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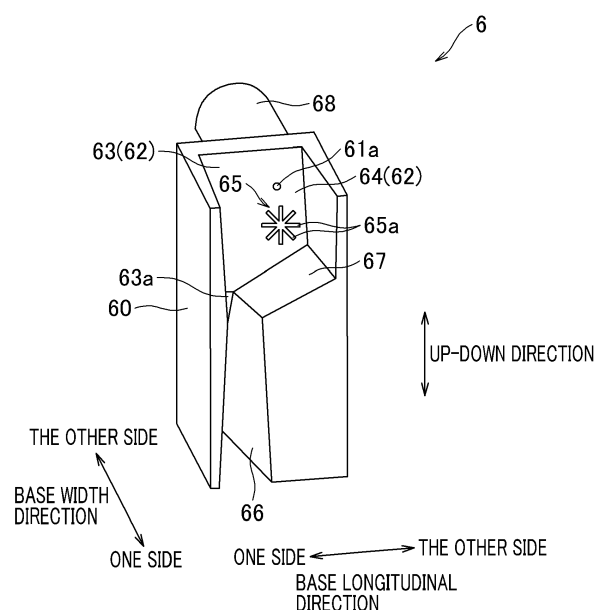
(54) **OIL SUPPLY GUIDE, TEXTILE MACHINE, AND FALSE-TWIST TEXTURING MACHINE**

(57) An object of the present invention is to enable easy determination of whether oil is discharged through a discharge port (61a), with low costs.

A discharge port (61a) allowing oil to be discharged is formed in an adjacent portion (64) which is adjacent to an opposed portion (63) in a direction orthogonal to a running direction of a yarn (Y). Furthermore, a stepped portion (65) formed of a protrusion is provided immediately below the discharge port (61a) in the adjacent por-

tion (64). Furthermore, an oil guiding surface (67) allowing the oil discharged through the discharge port (61a) to be guided from the adjacent portion (64) to a contact surface (63a) of the opposed portion (63) is provided. The stepped portion (65) is able to temporarily hold a part of the oil which is discharged through the discharge port (61a) and which flows toward the oil guiding surface (67).

FIG.4



Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an oil supply guide configured to apply oil to a yarn, and a textile machine and a false-twist texturing machine which include the oil supply guide.

[0002] A known textile machine includes an oil supply guide configured to apply oil to a yarn. For example, Patent Literature 1 (Japanese Laid-Open Patent Publication No. 2019-135335) discloses a spun yarn take-up apparatus including an oil supply guide configured to apply oil to a yarn spun out from a spinning apparatus. The oil supply guide includes a guide main body whose surface extends in an up-down direction. In this regard, the yarn running downward makes contact with the surface of the guide main body. Furthermore, a discharge port allowing the oil to be discharged is formed in the surface of the guide main body. With this arrangement, the oil discharged through the discharge port is applied to the yarn in contact with the surface of the guide main body.

SUMMARY OF THE INVENTION

[0003] In the above-described oil supply guide, the oil may leak at an intermediate position of a path allowing the oil to be supplied from an oil tank to the discharge port. As a result, the oil may not be discharged through the discharge port. Furthermore, the discharge port may be disadvantageously stuck so that the oil is not discharged through the discharge port. Because an amount of the oil in the oil tank decreases when the oil leaks, it is impossible to know that the oil is not discharged through the discharge port.

[0004] In a textile machine including spindles, the above-described oil supply guide is provided for each spindle. Typically, the oil is supplied from the single oil tank to discharge ports of oil supply guides provided for the respective spindles. Therefore, when the oil is not discharged through one of the discharge ports of the oil supply guides, the one of the discharge ports of the oil supply guides cannot be specified by how the amount of the oil in the oil tank decreases.

[0005] It is conceivable to provide a flowmeter at a path to each discharge port, for making it possible to specify one discharge port through which the oil is not discharged. However, the provision of the flowmeter at each path is a great cost. Because a running yarn opposes each discharge port, it is difficult to visually check each discharge port and its surroundings for determining whether the oil is discharged from each discharge port. Assume that the running yarn does not oppose each discharge port so that each discharge port is visible. In this case, however, when the amount of the oil discharged through each discharge port is set to be small, it is difficult to determine whether the oil is discharged through each discharge port.

[0006] An object of the present invention is to provide an oil supply guide, a textile machine, and a false-twist texturing machine which enable easy determination of whether oil is discharged through a discharge port with low costs.

[0007] According to a first aspect of the invention, an oil supply guide configured to apply oil to a running yarn includes: an opposed portion which includes a contact surface and which opposes a yarn path, the yarn making contact with the contact surface; an adjacent portion which is adjacent to the opposed portion in a direction orthogonal to a running direction of the yarn; a discharge port which is formed in the adjacent portion and which allows the oil to be discharged; a stepped portion which is provided immediately below the discharge port in the adjacent portion and which is formed of a protrusion or a concave portion; and an oil guiding surface which allows the oil discharged through the discharge port to be guided from the adjacent portion to the contact surface of the opposed portion. In this regard, the stepped portion is able to temporarily hold a part of the oil which is discharged through the discharge port and which flows toward the oil guiding surface.

[0008] According to this aspect, when the oil is discharged through the discharge port, the stepped portion temporarily holds a part of the oil flowing toward the oil guiding surface. The oil which is partially and temporarily held by the stepped portion leaves the stepped portion. However, because the oil is continuously supplied to the stepped portion, the stepped portion always holds the oil as long as the oil is discharged through the discharge port. As discharge of the oil through the discharge port stops, the oil is not supplied to the stepped portion. Therefore, an amount of the oil held by the stepped portion decreases. The stepped portion is formed in the adjacent portion which is adjacent to the opposed portion in the direction orthogonal to the running direction of the yarn. This makes it possible to visually check the stepped portion even when the yarn runs. With this, by visually checking the stepped portion, whether the oil is discharged through the discharge port is determined based on how the stepped portion looks. In this regard, the stepped portion looks differently between a case where the stepped portion holds the oil and a case where the stepped portion does not hold any oil. It is therefore possible to easily determine whether the oil is discharged through the discharge port, with low costs.

[0009] According to a second aspect of the invention, the oil supply guide is arranged such that the stepped portion is formed of at least two rod-shaped members extending from a single center point in the adjacent portion, and the at least two rod-shaped members are at least two of: a first rod-shaped member which is provided above a virtual straight line and which is provided on one side in a horizontal direction of the center point, the virtual straight line passing the center point in the adjacent portion and extending in the horizontal direction; a second rod-shaped member which is provided above the virtual

straight line and which is provided on the other side in the horizontal direction of the center point; and a third rod-shaped member which is provided above the virtual straight line and which is orthogonal to the virtual straight line.

[0010] This allows the stepped portion, which is simple in shape and which is relatively easily producible, to hold the oil when the oil is discharged through the discharge port. In this regard, as the discharge of the oil through the discharge port stops, an amount of the oil held by the stepped portion decreases.

[0011] According to a third aspect of the invention, the oil supply guide is arranged such that the stepped portion is formed of at least three rod-shaped members which radially extend from a single center point in the adjacent portion and which are provided at regular intervals.

[0012] This allows the stepped portion, which is simple in shape and which is relatively easily producible, to hold the oil when the oil is discharged through the discharge port. In this regard, as the discharge of the oil through the discharge port stops, an amount of the oil held by the stepped portion decreases.

[0013] According to a fourth aspect of the invention, the oil supply guide is arranged such that the stepped portion is formed of eight rod-shaped members.

[0014] According to this aspect, whether the oil is held by the stepped portion is easily known.

[0015] According to a fifth aspect of the invention, the oil supply guide is arranged such that a level difference between each of the rod-shaped members and the adjacent portion increases toward the center point.

[0016] According to this aspect, when the discharge of the oil through the discharge port stops, the oil is unlikely to remain in the stepped portion. Therefore, whether the oil is held by the stepped portion is further easily known.

[0017] According to a sixth aspect of the invention, the oil supply guide is arranged such that each of the rod-shaped members is the protrusion.

[0018] According to this aspect, as the oil reaches the stepped portion, the oil is easily spread at the adjacent rod-shaped members. Therefore, whether the oil is held by the stepped portion is further easily known. The oil is spread around the stepped portion. With this, when (i) the size of the stepped portion is unchanged from that in a case where each of the rod-shaped members is the concave portion and (ii) the stepped portion holds the oil, the stepped portion looks large as compared to that in this case. Therefore, whether the oil is held by the stepped portion is further easily known.

[0019] According to a seventh aspect of the invention, the oil supply guide is arranged such that the stepped portion is formed of the protrusion and includes a holding surface which is curved to protrude in a direction away from the discharge port formed in the adjacent portion and which is able to temporarily hold the oil.

[0020] This allows the stepped portion, which is simple in shape and which is relatively easily producible, to hold the oil when the oil is discharged through the discharge

port. In this regard, as the discharge of the oil through the discharge port stops, an amount of the oil held by the stepped portion decreases.

[0021] According to an eighth aspect of the invention, the oil supply guide is arranged such that the stepped portion is provided with a communicating path which is connected to the holding surface and which causes a space closer to the discharge port than the stepped portion is to communicate with a space which opposes the discharge port over the stepped portion.

[0022] According to this aspect, the communicating path is provided so that the oil is unlikely to remain in the stepped portion at the stop of discharge of the oil through the discharge port.

[0023] According to a ninth aspect of the invention, the oil supply guide is arranged such that the stepped portion is formed of the protrusion and includes a holding surface which is a flat surface and which is able to temporarily hold the oil, one end portion of the flat surface is connected to the adjacent portion, and the flat surface is inclined so that the one end portion of the flat surface is below another end portion of the flat surface.

[0024] This allows the stepped portion, which is simple in shape and which is relatively easily producible, to hold the oil when the oil is discharged through the discharge port. In this regard, as the discharge of the oil through the discharge port stops, an amount of the oil held by the stepped portion decreases.

[0025] According to a tenth aspect of the invention, the oil supply guide is arranged such that the stepped portion is formed of the concave portion and is circular in shape.

[0026] This allows the stepped portion, which is simple in shape and which is relatively easily producible, to hold the oil when the oil is discharged through the discharge port. In this regard, as the discharge of the oil through the discharge port stops, an amount of the oil held by the stepped portion decreases.

[0027] According to an eleventh aspect of the invention, a textile machine includes: spindles; and oil supply guides each of which is identical with the oil supply guide according to any one of the first to tenth aspects and which are provided for the respective spindles.

