



EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.11.2023 Bulletin 2023/44

(51) International Patent Classification (IPC):
B65H 54/71 (2006.01) B65H 54/88 (2006.01)

(21) Application number: **23168926.6**

(52) Cooperative Patent Classification (CPC):
B65H 54/71; B65H 54/88; B65H 2701/3132; B65H 2701/38

(22) Date of filing: **20.04.2023**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **Yano, Yasunobu**
Kyoto-shi, Kyoto, 612-8686 (JP)
• **Kaneko, Masahiko**
Kyoto-shi, Kyoto, 612-8686 (JP)

(74) Representative: **Grünecker Patent- und Rechtsanwälte**
PartG mbB
Leopoldstraße 4
80802 München (DE)

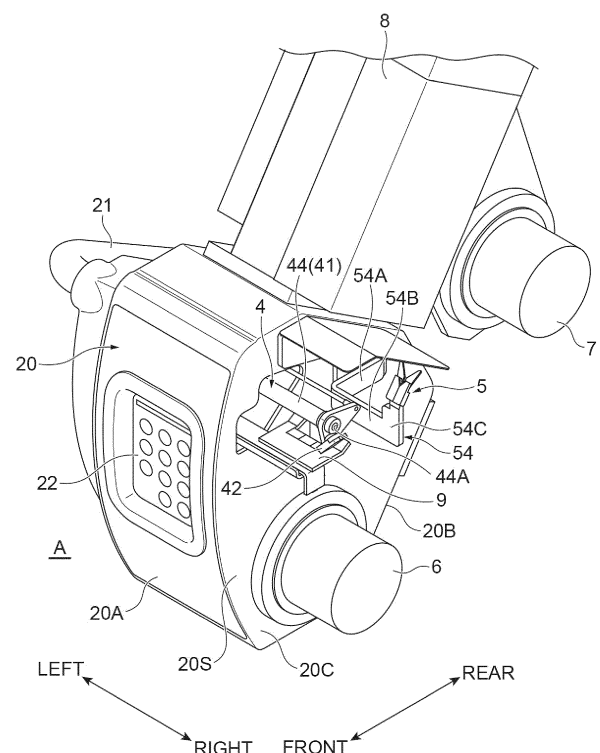
(30) Priority: **28.04.2022 JP 2022074920**

(71) Applicant: **TMT Machinery, Inc.**
Osaka-shi, Osaka 541-0041 (JP)

(54) **MELT SPINNING EQUIPMENT**

(57) Melt spinning equipment 100 includes a plurality of spinning take-up apparatuses 1 and a cutting unit 5. The cutting unit is a cutting unit 5 used for an operation of cutting a plurality of yarns Y by an operator, is able to cut a bundle of the plurality of yarns Y to be threaded to a take-up apparatus 3, and is provided in at least one of the take-up apparatus 3 and a yarn breakage-treating device 4. The yarn breakage-treating device 4 includes a cutter 42 which continuously cuts one or more of the plurality of yarns Y arranged side by side in an array direction and a suction portion 44 which holds the plurality of yarns Y cut by the cutter 42 and the plurality of yarns Y cut by the cutting unit 5.

Fig.3



Description

TECHNICAL FIELD

[0001] The present disclosure relates to melt spinning equipment that includes a plurality of spinning take-up apparatuses.

BACKGROUND

[0002] A spinning take-up apparatus includes a spinning apparatus which spins out a yarn, a take-up apparatus which winds a plurality of yarns spun out from the spinning apparatus, and a yarn breakage-treating device which is operated after a yarn winding operation or during a yarn cutting operation in the take-up apparatus to temporarily keep the yarn. Patent Document 1 (JP 2013-57148 A) discloses a yarn breakage-treating device including a first cutter which cuts a plurality of yarns, a suction device which includes a suction portion (suction port) sucking the plurality of yarns cut by the first cutter, and a second cutter which cuts the plurality of yarns sucked to the suction portion.

