412(41)

FIG. 10A

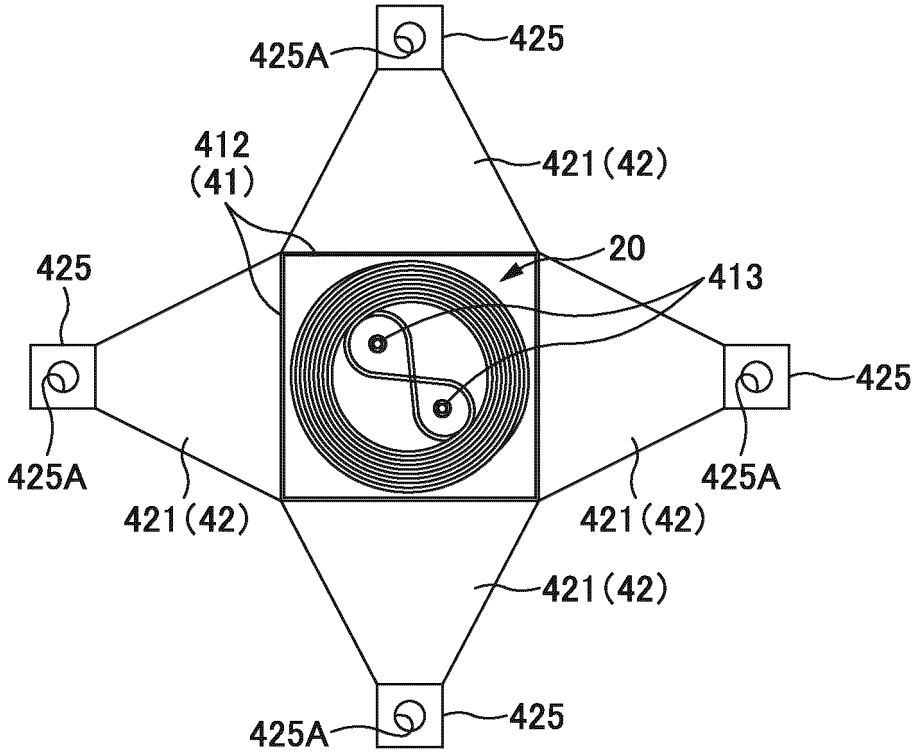
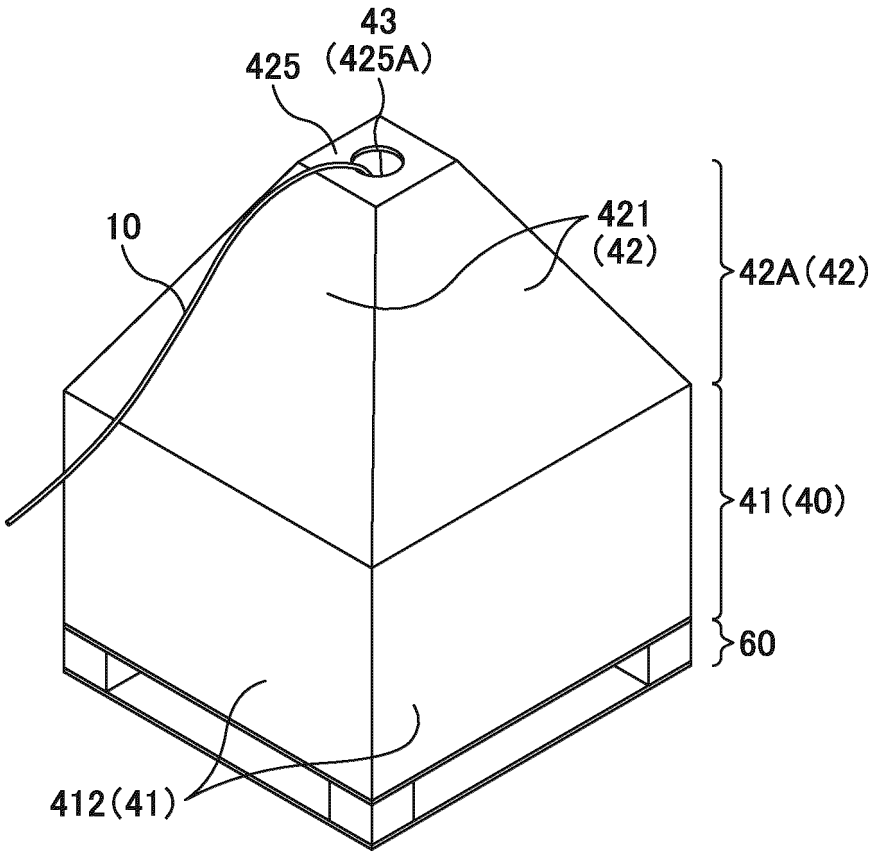