[0028] This makes it possible to easily determine whether the oil is discharged through the discharge port of each of the oil supply guides provided for the respective spindles, with low costs.

[0029] According to a twelfth aspect of the invention, the textile machine further includes an oil tank from which the oil is supplied to the oil supply guides, and the oil tank is shared between the oil supply guides provided for the respective spindles.

[0030] When the oil tank is shared between the oil supply guides provided for the respective spindles, it is difficult to specify which discharge port is stuck by referring to how an amount of the oil in the oil tank decreases. According to this aspect, by visually checking the stepped portion of each of the oil supply guides, whether the oil is discharged through the discharge port is determined.

Therefore, the oil supply guides of the present invention are suitably applied to the textile machine structured as described above.

[0031] According to a thirteenth aspect of the invention, the textile machine further includes two yarn regulating guides which are separated from each other in the running direction of the yarn, and each of the oil supply guides is provided between the two yarn regulating guides.

[0032] According to this aspect, in each of the oil supply guides, the oil is applied to the yarn in which filaments are bundled by the two yarn regulatory guides. Therefore, the required adhering capability of the oil is lower than that in a case where the oil is applied to the yarn in which the filaments are not bundled. According to this aspect, the discharge port which allows the oil to be discharged is provided not to oppose the yarn path. The required adhering capability of the oil in the above-described textile machine is sufficient also in this case. Therefore, the oil supply guides of the present invention are suitably used.

[0033] According to a fourteenth aspect of the invention, a false-twist texturing machine includes: a yarn supplying part retaining a yarn supply package; a processing part configured to false-twist a yarn supplied from the yarn supply package; a winding part configured to wind the yarn false-twisted by the processing part, so as to form a wound package; and the oil supply guide according to any one of the first to tenth aspects.

[0034] In the false-twist texturing machine configured to form the wound package by winding the yarn after false-twisting the yarn supplied from the yarn supply package, the oil is additionally applied to the yarn to which the oil has been applied. Therefore, the required adhering capability of the oil in the false-twist texturing machine is lower than that in a textile machine of another type such as a spun yarn take-up apparatus, etc. According to this aspect, the discharge port which allows the oil to be discharged is provided not to oppose the yarn path. The required adhering capability of the oil in the false-twist texturing machine is sufficient also in this case. Therefore, the oil supply guides of the present invention are suitably applied to the false-twist texturing machine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035]

FIG. 1 is a profile of a false-twist texturing machine related to an embodiment.

FIG. 2 is a perspective view of each oiling device.

FIG. 3 is a profile of the oiling device.

FIG. 4 is a perspective view of each oil supply guide.

FIG. 5(a) is a front view of the oil supply guide, and FIG. 5(b) is a cross section taken along a line Vb-Vb in FIG. 5(a).

FIG. 6(a) is a front view of an oil supply guide of a first modification, and FIG. 6(b) is a cross section

taken along a line VIb-VIb in FIG. 6(a).

FIG. 7 is a front view of an oil supply guide of a second modification.

FIG. 8(a) is a front view of an oil supply guide of a third modification, and FIG. 8(b) is a cross section taken along a line VIIIb-VIIIb in FIG. 8(a).

FIG. 9(a) is a front view of an oil supply guide of a fourth modification, and FIG. 9(b) is a cross section taken along a line IXb-IXb in FIG. 9(a).

FIG. 10(a) is a front view of an oil supply guide of a fifth modification, and FIG. 10(b) is a cross section taken along a line Xb-Xb in FIG. 10(a).

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0036] The following will describe a false-twist texturing machine 1 (corresponding to a textile machine of the present invention) of a preferred embodiment of the present invention, with reference to FIG. 1. Hereinafter, a vertical direction to the sheet of FIG. 1 is defined as a base longitudinal direction, and a left-right direction to the sheet is defined as a base width direction. A direction orthogonal to the base longitudinal direction and the base width direction is defined as an up-down direction (vertical direction) in which the gravity acts.

[0037] The false-twist texturing machine 1 is able to perform false twisting of yarns Y made of, e.g., synthetic fibers such as nylon (polyamide fibers) and polyester. The false-twist texturing machine 1 includes a yarn supplying part 2 for supplying the yarns Y, a processing part 3 configured to perform the false twisting of the yarns Y supplied from the supplying part 2, and a winding part 4 configured to wind the yarns Y processed by the processing part 3 onto winding bobbins Bw.

[0038] The yarn supplying part 2 includes a creel stand 5 retaining yarn supply packages Ps. The yarn supplying part 2 is configured to supply the yarns Y to the processing part 3. The processing part 3 is configured to false-twist the yarns Y supplied from the yarn supply packages Ps. In the processing part 3, the following members are provided in this order from the upstream in a yarn running direction (a direction in which each yarn Y runs): each first feed roller 11a; each twist-stopping guide 12; each heater 13; each cooler 14; each false-twisting device 15; each tension sensor 16; each second feed roller 11b; each interlacing device 17; each third feed roller 11c, and each oiling device 20. The winding part 4 is configured to wind the yarns Y false-twisted by the processing part 3 onto the winding bobbins Bw by means of winding devices 10, so as to form wound packages Pw.

[0039] The false-twist texturing machine 1 further includes a main base 18 and a supporting frame 19 which extend in the base longitudinal direction (direction orthogonal to the sheet of FIG. 1). To the main base 18, the winding devices 10 are attached. The main base 18 is provided to oppose the creel stand 5 over a working space A, with respect to the base width direction (left-right direction in FIG. 1). Each device forming the

processing part 3 is attached to the supporting frame 19. Each device forming the processing part 3 is provided above the working space A.

[0040] In the false-twist texturing machine 1, processing units (which are also termed spindles) in which yarn paths are formed to pass the devices forming the processing part 3 are lined up in the base longitudinal direction. With this arrangement, in the false-twist texturing machine 1, the yarns Y running while being aligned in the base longitudinal direction can be simultaneously false-twisted.

[0041] In the present embodiment, the first feed roller 11a, the second feed roller 11b, and the third feed roller 11c are shared between plural (e.g., two) spindles. The first feed roller 11a, the second feed roller 11b, and the third feed roller 11c may be provided for each spindle. The heater 13 and the cooler 14 are shared between plural (e.g., four) spindles. The twist-stopping guide 12, the false-twisting device 15, the tension sensor 16, the interlacing device 17, and a later-described oil supply guide 6 of the oiling device 20 are provided for each spindle.

[0042] Each yarn Y supplied from the yarn supplying part 2 to the processing part 3 is drawn between the first feed roller 11a and the second feed roller 11b, and twisted by the false-twisting device 15. The twist formed by the false-twisting device 15 is propagated to the twist-stopping guide 12, but is not propagated to the upstream in the yarn running direction of the twist-stopping guide 12.

[0043] The yarn Y which is twisted and drawn as described above is heated by the first heater 13. After that, the yarn Y is cooled and thermally set by the cooler 14. The yarn Y having passed the false-twisting device 15 is unwound before the yarn Y reaches the second feed roller 11b. However, the twist of the yarn Y is thermally set as described above. Each of filaments therefore maintains a wavy false-twisted state. In this regard, the tension sensor 16 provided between the false-twisting device 15 and the second feed roller 11b is able to detect a defect such as excessive tension and yarn breakage in the yarn Y.

[0044] The yarn Y is then relaxed between the second feed roller 11b and the third feed roller 11c, and interlaced by the interlacing device 17. Subsequently, the oiling device 20 applies oil to the yarn Y. In this regard, the false-twist texturing machine 1 is configured to false-twist the yarn Y to which the oil has been applied. Therefore, in the oiling device 20, the oil is additionally applied to the yarn Y to which the oil has been applied. The oiled yarn Y is wound by the winding device 10 in the winding part 4.

(Oiling Device 20)

[0045] The following will describe the structure of the oiling device 20 with reference to FIG. 2 and FIG. 3. As shown in FIG. 2, the oiling device 20 includes oil supply guides 6, upstream yarn guides 21, and downstream yarn guides 22. As shown in FIG. 3, each oil supply guide 6

is fixed to a holder 7 attached to the supporting frame 19. The oil supply guides 6 are provided for the respective spindles. The oil supply guides 6 are aligned in the base longitudinal direction. The oil is supplied to each oil supply guide 6 from an oil tank 70 shared between the oil supply guides 6.

[0046] The upstream yarn guides 21 are separated from the downstream yarn guides 22 in the yarn running direction. The upstream yarn guides 21 are provided upstream of the respective oil supply guides 6 in the yarn running direction. The downstream yarn guides 22 are provided downstream of the respective oil supply guides 6 in the yarn running direction. In other words, the oil supply guides 6 are provided between the upstream yarn guides 21 and the downstream yarn guides 22. The upstream yarn guides 21 and the downstream yarn guides 22 are preferably provided in the vicinity of the oil supply guides 6, so that the yarns Y are sent to the oil supply guides 6 while the filaments are bundled. Each upstream yarn guide 21 is provided between the third feed roller 11c and a corresponding oil supply guide 6 in the yarn running direction. Each downstream yarn guide 22 is provided between a corresponding oil supply guide 6 and the winding part 4.

[0047] Each oil supply guide 6 includes a surface 62 (see FIG. 4 and FIGs. 5(a) and 5(b)) in which a discharge port 61a is formed. The discharge port 61a is an opening of a nozzle 61 from which the oil is discharged. Each yarn Y is sent to the oiling device 20 by the third feed roller 11c, runs downward while being guided by the upstream yarn guide 21 and the downstream yarn guide 22, and makes contact with a contact surface 63a which is a part of the surface 62 of the oil supply guide 6. As the yarn Y makes contact with the contact surface 63a in the surface 62 of the oil supply guide 6, the oil discharged from the nozzle 61 is applied to the yarn Y.

(Oil Supply Guide 6)

[0048] The following will describe the structure of each oil supply guide 6 with reference to FIG. 4 and FIGs. 5(a) and 5(b). As shown in FIG. 4 and FIG. 5(b), the oil supply guide 6 further includes a guide main body 60 and a passage part 68. The guide main body 60 and the passage part 68 are integrally formed. The passage part 68 is substantially cylindrical in shape, and an oil passage 69 in which the oil flows is formed in the passage part 68. The guide main body 60 is provided at an end portion on one side (left side in FIG. 5(b)) of the passage part 68 in an extending direction of the passage part 68 (a direction in which the passage part 68 extends). The oil supply guide 6 is fixed to a corresponding holder 7 so that the extending direction of the passage part 68 is identical with the base width direction.