SUMMARY

[0003] In the spinning take-up apparatus, in a case in which the plurality of yarns spun out from the spinning apparatus are threaded to the take-up apparatus, an operator generally receives the plurality of yarns spun out from the spinning apparatus by a suction gun and threads the plurality of yarns sucked and held in the suction gun to the spinning take-up apparatus. Here, in general, the number of the suction guns is smaller than the number of the plurality of spinning take-up apparatuses. Therefore, in a situation in which the threading operations are performed at the same timing in the plurality of spinning take-up apparatuses, when the threading operation is performed on one spinning take-up apparatus, the yarn spun out from the spinning apparatus may not be received by the suction gun in the other spinning take-up apparatus.

[0004] Here, the suction portion of the yarn breakage-treating device temporarily holds the plurality of yarns spun out from the spinning apparatus. As a method of holding the yarn in the yarn breakage-treating device, there is known a method in which an operator receives the plurality of yarns spun out from the spinning apparatus, cuts the ends of the plurality of yarns using a cutting tool (scissors, a cutter, or the like), and then sucking and holding the plurality of yarns in the suction portion. However, in this method, since the operator performs the work while holding the cutting tool, workability is not good and safety is not good.

[0005] As another method of holding the yarn in the yarn breakage-treating device, there is known a method of cutting the plurality of yarns by cutters (a first cutter and a second cutter) of the yarn breakage-treating device

and sucking and holding the plurality of cut yarns in the suction portion. However, the cutters of the yarn breakage-treating device are for continuously (gradually) cutting one or more of the plurality of yarns. Therefore, when the plurality of yarns are bundled together and cut at once, troubles such as damage to the cutters and shortened life may occur. Therefore, there is a possibility that the original function of the cutters may be hindered.

[0006] An aspect of the present disclosure is to provide melt spinning equipment capable of improving workability and safety when threading a plurality of yarns spun out from a spinning apparatus to a take-up apparatus and preventing troubles from occurring in a cutter of yarn breakage-treating device in a case in which a plurality of spinning take-up apparatuses are installed.

[0007] Melt spinning equipment according to an aspect of the present disclosure includes: a plurality of spinning take-up apparatuses; and a cutting unit, wherein each of the plurality of spinning take-up apparatuses includes a spinning apparatus which spins out a plurality of yarns, a take-up apparatus which takes in the plurality of yarns, and a yarn breakage-treating device which temporarily keeps the plurality of yarns, wherein the cutting unit is a cutting unit used for an operation of cutting the plurality of yarns by an operator, is able to cut a bundle of the plurality of yarns to be threaded to the take-up apparatus, and is installed in at least one of the take-up apparatus and the yarn breakage-treating device, and wherein the yarn breakage-treating device includes at least one cutter which continuously cuts one or more of the plurality of yarns in an array direction of the plurality of yarns and a suction portion which holds the plurality of yarns cut by the cutter and the plurality of yarns cut by the cutting unit.

[0008] The melt spinning equipment according to an aspect of the present disclosure includes the cutting unit used for the operation of cutting the plurality of yarns by the operator. That is, the melt spinning equipment includes the cutting unit dedicated for cutting the bundle of the plurality of yarns to be threaded to the take-up apparatus when threading the plurality of yarns spun out from the spinning apparatus to the take-up apparatus. Accordingly, the operator can cut the bundle of the plurality of yarns at once by the cutting unit without using the cutting tool or the cutter. Thus, it is possible to improve the workability and safety when threading the plurality of yarns spun out from the spinning apparatus to the take-up apparatus and to prevent troubles occurring in the cutter of the yarn breakage-treating device in a case in which the plurality of spinning take-up apparatuses are installed.

[0009] Further, in the melt spinning equipment, the suction portion of the yarn breakage-treating device of each spinning take-up apparatus holds the plurality of yarns cut by the cutting unit. Therefore, even when the suction gun cannot receive the yarn spun out from the spinning apparatus, the suction portion can temporarily keep the yarn.

[0010] In one embodiment, the cutting unit may be in-

stalled in at least one of the take-up apparatus and the yarn breakage-treating device in each of the plurality of spinning take-up apparatuses. In this configuration, since the plurality of yarns can be cut by the cutting unit installed in the yarn breakage-treating device or the take-up apparatus of each spinning take-up apparatus, it is possible to further improve the workability.