FIG. 10B



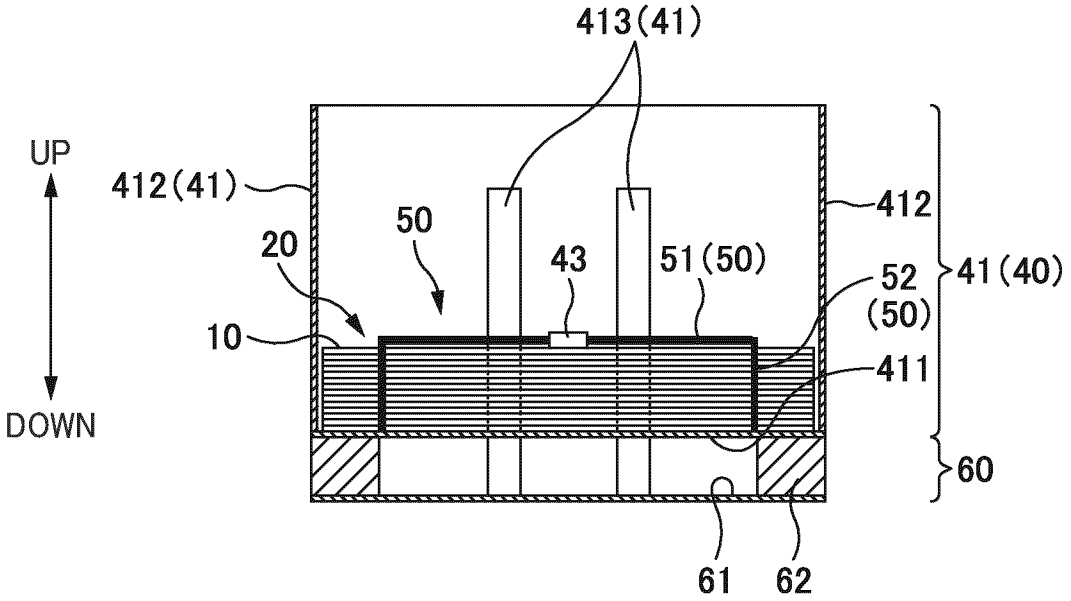


FIG. 11A

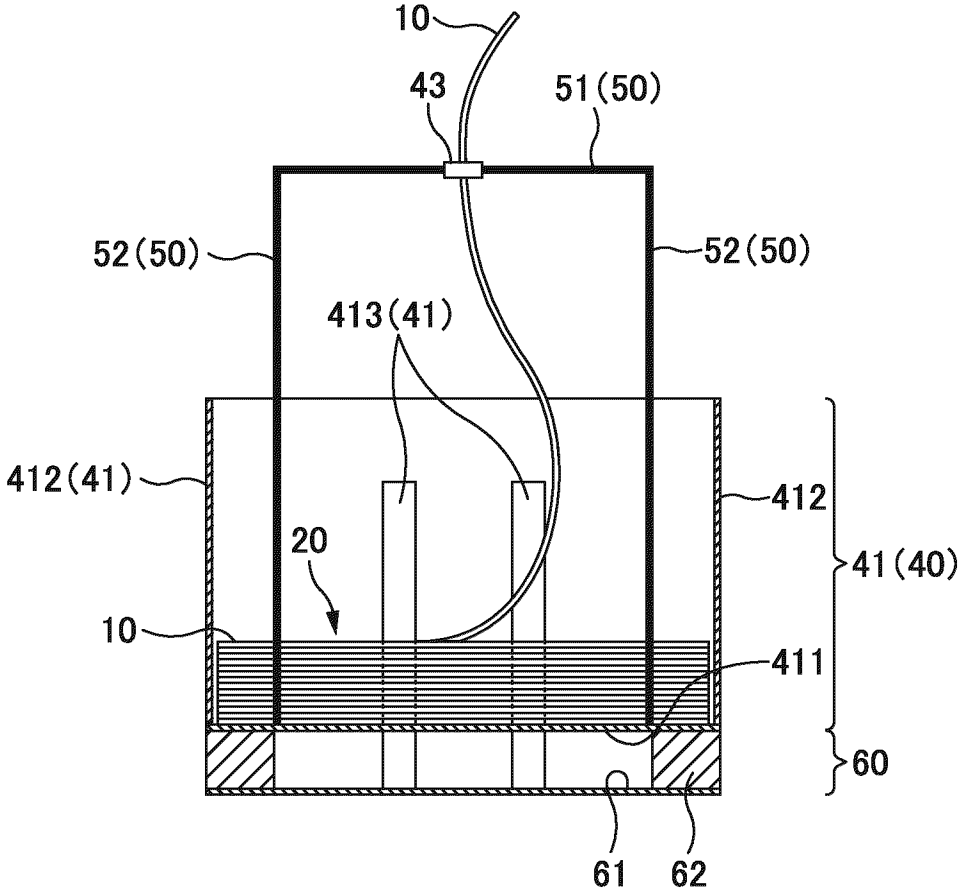


FIG. 11B

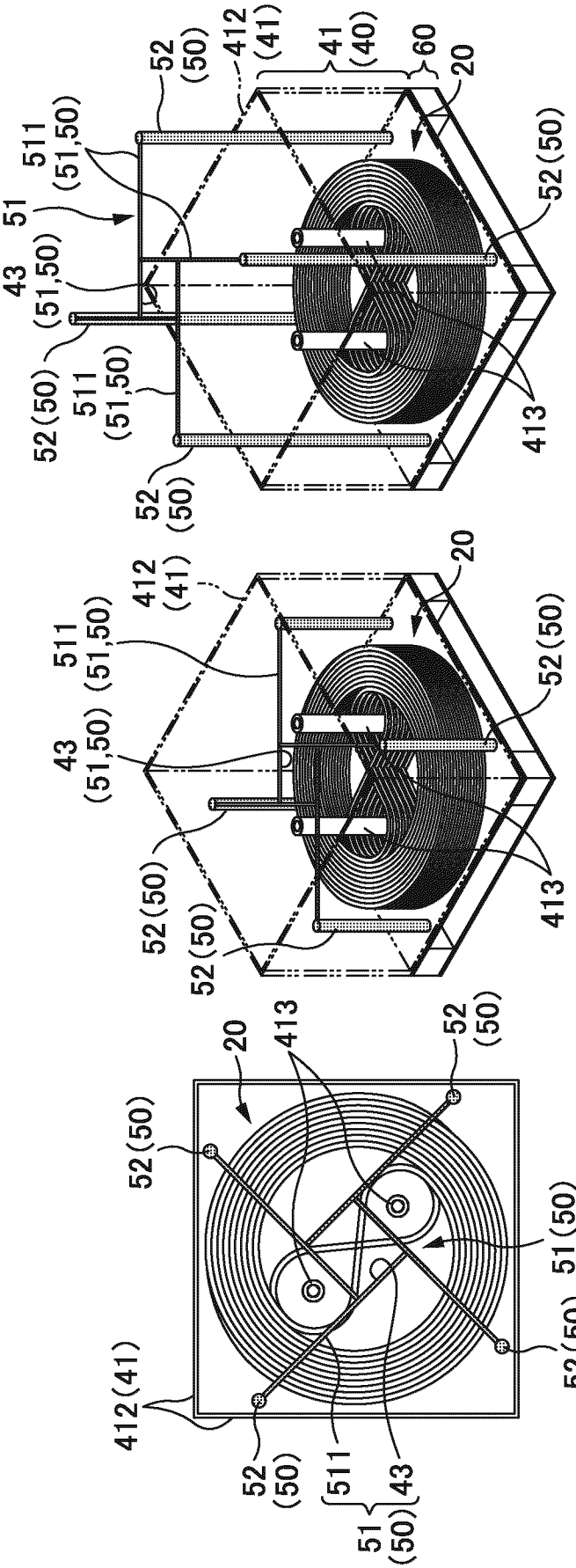


FIG. 12C

FIG. 12B

FIG. 12A

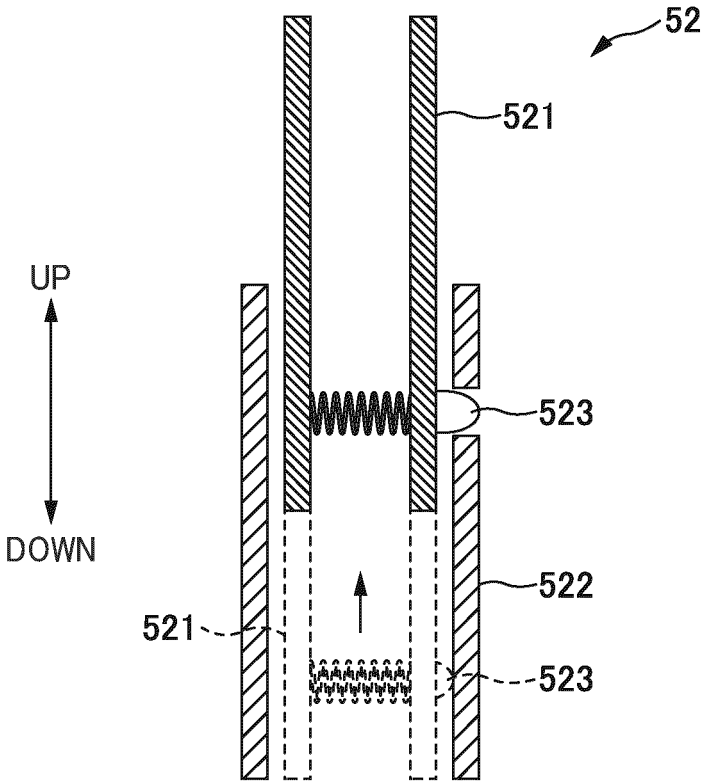


FIG. 13

FIG. 14A

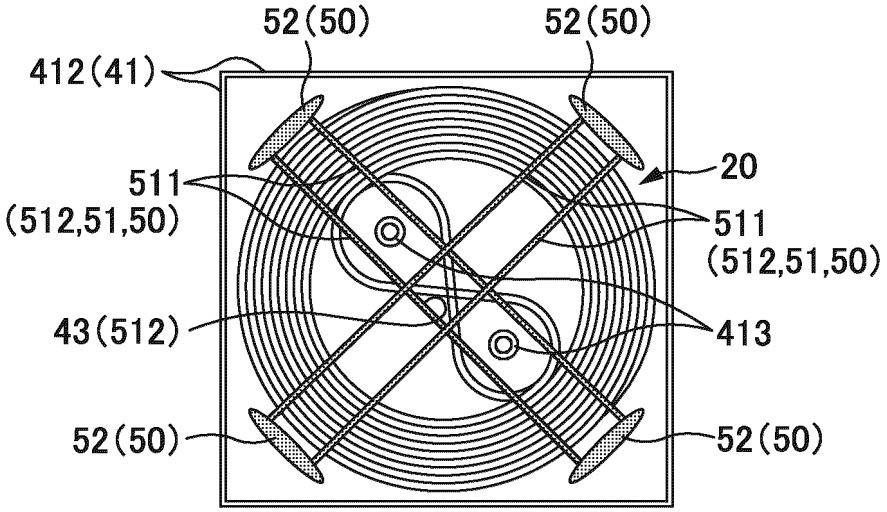


FIG. 14B

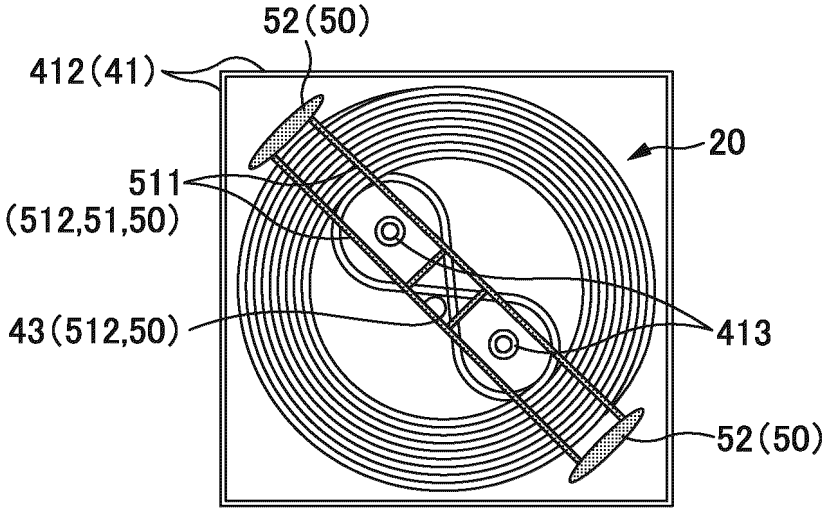
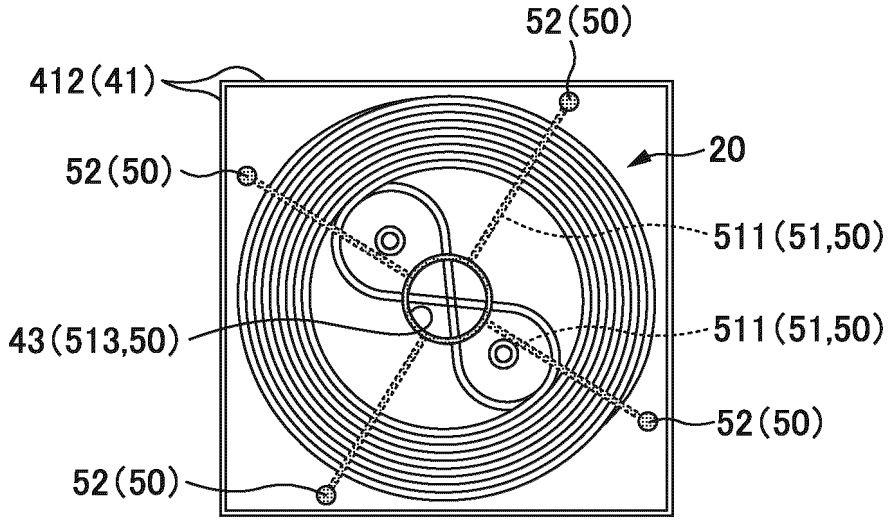


FIG. 14C



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2023/001798