[0049] The guide main body 60 includes the nozzle 61, the surface 62, a stepped portion 65, and oil guiding surfaces 66 and 67. The surface 62 is an end face on one side (left side in FIG. 5(b)) of the guide main body 60 in

the base width direction. The nozzle 61 has an opening formed in the surface 62. That is, the discharge port 61a of the nozzle 61 is formed in the surface 62. The nozzle 61 is connected to an end portion on one side (left side in FIG. 5(b)) of the oil passage 69 extending along the base width direction.

[0050] The following details the surface 62 of the guide main body 60. The surface 62 extends in the up-down direction. The surface 62 includes the following portions: an opposed portion 63 which opposes a yarn path with respect to the base width direction; and an adjacent portion 64 which is adjacent to the opposed portion 63 with respect to the base longitudinal direction (a direction orthogonal to the yarn running direction).

[0051] The opposed portion 63 extends over the entire length of the surface 62 in the up-down direction. The opposed portion 63 includes the contact surface 63a with which the yarn Y makes contact. The contact surface 63a is a lower part of the opposed portion 63. The contact surface 63a is preferably curved in the up-down direction so as to protrude toward one side (left side in FIG. 5(b)) in the base width direction. On both sides of the contact surface 63a in the base longitudinal direction (left and right sides in FIG. 5(a)), oil guiding surfaces 66 are respectively provided.

[0052] An upper part of the opposed portion 63 (a part of the opposed portion 63 except the contact surface 63a) is adjacent to the adjacent portion 64. As shown in FIG. 5(b), the adjacent portion 64 is inclined so that its lower end portion is provided on one side (left side in FIG. 5(b)) in the base width direction as compared to its upper end portion.

[0053] The discharge port 61a is formed in the adjacent portion 64 of the surface 62. As described above, the surface 62 extends in the up-down direction and is not a horizontal surface. Therefore, the oil discharged through the discharge port 61a flows downward along the adjacent portion 64 because of the gravity. The stepped portion 65 formed of protrusions is provided immediately below the discharge port 61a in the adjacent portion 64. As shown in FIG. 5(b), in the adjacent portion 64, a part in which the stepped portion 65 is formed protrudes toward one side (left side in FIG. 5(b)) in the base width direction of the adjacent portion 64 as compared to a part in which the stepped portion 65 is not formed. The stepped portion 65 and the guide main body 60 are integrally formed.

[0054] The stepped portion 65 is formed of rod-shaped members 65a which are radially provided. In other words, the rod-shaped members 65a radially extend from a single center point O which is the center point of the rod-shaped members 65 which are radially provided. The rod-shaped members 65a are uniform in length (length along the surface of the surface of the adjacent portion 64). The center point O is provided immediately below the discharge port 61a in the adjacent portion 64. The eight rod-shaped members 65a are provided at regular intervals. That is, an angle between two adjacent rod-shaped members 65a is 45 degrees. As shown in FIG.

5(b), the degree of protrusion of each rod-shaped member 65a from the surface 62 (hereinafter, this is referred to as the protrusion degree A1) increases toward the center point O.

[0055] Three of the eight rod-shaped members 65a are provided above a virtual straight line L (see FIGs. 5(a) and 5(b)) which passes the center point O in the adjacent portion 64 and which extends in a horizontal direction (the base longitudinal direction). One (corresponding to a first rod-shaped member of the present invention) of these three rod-shaped members 65a is provided on one side in the horizontal direction (base longitudinal direction) of the center point O. Furthermore, another (corresponding to a second rod-shaped member of the present invention) of these three rod-shaped members 65a is provided on the other side in the horizontal direction (base longitudinal direction) of the center point O. Furthermore, another (corresponding to a third rod-shaped member of the present invention) of these three rod-shaped members 65a is orthogonal to the virtual straight line L.

[0056] The oil guiding surface 67 allows the oil discharged through the discharge port 61a to be guided from the adjacent portion 64 to the contact surface 63a of the opposed portion 63. The oil guiding surface 67 is provided immediately below the stepped portion 65. The oil guiding surface 67 is inclined so that an end portion on one side (left side in FIG. 5(a)) in the base longitudinal direction of the oil guiding surface 67 is provided below an end portion on the other side (right side of FIG. 5(a)) in the base longitudinal direction of the oil guiding surface 67. The end portion on the one side in the base longitudinal direction of the oil guiding surface 67 is close to an upper end portion of the contact surface 63a.

[0057] The oil supplied from the oil tank 70 to each oil supply guide 6 is sent to the nozzle 61 through the oil passage 69 of the passage part 68, and discharged through the discharge port 61a. The oil discharged through the discharge port 61a flows downward along the adjacent portion 64 of the surface 62. As the oil reaches the stepped portion 65 provided immediately below the discharge port 61a, the oil is spread because of the surface tension at adjacent rod-shaped members 65a. With this arrangement, when the oil is discharged through the discharge port 61a, the stepped portion 65 temporarily holds a part of the oil which is discharged through the discharge port 61a and which flows toward the oil guiding surface 67. The oil which is partially and temporarily held by the stepped portion 65 leaves the stepped portion 65. However, because the oil is continuously supplied to the stepped portion 65, the stepped portion 65 always holds the oil as long as the oil is discharged through the discharge port 61a. When the oil is not held by the stepped portion 65 or leaves the stepped portion 65, the oil flows downward from the stepped portion 65. Subsequently, the oil guiding surface 67 provided immediately below the stepped portion 65 allows the oil to be guided from the adjacent portion 64 to the contact surface 63a of the opposed portion 63. After being guided to the

contact surface 63a, the oil flows downward along the oil guiding surfaces 66. As a result, the oil is applied to the yarn Y in contact with the contact surface 63a. As the discharge of the oil through the discharge port 61a stops, the oil is not supplied to the stepped portion 65. In this case, when the oil which is temporarily held by the stepped portion 65 leaves, the stepped portion 65 does not hold any oil.

[0058] As such, the stepped portion 65 holds the oil when the oil is discharged through the discharge port 61a, and the stepped portion 65 does not hold any oil when the discharge of the oil through the discharge port 61a stops. When an amount of the oil discharged through the discharge port 61a is smaller than usual, an amount of the oil held by the stepped portion 65 is smaller than usual. The stepped portion 65 looks differently between a case where the stepped portion 65 holds a normal amount of the oil, a case where the stepped portion 65 holds a smaller amount of the oil, and a case where the stepped portion 65 does not hold any oil. With this arrangement, by visually checking the stepped portion 65, whether the oil is properly discharged through the discharge port 61a is determined based on how the stepped portion 65 looks.

[0059] The oil is scarcely adhered to the upper part of the opposed portion 63. With this arrangement, as the running yarn Y makes contact with the upper part of the opposed portion 63, powder, etc. is generated. In this regard, the upper part of the opposed portion 63 is inclined from the yarn path in the base width direction so that the running yarn Y does not make contact with the upper part of the opposed portion 63. Meanwhile, when the adjacent portion 64 is considerably inclined in the base width direction, the oil discharged through the discharge port 61a may not flow downward and the oil may not be supplied to the stepped portion 65. Therefore, the upper part of the opposed portion 63 is preferably not flush with the adjacent portion 64.

(Advantageous Effects of Embodiment)

[0060] As described above, each oil supply guide 6 provided in the false-twist texturing machine 1 of the present embodiment includes (i) the surface 62 which extends in the up-down direction and which includes the opposed portion 63 and the adjacent portion 64, (ii) the discharge port 61a which is formed in the adjacent portion 64 and which allows the oil to be discharged, (iii) the stepped portion 65 which is provided immediately below the discharge port 61a in the adjacent portion 64 and which is formed of protrusions, and (iv) the oil guiding surface 67 which allows the oil discharged through the discharge port 61a to be guided from the adjacent portion 64 to the contact surface 63a of the opposed portion 63. In this regard, the contact surface 63a with which the yarn Y makes contact is a part of the opposed portion 63 which opposes the yarn path, and the adjacent portion 64 is adjacent to the opposed portion 63 in the direction

orthogonal to the yarn running direction. Furthermore, the stepped portion 65 is able to temporarily hold a part of the oil which is discharged through the discharge port 61a and which flows toward the oil guiding surface 67.

[0061] With the arrangement above, when the oil is discharged through the discharge port 61a, the stepped portion 65 temporarily holds a part of the oil flowing toward the oil guiding surface 67. The oil which is partially and temporarily held by the stepped portion 65 leaves the stepped portion 65. However, because the oil is continuously supplied to the stepped portion 65, the stepped portion 65 looks as if the stepped portion 65 always holds the oil as long as the oil is discharged through the discharge port 61a. As the discharge of the oil through the discharge port 61a stops, the oil is not supplied to the stepped portion 65. Therefore, an amount of the oil held by the stepped portion 65 decreases. The stepped portion 65 is formed in the adjacent portion 64 which is adjacent to the opposed portion 63 in the direction orthogonal to the yarn running direction. This makes it possible to visually check the stepped portion 65 even when the yarn Y runs. With this arrangement, by visually checking the stepped portion 65, whether the oil is discharged through the discharge port 61a is determined based on how the stepped portion 65 looks. In this regard, the stepped portion 65 looks differently between the case where the stepped portion 65 holds the oil and the case where the stepped portion 65 does not hold any oil. It is therefore possible to easily determine whether the oil is discharged through the discharge port 61a with low costs.

[0062] In the oil supply guide 6 of the present embodiment, the stepped portion 65 is formed of the rod-shaped members 65a which radially extend from the center point O. This allows the stepped portion 65 which is simple in shape and which is relatively easily producible to hold the oil when the oil is discharged through the discharge port 61a. In this regard, as the discharge of the oil through the discharge port 61a stops, an amount of the oil held by the stepped portion 65 decreases.

[0063] In the oil supply guide 6 of the present embodiment, the stepped portion 65 is formed of the eight rod-shaped members 65a which are provided at regular intervals. With this arrangement, the oil is held around the center point O. It is therefore easy to know whether the oil is held by the stepped portion 65.

[0064] In the oil supply guide 6 of the present embodiment, the protrusion degree A1 of each rod-shaped member 65a from the surface 62 increases toward the center point O. In this regard, each rod-shaped member 65a forms the stepped portion 65. With this arrangement, when the discharge of the oil through the discharge port 61a stops, the oil is unlikely to remain in the stepped portion 65. Therefore, whether the oil is held by the stepped portion 65 is further easily known.