[0011] In one embodiment, the melt spinning equipment may further include a plurality of suction guns capable of sucking the plurality of yarns spun out from the spinning apparatus and the number of the plurality of installed suction guns may be smaller than the number of the plurality of installed spinning take-up apparatuses. In this configuration, in a situation in which the threading operations are performed at the same timing in the plurality of spinning take-up apparatuses, when the threading operation is performed on one spinning take-up apparatus, the yarn spun out from the spinning apparatus may not be received by the suction gun in the other spinning take-up apparatus. Therefore, in the configuration in which the number of the plurality of installed suction gun is smaller than the number of the plurality of installed spinning take-up apparatuses, since there is no standby time for using the suction gun by holding the plurality of yarns cut by the cutting unit in the suction portion of the yarn breakage-treating device of each spinning take-up apparatus, it is possible to improve workability.

[0012] In one embodiment, the cutting unit may be disposed in the vicinity of a suction port of the suction portion. In this configuration, the plurality of yarns cut by the cutting unit can be easily guided to the suction port of the suction portion.

[0013] In one embodiment, the yarn breakage-treating device and the cutting unit may be fixed to one side portion in the same member in the take-up apparatus. In this configuration, the plurality of yarns cut by the cutting unit can be easily guided to the suction port of the suction portion.

[0014] In one embodiment, a side surface of the one side portion may intersect the array direction, a work area in which the operator is positioned during the cutting operation may be provided on one side with respect to the suction portion, and the cutting unit may be provided on the other side with respect to the suction portion in an orthogonal direction orthogonal to the array direction in a horizontal plane. In this configuration, since the work area and the cutting unit face each other in the orthogonal direction, the cutting unit does not disturb the threading operation by the suction gun.

[0015] In one embodiment, the cutting unit may be disposed at a position farther from the side surface in the array direction than a suction port of the suction portion when viewed from one side to the other side in the orthogonal direction. In this configuration, in a case in which the operator performs an operation while being positioned in the work area, the suction portion does not disturb the operation in which the plurality of yarns cut by the cutting unit is guided to the suction port of the suction

portion. Therefore, the plurality of yarns cut by the cutting unit can be easily guided to the suction port of the suction portion.

[0016] In one embodiment, the cutting unit may include a first blade which has a first blade portion and a second blade which is disposed to overlap the first blade and has a second blade portion. When viewed from an overlapping direction in which the first blade and the second blade overlap each other, a first ridge of a cutting edge of the first blade portion and a second ridge of a cutting edge of the second blade portion may intersect each other and a crossing portion may be formed by intersecting the first blade portion and the second blade portion. Then, the cutting unit may be provided so that the array direction is orthogonal to the overlapping direction and the crossing portion is visible when viewed from one side to the other side in an orthogonal direction orthogonal to the array direction in a horizontal plane. In this configuration, since the operator positioned in the work area can easily recognize the crossing portion in the cutting unit, it is possible to easily perform the work on the cutting unit.

[0017] In one embodiment, the crossing portion may be positioned above the suction portion in an up and down direction. In this configuration, the plurality of yarns cut by the cutting unit can be easily guided to the suction port of the suction portion.

[0018] In one embodiment, the cutting unit may cut the plurality of yarns entering the crossing portion from above. In this configuration, the operator can cut the plurality of yarns by an operation of moving the plurality of yarns up and down with respect to the cutting unit. Therefore, it is possible to easily cut the plurality of yarns.

[0019] In one embodiment, the first blade and the second blade may be inclined so that upper portions of the first blade and the second blade are positioned on the other side in the orthogonal direction and lower portions of the first blade and the second blade are positioned on one side in the orthogonal direction when viewed from the array direction. During the cutting operation, the operator grips the plurality of yarns with both hands, bundles the plurality of yarns, inserts the bundle of the plurality of yarns into the cutting unit in a portion between one hand and the other hand, and moves the plurality of yarns from top to down. At this time, the hand positioned on the rear side is moved downward to push down the bundle of the plurality of yarns while the height position of the hand positioned on the front side is fixed. Since it becomes easier to apply a shearing force to the plurality of yarns if the first blade and the second blade are inclined as described above when performing such an operation, the plurality of yarns can be easily cut.