A. CLASSIFICATION OF SUBJECT MATTER

B65D 85/04(2006.01)i
FI: B65D85/04

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)

B65D85/04

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

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X	KR 10-2020-0127760 A (HYUNDAI WELDING CO LTD) 11 November 2020 (2020-11-11) fig. 6c, 7c, 9b	1-8
Y		9-11
Y	JP 2009-107021 A (HYUNDAI WELDING CO LTD) 21 May 2009 (2009-05-21) fig. 6, 11	9-11
Y	EP 2256064 A1 (ISAF S.P.A.) 01 December 2010 (2010-12-01) fig. 1A	9-11
A	JP 2000-335636 A (C I F E SPA) 05 December 2000 (2000-12-05)	1-11
A	US 2013/0082132 A1 (GAUL, Ryan William) 04 April 2013 (2013-04-04)	1-11
A	US 5494160 A (GELMETTI, Carlo) 27 February 1996 (1996-02-27)	1-11

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Date of the actual completion of the international search	Date of mailing of the international search report
06 February 2023	**21 February 2023**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2023/001798

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JP 2009-107021 A	21 May 2009	US 2009/0107867 A1 fig. 6, 11 KR 10-2009-0043292 A CN 101423138 A	
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REFERENCES CITED IN THE DESCRIPTION

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- JP 2022106133 A **[0002]**
- JP 2000102821 A **[0004]**