[0065] In the oil supply guide 6 of the present embodiment, the rod-shaped members 65a are protrusions. With this arrangement, as the oil reaches the stepped portion 65, the oil is easily spread at adjacent rod-shaped

members 65a. Therefore, whether the oil is held by the stepped portion 65 is further easily known. The oil is spread around the stepped portion 65. With this arrangement, when (i) the size of the stepped portion 65 is unchanged from that in a case where the rod-shaped members 65a are concave portions and (ii) the stepped portion 65 holds the oil, the stepped portion 65 looks large as compared to this case. Therefore, whether the oil is held by the stepped portion 65 is further easily known.

[0066] In the false-twist texturing machine 1, the oil is additionally applied to the yarn Y to which the oil has been applied. Therefore, the required adhering capability of the oil in the false-twist texturing machine 1 is lower than that in other textile machines such as a spun yarn take-up apparatus, etc. In the embodiment above, the discharge port 61a which allows the oil to be discharged is provided not to oppose the yarn path. The required adhering capability of the oil in the false-twist texturing machine 1 is sufficient also in this case.

[0067] The embodiment of the present invention is described hereinabove. However, the specific structure of the present invention shall not be interpreted as to be limited to the above described embodiment. The scope of the present invention is defined not by the above embodiment but by claims set forth below, and shall encompass the equivalents in the meaning of the claims and every modification within the scope of the claims.

[0068] In the embodiment above, the stepped portion 65 is formed of the rod-shaped members 65a which radially extend from the single center point O. However, the disclosure is not limited to this. As shown in FIG. 6(a), an oil supply guide 106 related to a first modification of the embodiment above is structured so that a stepped portion 165 viewed from the front (viewed in an opposite direction to the surface 62) is U-shaped to protrude downward. With this arrangement, a top surface of the stepped portion 165 functions as a holding surface 165a which is curved to protrude in a direction away from the discharge port 61a (protrude downward) formed in the adjacent portion 64 and which is able to temporarily hold the oil. The stepped portion 165 is formed of a protrusion in the same manner as in the embodiment above. As shown in FIG. 6(b), in the adjacent portion 64, a part in which the stepped portion 165 is formed protrudes toward one side (left side in FIG. 6(b)) in the base width direction of the adjacent portion 64 as compared to a part in which the stepped portion 165 is not formed. In the oil supply guide 106 of the first modification, the stepped portion 165 which is simple in shape and which is relatively easily producible is provided so as to hold the oil when the oil is discharged through the discharge port 61a. In this regard, as the discharge of the oil through the discharge port 61a stops, an amount of the oil held by the stepped portion 165 decreases.

[0069] As shown in FIG. 7, an oil supply guide 206 related to a second modification of the embodiment above is structured so that a stepped portion 265 viewed from the front is U-shaped to protrude downward in the

same manner as in the first modification. The stepped portion 265 is provided with a connecting path 265b which causes a space above the stepped portion 265 to communicate with a space below the stepped portion 265.

5 The space above the stepped portion 265 is closer to the discharge port 61a than the space below the stepped portion 265 is, and the space below the stepped portion 265 opposes the discharge port 61a over the stepped portion 265. The communicating path 265a is connected to a holding surface 265a which is a top surface of the stepped portion 265. In the oil supply guide 206 of the second modification, the communicating path 265b is provided so that the oil is unlikely to remain in the stepped portion 265 at the stop of the discharge of the oil through the discharge port 61a.

10 **[0070]** As shown in FIG. 8(a) and FIG. 8(a), an oil supply guide 306 related to a third modification of the embodiment above is structured so that a stepped portion 365 is formed of a protrusion in the same manner as in the embodiment above. The stepped portion 365 is a plate member including a surface orthogonal to a plane parallel to both the up-down direction and the base width direction. The plate-shaped stepped portion 365 is inclined so that an end portion on one side (left side in FIG. 8(b)) in the base width direction of the stepped portion 365 is provided above an end portion on the other side (right side in FIG. 8(b)) in the base width direction of the stepped portion 365. A top surface of the plate-shaped stepped portion 365 functions as a holding surface 365a which is able to temporarily hold the oil. An end portion on the other side (right side in FIG. 8(b)) in the base width direction of the holding surface 365a is connected to the adjacent portion 64. The holding surface 365a is a flat surface inclined so that an end portion on one side (left side in FIG. 8(b)) in the base width direction of the holding surface 365a is provided above the end portion on the other side (right side in FIG. 8(b)) in the base width direction of the holding surface 365a. In the oil supply guide 306 of the third modification, the simple-shaped stepped portion 365 which is simple in shape and which is relatively easily producible is provided so as to hold the oil when the oil is discharged through the discharge port 61a. In this regard, as the discharge of the oil through the discharge port 61a stops, an amount of the oil held by the stepped portion 365 decreases.

45 **[0071]** In the embodiment above, the stepped portion 65 is formed of protrusions. However, the stepped portion 65 may be formed of concave portions.

[0072] As shown in FIG. 9(a) and FIG. 9(b), in an oil supply guide 406 related to a fourth modification of the embodiment above, a stepped portion 465 is formed of rod-shaped members 465a which radially extend from the center point O in the same manner as in the embodiment above and which are concave portions. That is, in the adjacent portion 64, a part in which the stepped portion 465 is formed is provided on the other side (right side in FIG. 9(b)) in the base width direction of the adjacent portion 64 from a part in which the stepped portion 465

is not formed. The degree of concave of each rod-shaped member 465a from the surface 62 (hereinafter, this is referred to as the concave degree A2) increases toward the center point O. In this regard, each rod-shaped member 465a forms the stepped portion 465. In the oil supply guide 406 of the fourth modification, the stepped portion 465 which is simple in shape and which is relatively easily producible is provided so as to hold the oil when the oil is discharged through the discharge port 61a. In this regard, as the discharge of the oil through the discharge port 61a stops, an amount of the oil held by the stepped portion 465 decreases.

[0073] As shown in FIG. 10(a) and FIG. 10(b), a stepped portion 565 of an oil supply guide 506 related to a fifth modification of the embodiment above is formed of a concave portion and circular in shape when viewed from the front (viewed in an opposite direction to the surface 62). In the adjacent portion 64, a part in which the stepped portion 565 is formed is provided on the other side (right side in FIG. 10(b)) in the base width direction of the adjacent portion 64 from a part in which the stepped portion 565 is not formed. In the oil supply guide 506 of the fifth modification, the stepped portion 565 which is simple in shape and which is relatively easily producible is provided so as to hold the oil when the oil is discharged through the discharge port 61a. In this regard, as the discharge of the oil through the discharge port 61a stops, an amount of the oil held by the stepped portion 506 decreases.

[0074] In the embodiment above, the stepped portion 65 is formed of the eight rod-shaped members 65a which are radially provided at regular intervals. However, the disclosure is not limited to this. The stepped portion 65 may be formed of at least three rod-shaped members 65a which are radially provided at regular intervals. The rod-shaped members 65a may not be radially provided at regular intervals as long as the rod-shaped members 65a include at least two of the following three rod-shaped members 65a described in (1) to (3):

- (1) a rod-shaped member 65a which is provided above the virtual straight line L (see FIG. 5(b)) and which is provided on one side in the horizontal direction (base longitudinal direction) of the center point O;
- (2) a rod-shaped member 65a which is provided above the virtual straight line L and which is provided on the other side in the horizontal direction (base longitudinal direction) of the center point O; and
- (3) a rod-shaped member 65a which is provided above the virtual straight line L and which is orthogonal to the virtual straight line L.

[0075] The number of rod-shaped members 65a forming the stepped portion 65 is preferably within a range of two to sixteen in consideration of the holding and releasing of the oil, the difficulty in production, the viscosity of the oil, etc.

[0076] In the embodiment above, the rod-shaped members 65a forming the stepped portion 65 are uniform in length. However, the rod-shaped members 65a may be different in length from one another.

[0077] In the embodiment above, the protrusion degree A1 of each rod-shaped member 65a from the surface 62 increases toward the center point O. In the fourth modification, the concave degree A2 of each rod-shaped member 465a from the surface 62 increases toward the center point O. However, a level difference (protrusion degree or concave amount) between the rod-shaped member 65a or rod-shaped member 465a and the surface 62 is not limited to this. For example, the level difference between the rod-shaped member 65a or rod-shaped member 465a and the surface 62 may be constant in a longitudinal direction of the rod-shaped member 65a or rod-shaped member 465a.

[0078] In the embodiment above, the stepped portion 65 and the guide main body 60 are integrally formed. However, the disclosure is not limited to this. The stepped portion 65 (165, 265, 365) formed of protrusions may be detachable from the guide main body 60.

[0079] In the embodiment above, the oil tank 70 is shared between oil supply guides provided for the respective spindles. However, the disclosure is not limited to this. In other words, the oil tank 70 may be provided for each spindle.

[0080] In the embodiment above, each oil supply guide 6 is applied to the false-twist texturing machine 1. However, the disclosure is not limited to this. For example, the oil supply guide 6 may be applied to a textile machine of another type such as a spun yarn take-up machine configured to take up a yarn spun out from a spinning apparatus.