[0020] In one embodiment, the yarn breakage-treating device and the cutting unit may be fixed to the same member in the take-up apparatus, the cutting unit may include an attachment member for attaching the first blade and the second blade to the member, and the attachment member may include a fixing portion which is fixed to the member, an extension portion which is con-

nected to the fixing portion and extends in the array direction, and a support portion which is connected to the extension portion, extends in an up and down direction, is connected to the lower portions of the first blade and the second blade, and supports the first blade and the second blade. In this configuration, the extension portion extends in the array direction and the support portion connected to this extension portion extends in the up and down direction. In this way, it is possible to prevent the attachment member from disturbing the cutting operation or to prevent the plurality of yarns from being caught by the attachment member by a configuration without a portion in which the extension portion and the support portion protrude in the orthogonal direction when viewed from the array direction.

[0021] In one embodiment, the yarn breakage-treating device and the cutting unit may be fixed to one side portion in the same member in the take-up apparatus, the member may be provided with a first operation portion which is operated by the operator, the first operation portion may be provided in the other side portion different from the one side portion in which the cutting unit is fixed in the member, and a work area in which the operator is positioned during the cutting work may be provided at a position in which the operation portion is operable. In this configuration, it is possible to perform the yarn cutting operation and the operation of the operation portion in the work area. Thus, it is possible to efficiently use the work area in a limited space of a factory or the like in which the melt spinning equipment is installed.

[0022] In one embodiment, the take-up apparatus may include a winding portion which winds the plurality of yarns, the winding portion may be provided with a second operation portion which is operated by the operator, and the first operation portion and the second operation portion may be arranged to face the same direction. In this configuration, the operator can operate the first operation portion or the second operation portion while confirming (seeing) both the first operation portion and the second operation portion.

[0023] In one embodiment, the plurality of spinning take-up apparatuses may be arranged in an arrangement direction, a passage through which the operator passes may be provided to extend in the arrangement direction, a work area in which the operator is positioned during the cutting work may be provided on the passage, the yarn breakage-treating device and the cutting unit may be fixed to one side portion in the same member in the take-up apparatus, and a side surface of the one side portion to which the cutting unit is fixed may intersect an extension direction of the passage. In this configuration, since the passage is provided on a straight line to extend in the arrangement direction, the operator can easily move. Further, since the cutting unit is not disposed on the passage, it is possible to prevent the operator passing through the passage from contacting the cutting unit.

[0024] According to an aspect of the present disclosure, it is possible to improve the workability and safety

when threading the plurality of yarns spun out from the spinning apparatus to the spinning take-up apparatus and to prevent troubles from occurring in the cutter of the yarn breakage-treating device in a case in which the plurality of spinning take-up apparatuses are installed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

FIG. 1 is a schematic side view of melt spinning equipment according to an embodiment.

FIG. 2 is a schematic front view of the melt spinning equipment.

FIG. 3 is a perspective view showing a housing provided with a cutting unit.

FIG. 4 is a front view of the housing provided with the cutting unit.

FIG. 5 is a side view of the housing provided with the cutting unit.

FIG. 6 is a perspective view showing a yarn breakage-treating device.

FIGS. 7A, 7B, 7C, 7D, and 7E are views showing the operation of a suction portion and a cutter.

FIG. 8 is a view showing a cutting unit.

FIG. 9 is a view showing a work area.

FIG. 10 is a front view of a housing in melt spinning equipment according to another embodiment.

FIGS. 11A, 11B, and 11C are views showing a work area according to a modified example.

DETAILED DESCRIPTION

[0026] Hereinafter, preferred embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. In the description of the drawings, the same or corresponding elements are denoted by the same reference numerals, and overlapping descriptions are omitted.

[0027] FIG. 1 is a schematic side view of melt spinning equipment according to an embodiment. FIG. 2 is a schematic front view of a spinning take-up apparatus. For convenience of description, the front and rear direction is set in FIG. 1 and the left and right direction is set in FIG. 2.

[0028] Melt spinning equipment 100 shown in FIGS. 1 and 2 is installed in a factory or the like. As shown in FIG. 2, the melt spinning equipment 100 includes a plurality of spinning take-up apparatuses 1 and a cutting unit (see FIG. 3). The plurality of spinning take-up apparatuses 1 are arranged side by side in the left and right direction. FIG. 2 shows two spinning take-up apparatuses 1. The melt spinning equipment 100 includes a plurality of suction guns 110. In the melt spinning equipment 100, the number of the plurality of installed spinning take-up apparatuses 1 is larger than the number of the plurality of installed suction guns 110.