Claims

1. An oil supply guide (6, 106, 206, 306, 406, 506) configured to apply oil to a running yarn (Y), the oil supply guide (6, 106, 206, 306, 406, 506) comprising:
 - an opposed portion (63) which includes a contact surface (63a) and which opposes a yarn path, the yarn (Y) making contact with the contact surface (63a);
 - an adjacent portion (64) which is adjacent to the opposed portion (63) in a direction orthogonal to a running direction of the yarn (Y);
 - a discharge port (61a) which is formed in the adjacent portion (64) and which allows the oil to be discharged;
 - a stepped portion (65, 165, 265, 365, 465, 565) which is provided immediately below the discharge port (61a) in the adjacent portion (64) and which is formed of a protrusion or a concave portion; and
 - an oil guiding surface (67) which allows the oil

- discharged through the discharge port (61a) to be guided from the adjacent portion (64) to the contact surface (63a) of the opposed portion (63),
the stepped portion (65, 165, 265, 365, 465, 565) being able to temporarily hold a part of the oil which is discharged through the discharge port (61a) and which flows toward the oil guiding surface (67).
2. The oil supply guide (6, 406) according to claim 1, wherein, the stepped portion (65, 465) is formed of at least two rod-shaped members (65a, 465a) extending from a single center point (O) in the adjacent portion (64), and
the at least two rod-shaped members (65a, 465a) are at least two of: a first rod-shaped member (65a, 465a) which is provided above a virtual straight line (L) and which is provided on one side in a horizontal direction of the center point (O), the virtual straight line (L) passing the center point (O) in the adjacent portion (64) and extending in the horizontal direction; a second rod-shaped member (65a, 465a) which is provided above the virtual straight line (L) and which is provided on the other side in the horizontal direction of the center point (O); and a third rod-shaped member (65a, 465a) which is provided above the virtual straight line (L) and which is orthogonal to the virtual straight line (L).
 3. The oil supply guide (6, 406) according to claim 1, wherein, the stepped portion (65, 465) is formed of at least three rod-shaped members (65a, 465a) which radially extend from a single center point (O) in the adjacent portion (64) and which are provided at regular intervals.
 4. The oil supply guide (6, 406) according to claim 3, wherein, the stepped portion (65, 465) is formed of eight rod-shaped members (65a, 465a).
 5. The oil supply guide (6, 406) according to any one of claims 2 to 4, wherein, a level difference between each of the rod-shaped members (65a, 465a) and the adjacent portion (64) increases toward the center point (O).
 6. The oil supply guide (6) according to any one of claims 2 to 5, wherein, each of the rod-shaped members (65a) is the protrusion.
 7. The oil supply guide (106, 206) according to claim 1, wherein, the stepped portion (165, 265) is formed of the protrusion and includes a holding surface (165a, 265a) which is curved to protrude in a direction away from the discharge port (61a) formed in the adjacent portion (64) and which is able to temporarily hold the oil.
 8. The oil supply guide (206) according to claim 7, wherein, the stepped portion (265) is provided with a communicating path (265b) which is connected to the holding surface (265a) and which causes a space closer to the discharge port (61a) than the stepped portion (265) is to communicate with a space which opposes the discharge port (61a) over the stepped portion (265).
 9. The oil supply guide (306) according to claim 1, wherein, the stepped portion (365) is formed of the protrusion and includes a holding surface (365a) which is a flat surface and which is able to temporarily hold the oil, one end portion of the flat surface is connected to the adjacent portion (64), and the flat surface is inclined so that the one end portion of the flat surface is below another end portion of the flat surface.
 10. The oil supply guide (506) according to claim 1, wherein, the stepped portion (565) is formed of the concave portion and is circular in shape.
 11. A textile machine (1) comprising: spindles; and oil supply guides (6, 106, 206, 306, 406, 506) each of which is identical with the oil supply guide according to any one of claims 1 to 10 and which are provided for the respective spindles.
 12. The textile machine (1) according to claim 11, further comprising an oil tank (70) from which the oil is supplied to the oil supply guides (6, 106, 206, 306, 406, 506), wherein,
the oil tank (70) is shared between the oil supply guides (6, 106, 206, 306, 406, 506) provided for the respective spindles.
 13. The textile machine (1) according to claim 11 or 12, further comprising two yarn regulating guides (21, 22) which are separated from each other in the running direction of the yarn (Y), wherein,
each of the oil supply guides (6, 106, 206, 306, 406, 506) is provided between the two yarn regulating guides (21, 22).
 14. A false-twist texturing machine (1) comprising: a yarn supplying part (2) retaining a yarn supply package (Ps); a processing part (3) configured to false-twist a yarn (Y) supplied from the yarn supply package (Ps); a winding part (4) configured to wind the yarn (Y) false-twisted by the processing part (3), so as to form a wound package (Pw); and
the oil supply guide (6, 106, 206, 306, 406, 506) according to any one of claims 1 to 10.

FIG.1

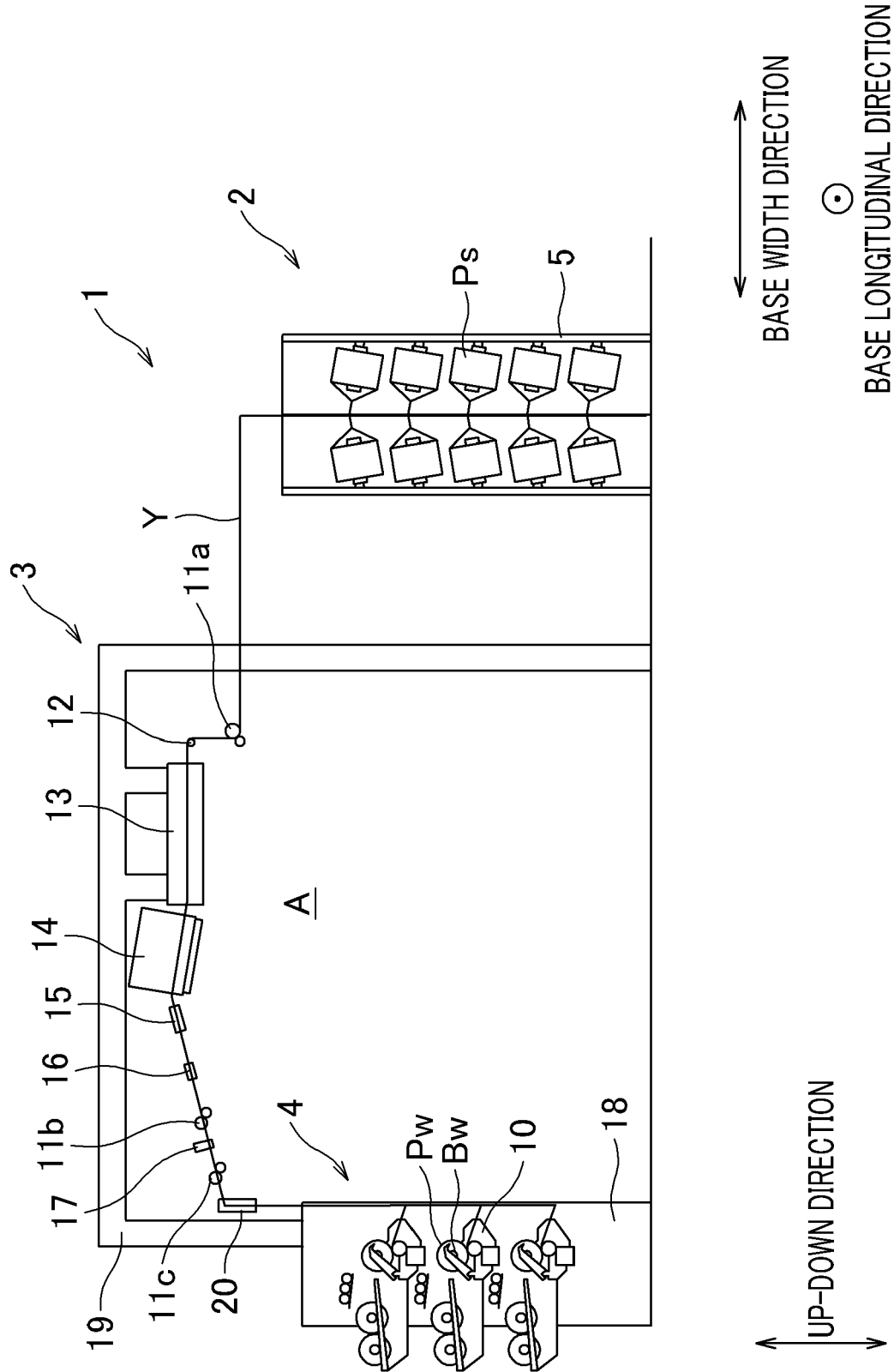


FIG.2

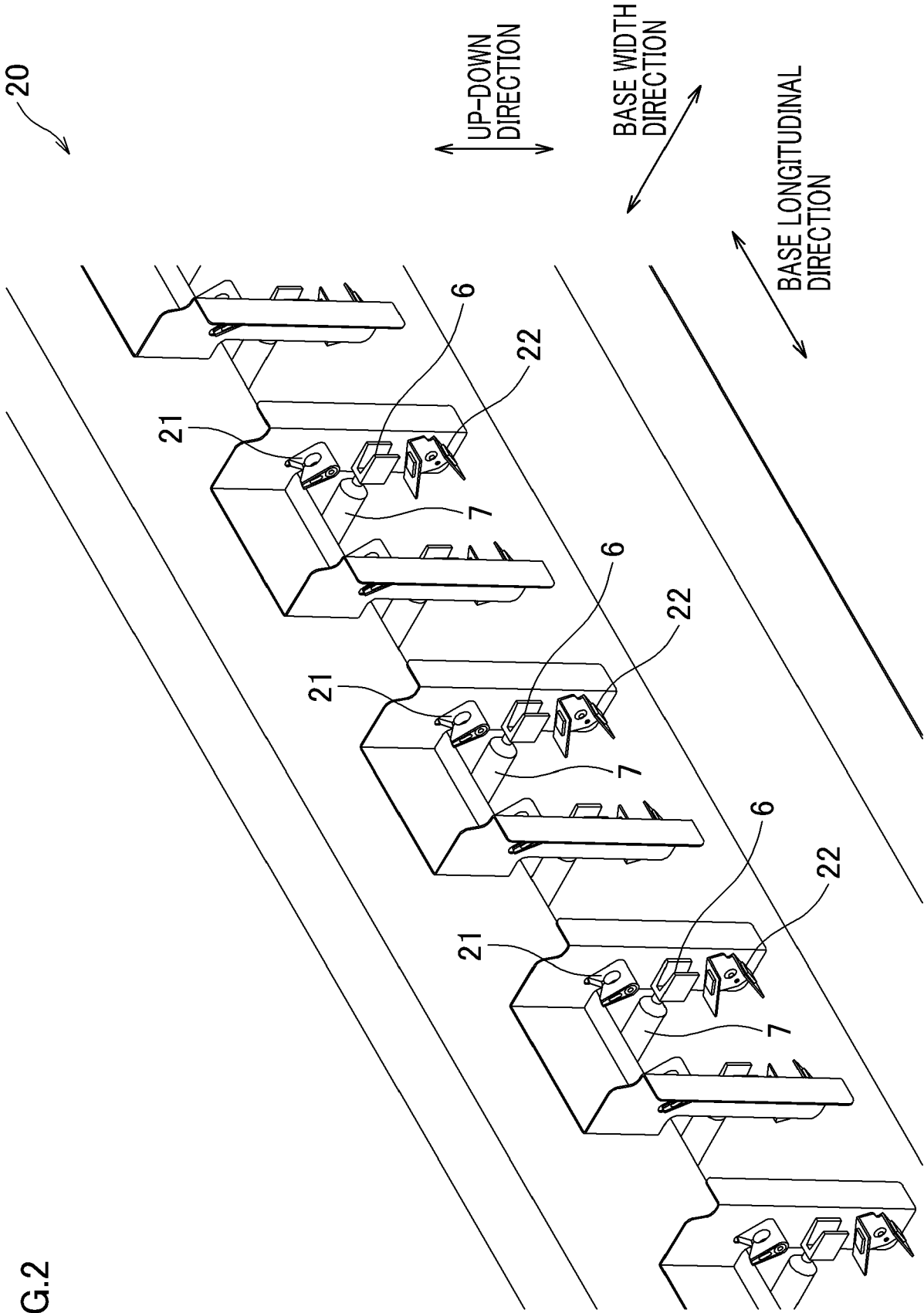


FIG.3

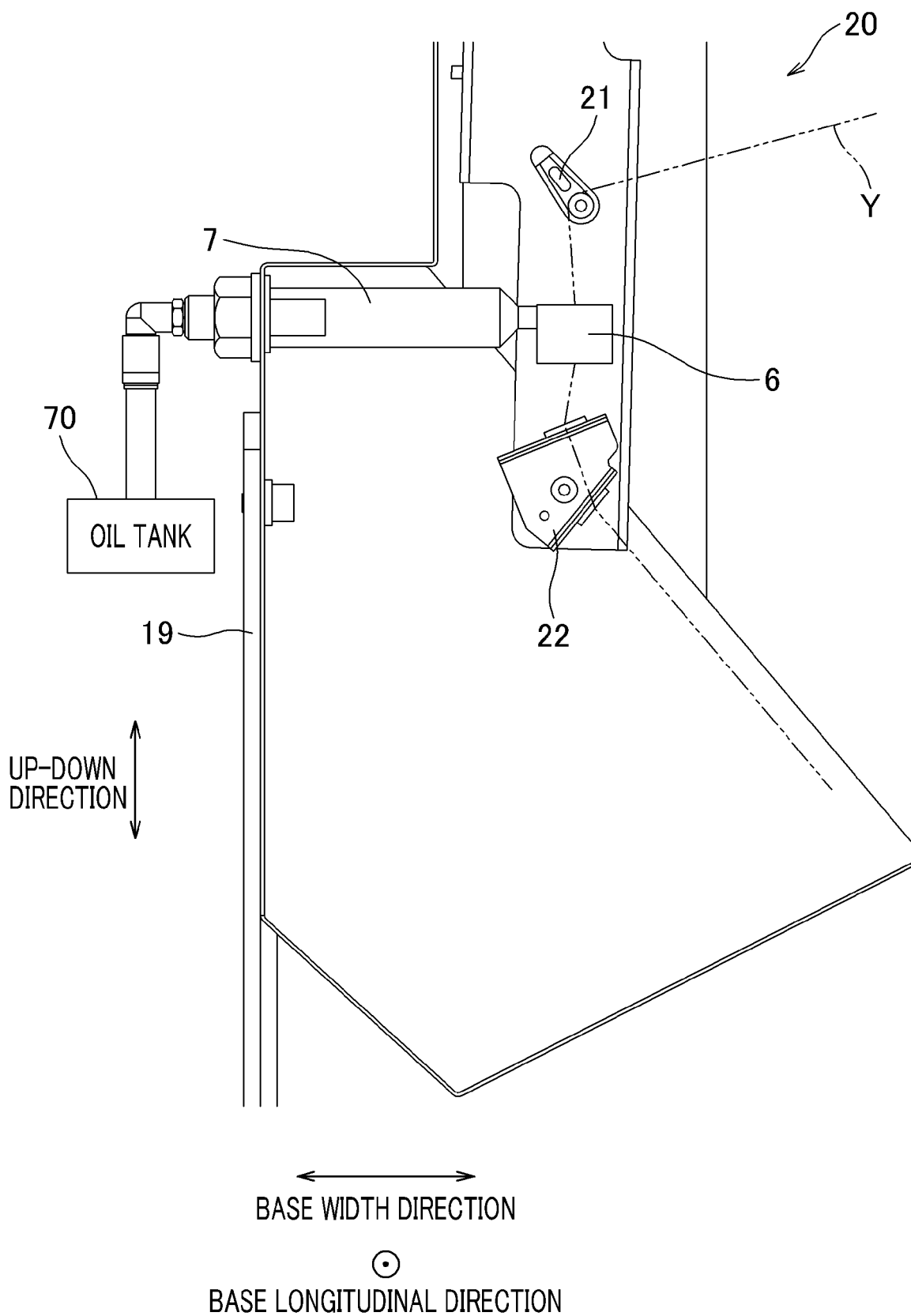


FIG.4

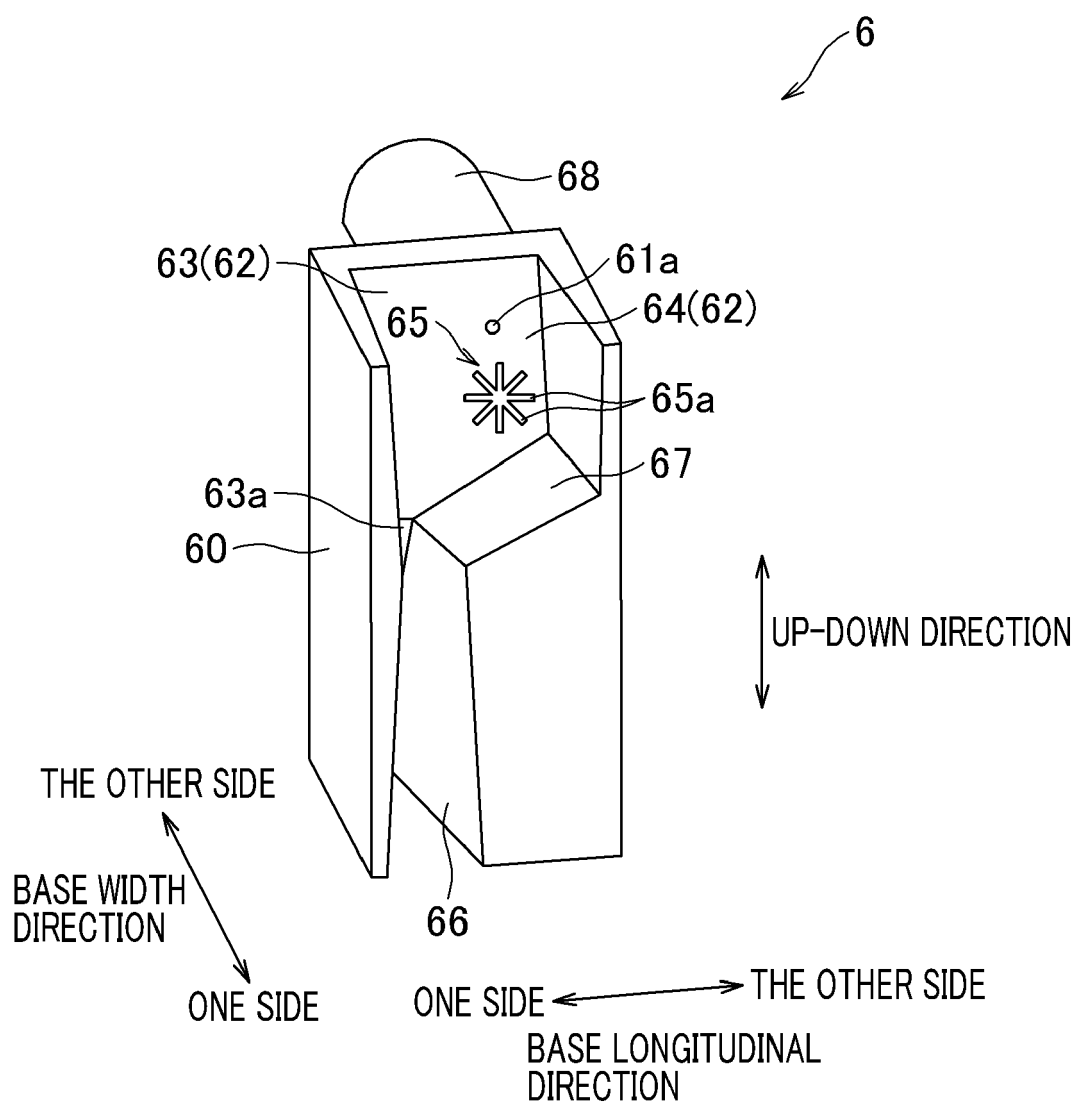


FIG.5

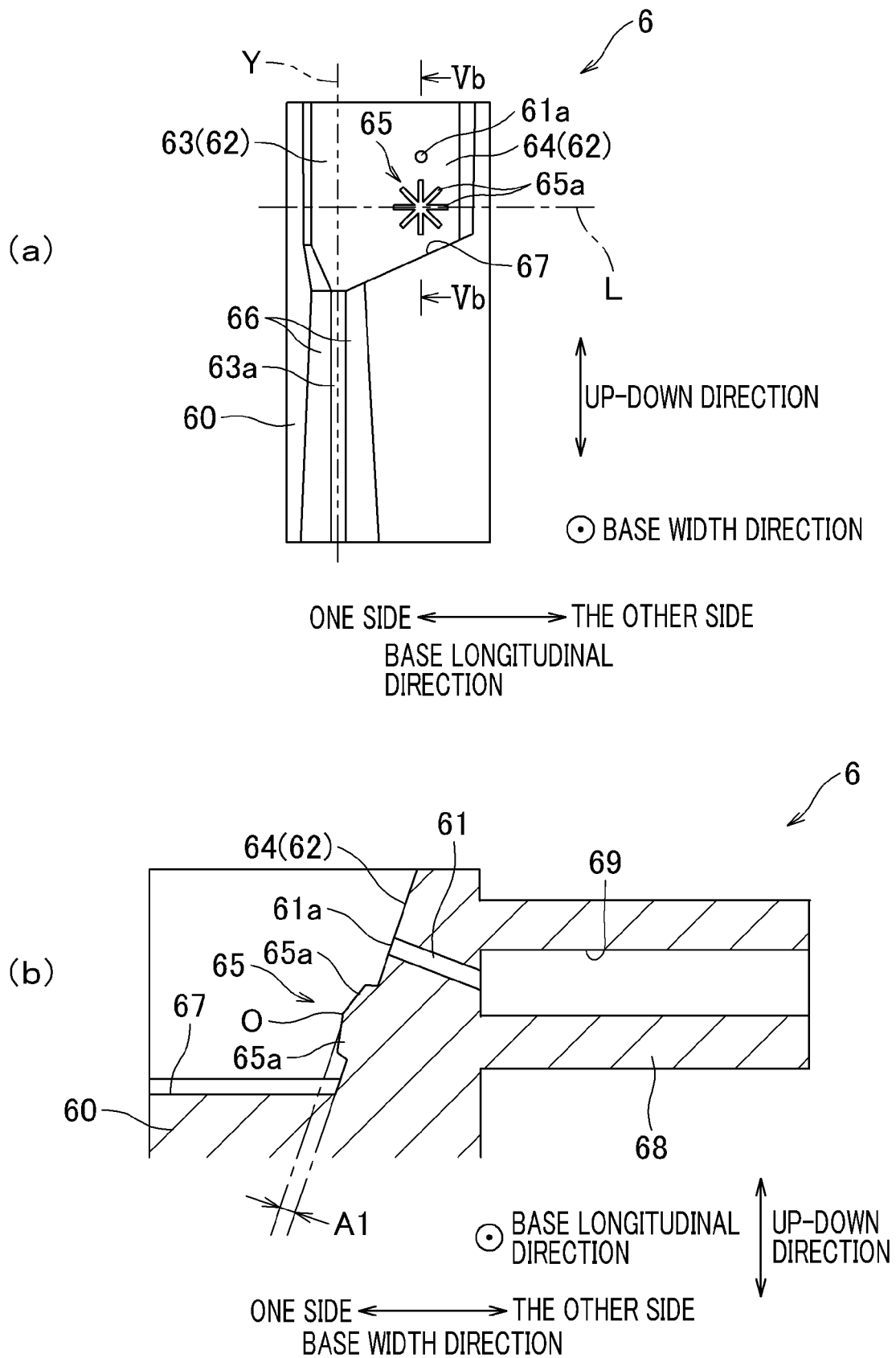


FIG.6

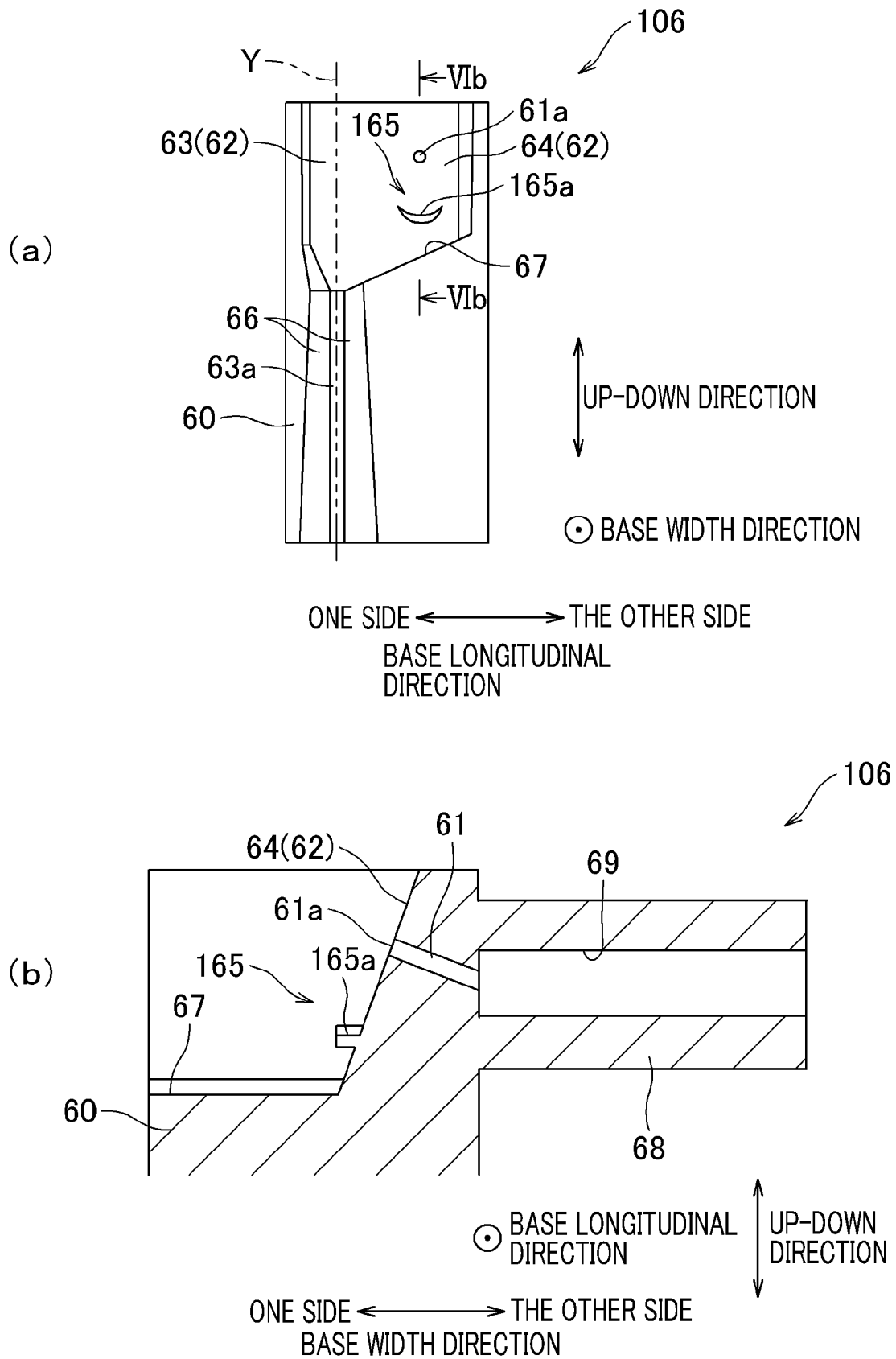


FIG.7

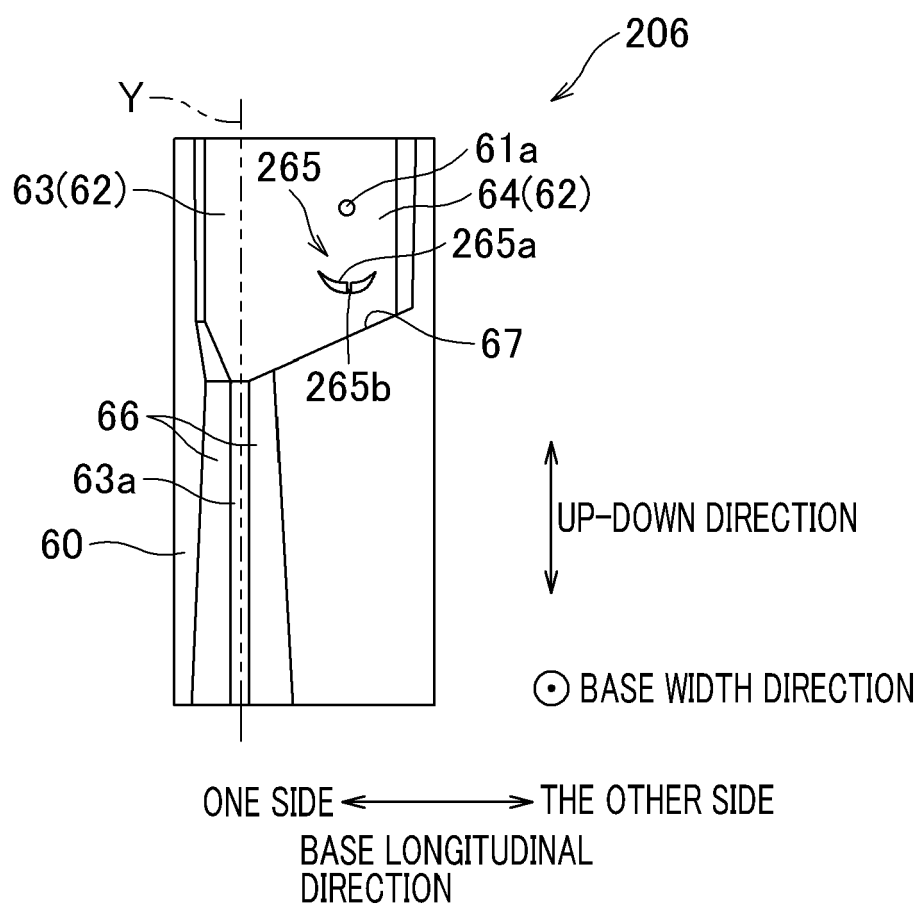


FIG.8

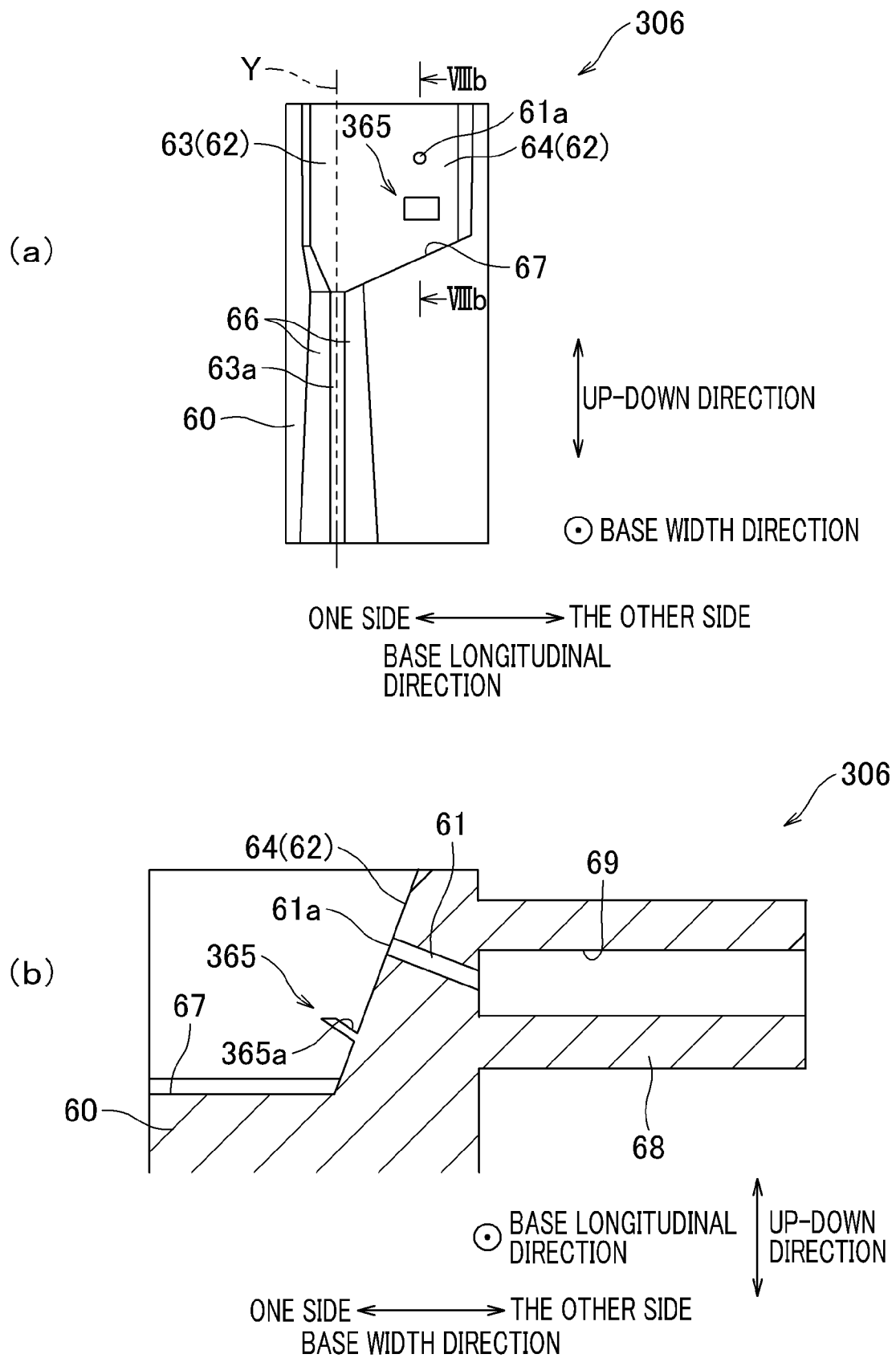


FIG.9

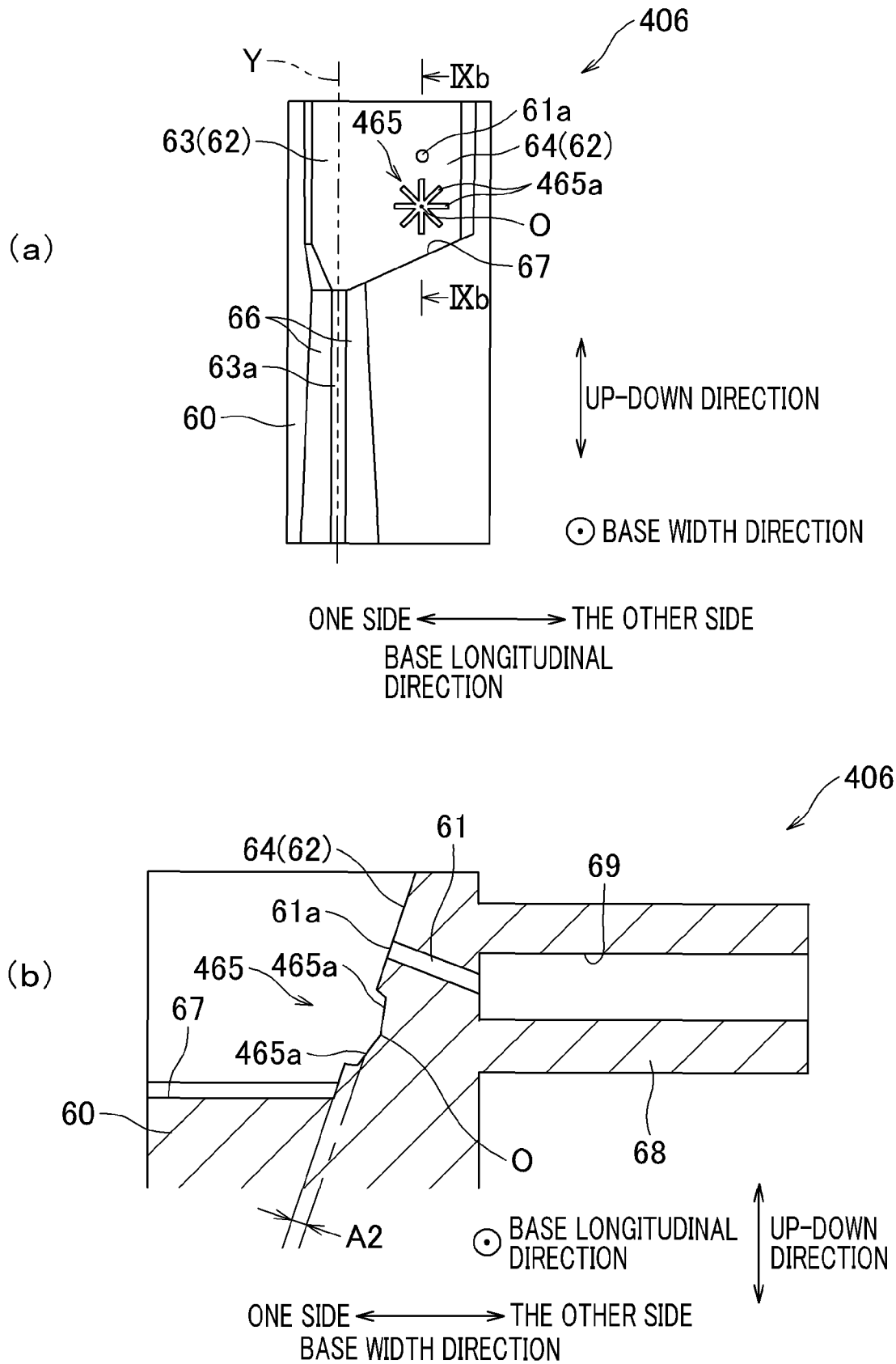
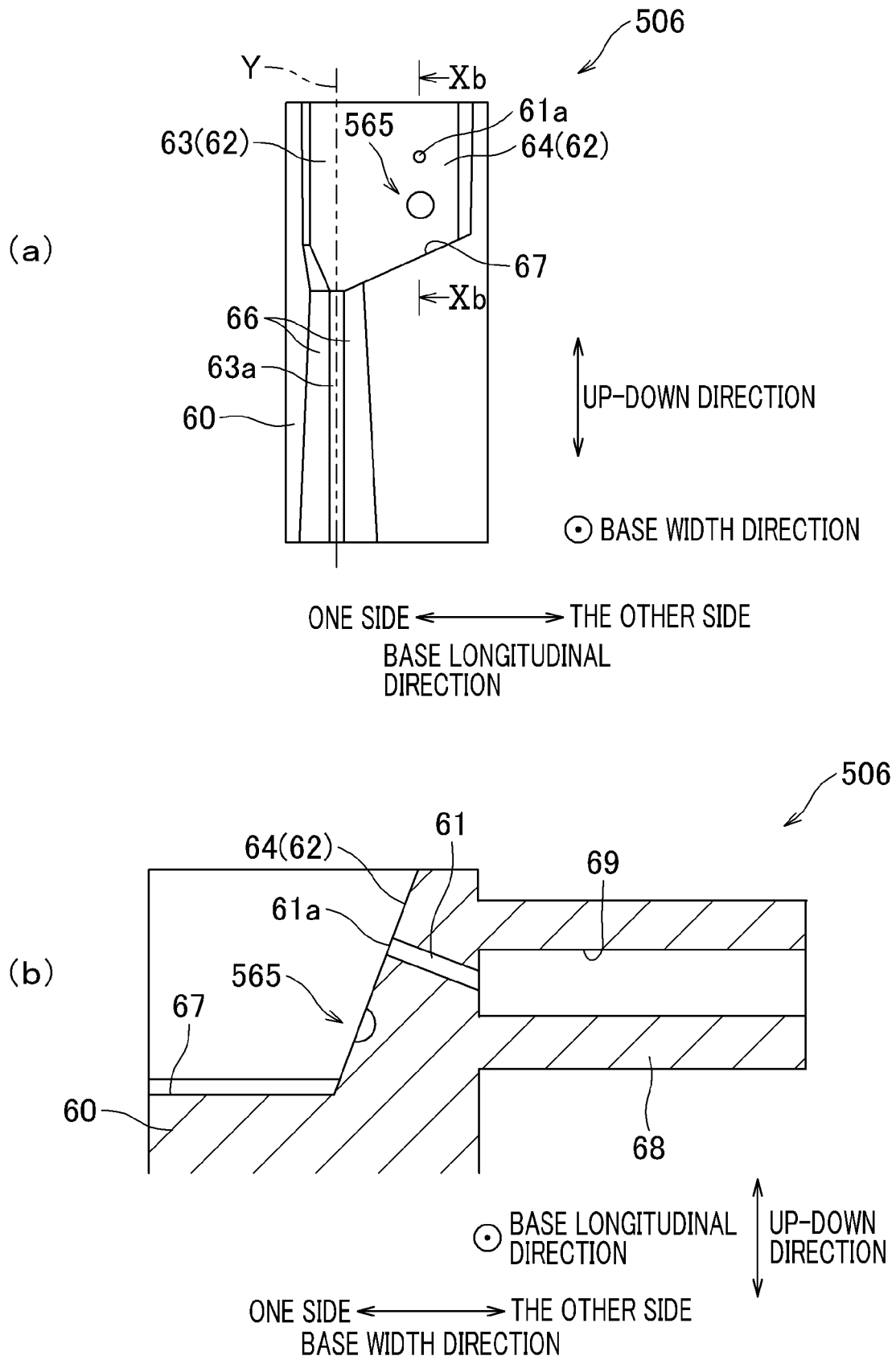


FIG.10





EUROPEAN SEARCH REPORT

Application Number

EP 22 21 1671

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 10 2017 001661 A1 (OERLIKON TEXTILE GMBH & CO KG [DE]) 23 August 2018 (2018-08-23) * paragraph [0019] - paragraph [0028] * * figures 1-4 *	1-14	INV. D01H13/30 B65H71/00 D06B3/04
A	EP 3 461 935 A1 (KYOCERA CORP [JP]) 3 April 2019 (2019-04-03) * claims 1-9 * * figures 1-3 *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			D01H B65H D06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 May 2023	Examiner Hausding, Jan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 22 21 1671

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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11-05-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102017001661 A1	23-08-2018	NONE	

EP 3461935 A1	03-04-2019	CN 109415845 A	01-03-2019
		EP 3461935 A1	03-04-2019
		JP 6680879 B2	15-04-2020
		JP WO2018003801 A1	04-04-2019
		WO 2018003801 A1	04-01-2018

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2019135335 A [0002]