[0029] Each of the plurality of spinning take-up apparatuses 1 has the same configuration. Hereinafter, a con-

figuration of an example of one spinning take-up apparatus 1 will be described in detail. As shown in FIGS. 1 and 2, the spinning take-up apparatus 1 includes a spinning apparatus 2, a take-up apparatus 3, and a yarn breakage-treating device 4. The spinning take-up apparatus 1 takes in a plurality of yarns Y spun out from the spinning apparatuses 2 in the take-up apparatus 3 and winds the plurality of yarns Y onto a plurality of bobbins B to form a plurality of packages P.

[0030] The spinning apparatus 2 spins out the plurality of yarns Y. The spinning apparatus 2 is disposed above the take-up apparatus 3. The plurality of yarns Y travel side by side in the array direction. The array direction matches the left and right direction.

[0031] The take-up apparatus 3 includes a first godet roller 6, a second godet roller 7, a guide rail 8, a yarn restricting mechanism 9, and a winding portion 10.

[0032] The first godet roller 6 and the second godet roller 7 take up the plurality of yarns Y spun out from the spinning apparatus 2. The first godet roller 6 is disposed below the spinning apparatus 2 in the up and down direction. The first godet roller 6 is installed in a housing 20 (see FIG. 4). The first godet roller 6 rotates around a rotating shaft extending in the left and right direction. The first godet roller 6 is rotationally driven by a first godet motor (not shown).

[0033] The second godet roller 7 is disposed behind the first godet roller 6. The second godet roller 7 rotates around a rotating shaft extending in the left and right direction. The second godet roller 7 is rotationally driven by a second godet motor (not shown).

[0034] The second godet roller 7 is movably supported by the guide rail 8. The guide rail 8 is disposed obliquely with respect to the front and rear direction so that one longitudinal end portion (the left end portion in FIG. 1) is directed downward and the other longitudinal end portion (the right end portion in FIG. 1) is positioned upward. The second godet roller 7 is connected to a cylinder (not shown). The second godet roller 7 moves along the guide rail 8 by the cylinder. Accordingly, the second godet roller 7 is movable between the winding position indicated by the solid line in FIG. 1 and the threading position indicated by the one-dotted chain line in FIG. 1. The winding position is a position when the yarn Y is wound. The threading position is a position closer to the first godet roller 6 than the winding position, and is a position when threading is performed.

[0035] The yarn restricting mechanism 9 is disposed above the first godet roller 6. As shown in FIGS. 3, 4, and 5, the yarn restricting mechanism 9 is installed in a side portion 20C of the housing 20. The yarn restricting mechanism 9 includes a first restricting portion 9A and a second restricting portion 9B. The first restricting portion 9A is disposed above the second restricting portion 9B. Each of the first restricting portion 9A and the second restricting portion 9B defines the interval between the plurality of yarns Y wound around the first godet roller 6. The first restricting portion 9A and the second restricting portion

9B stabilize the traveling of the plurality of yarns Y and restrict the lateral movement of the plurality of yarns Y arranged in the left and right direction.

[0036] As shown in FIGS. 1 and 2, the winding portion 10 includes a plurality of fulcrum guides 11, a plurality of traverse guides 12, a turret 13, two bobbin holders 14, and a contact roller 15.

[0037] As shown in FIG. 1, the plurality of fulcrum guides 11 are individually provided for the plurality of yarns Y and are arranged in the front and rear direction. The plurality of fulcrum guides 11 are movably attached to the guide member 16. The guide member 16 is disposed so that the longitudinal direction follows the front and rear direction. The guide member 16 is attached to a body frame 19 by a support member 18 attached therebelow.

[0038] The plurality of traverse guides 12 are individually provided for the plurality of yarns Y and are arranged side by side in the front and rear direction. Each traverse guide 12 is driven by a traverse motor (not shown) and moves in a reciprocating manner in the front and rear direction. The yarn Y hung on the traverse guide 12 is traversed around the fulcrum guide 11.

[0039] The turret 13 is a disk-shaped member. The turret 13 rotates around the rotating shaft extending in the front and rear direction. The turret 13 is rotationally driven by a turret motor (not shown). In each of two bobbin holders 14, the axial direction extends in the front and rear direction. Two bobbin holders 14 are respectively rotatably supported by the upper end portion and the lower end portion of the turret 13. Each bobbin holder 14 is equipped with a plurality of bobbins B individually provided for the plurality of yarns Y arranged side by side in the front and rear direction. Each of two bobbin holders 14 is rotationally driven by a separate winding motor (not shown).

[0040] In the winding portion 10, when the upper bobbin holder 14 is rotationally driven, the yarn Y traversed by the traverse guide 12 is wound around the bobbin B to form the package P. After the formation of the package P is completed, the upper and lower positions of the two bobbin holders 14 are exchanged by rotating the turret 13. Accordingly, the bobbin holder 14 which has been positioned on the lower side until then moves upward, and the yarn Y can be wound around the bobbin B attached to the bobbin holder 14 to form the package P. Further, the bobbin holder 14 which has been positioned on the upper side until then moves downward, and the completed package P can be collected from the bobbin holder 14.

[0041] The contact roller 15 is disposed above the upper bobbin holder 14. The contact roller 15 rotates around the rotating shaft extending in the front and rear direction. The contact roller 15 contacts the surface of the package P in which the yarn Y is wound around the bobbin B attached to the upper bobbin holder 14 to apply a contact pressure to the surface of the package P while the yarn Y is winding.

[0042] The yarn breakage-treating device 4 is operated after the yarn winding operation or during the yarn cutting operation in the take-up apparatus 3 to hold the plurality of yarns Y. The yarn breakage-treating device 4 is disposed above the yarn restricting mechanism 9. As shown in FIG. 3, the yarn breakage-treating device 4 is installed in the housing (member) 20.

[0043] As shown in FIG. 6, the yarn breakage-treating device 4 includes a holder 40, a suction device 41, and a cutter 42. The holder 40 serves as a base of the yarn breakage-treating device 4 and is provided in the housing 20 (see FIG. 4).

[0044] The suction device 41 is for sucking the plurality of yarns Y cut by the cutter 42. The suction device 41 includes a holding portion 43, a suction portion 44, and a cylinder 45. The holding portion 43 and the suction portion 44 are cylindrical members. The suction portion 44 is held to advance and retreat with respect to the holding portion 43 and the inside of the suction portion 44 communicate with each other. Airtightness is maintained between the outside of the suction portion 44 and the inside of the holding portion 43 so that air does not leak. A suction port 44A which sucks the plurality of cut yarns Y is formed at the tip of the suction portion 44. The holding portion 43 is fixed to the holder 40 so that the advancing and retreating direction of the suction portion 44 is parallel to the array direction of the plurality of yarns Y (left and right direction). The suction portion 44 penetrates the holder 40 and the suction port 44A of the tip protrudes from the opening portion 40A of the holder 40.

[0045] A suction source 48 (see FIG. 2) is connected to the suction device 41. The suction source 48 is for generating a suction airflow. The suction source 48 generates a suction force for sucking the plurality of cut yarns Y at the suction port 44A. The suction source 48 and the suction device 41 are connected to each other through a solenoid valve (not shown).

[0046] The cylinder 45 is fixed to the holder 40. The cylinder 45 includes a cylinder rod 46. The tip of the cylinder rod 46 is connected to a connecting member 47 fixed to the suction portion 44. The cylinder 45 is driven by a driving device 49 (see FIG. 2). By advancing and retreating the cylinder 45 by the driving device 49, the suction portion 44 moves between a first position P1 (see FIG. 7C) which is an advancing position and a second position P2 (see FIG. 7A) which is a retreating position from the first position P1. As shown in FIGS. 3 and 4, the suction portion 44 protrudes from the side portion 20C of the housing 20 at the first position P1.

[0047] As shown in FIG. 6, the cutter 42 cuts the plurality of yarns Y after the yarn winding operation or during the yarn cutting operation in the take-up apparatus 3. The cutter 42 advances and retreats together with the suction portion 44 of the suction device 41 and cuts the plurality of yarns Y on the upstream side of the yarn restricting mechanism 9 when the suction portion 44 advances. Specifically, as shown in FIGS. 7A, 7B, and 7C,

the cutter 42 cuts the yarn Y in accordance with the movement of the suction portion 44 advancing from the second position P2 to the first position P1. At this time, the suction portion 44 sucks the yarn Y cut by the cutter 42. As shown in FIGS. 7D and 7E, the cutter 42 retreats together with the suction portion 44 sucking the plurality of yarns Y and moves from the first position P1 to the second position P2.

[0048] The cutter 42 continuously cuts one or more of the plurality of yarns Y arranged in the array direction. Here, continuously cutting one or more of the plurality of yarns Y means gradually cutting the plurality of yarns Y that are not bundled. That is, continuously cutting one or more of the plurality of yarns Y means cutting the plurality of yarns Y while the cutter 42 contacts one or more yarns Y several times in accordance with the movement of the suction portion 44 while the suction portion 44 moves from the second position P2 to the first position P1. Thus, this is different from the operation of cutting the bundle of the plurality of yarns Y in one operation.

[0049] As shown in FIGS. 3, 4, and 5, a cutting unit 5 is used for the operation of cutting the plurality of yarns Y by the operator. The cutting unit 5 cuts a bundle of the plurality of yarns Y to be threaded to the take-up apparatus 3. As shown in FIG. 8, the cutting unit 5 includes a first blade (cutting blade) 50, a second blade (cutting blade) 51, a guide member 52, and an attachment member 54. The state of the cutting unit 5 shown in FIG. 7 is the front side of the cutting unit 5.

[0050] The first blade 50 includes a first blade portion 50A which is a tip thereof and a first base portion 50B which is continuous to the first blade portion 50A. The second blade 51 includes a second blade portion 51A which is a tip thereof and a second base portion 51B which is continuous to the second blade portion 51A.

[0051] The first blade 50 and the second blade 51 are arranged while the first base portion 50B and the second base portion 51B overlap each other so that the first blade 50 is positioned on the upper side and the second blade 51 is positioned on the lower side. A first ridge 50R of a cutting edge of the first blade 50 and a second ridge 51R of a cutting edge of the second blade 51 intersect at their midpoints. Accordingly, the cutting unit 5 is provided with a crossing portion C in which the first blade 50 and the second blade 51 intersect each other. In the first blade 50, a blade angle θ_1 of the first blade portion 50A is equal to or larger than 15° and smaller than 30° . In the second blade 51, a blade angle θ_2 of the second blade portion 51A is equal to or larger than 15° and smaller than 30° . In this embodiment, the blade angle θ_1 of the first blade 50 and the blade angle θ_2 of the second blade 51 are the same as each other. A gap is provided between the first blade portion 50A of the first blade 50 and the second blade portion 51A of the second blade 51. That is, a part of the lower surface of the first blade portion 50A and a part of the upper surface of the second blade portion 51A face each other with a gap therebetween.

[0052] The guide member 52 is disposed on the back side of the first blade 50 in an overlapping state in FIG.

8. The guide member 52 is for guiding the plurality of yarns Y to the crossing portion C between the first blade portion 50A and the second blade portion 51A formed in the first blade 50 and the second blade 51 intersecting each other. The guide member 52 is formed in a substantially V shape to guide the plurality of yarns Y to the crossing portion C between the first blade 50 and the second blade 51 intersecting each other.

[0053] As shown in FIGS. 3, 4, and 5, the attachment member 54 attaches the first blade 50 and the second blade 51 to the housing 20. The attachment member 54 includes a fixing portion 54A, an extension portion 54B, and a support portion 54C. The fixing portion 54A, the extension portion 54B, and the support portion 54C are integrally molded with each other. The attachment member 54 has, for example, a substantially L shape. The attachment member 54 is formed by bending a metal plate member. The thickness (plate thickness) of the attachment member 54 is, for example, 6 mm. The attachment member 54 has strength enough to withstand the load applied to the cutting unit 5 when the operator cuts the plurality of yarns Y.

[0054] The fixing portion 54A is a portion which is fixed to the side portion 20C (to be described later) of the housing 20. The fixing portion 54A is fixed to the side portion 20C. The fixing portion 54A is fixed to the side portion 20C by a screw, welding, or the like.

[0055] The extension portion 54B is a portion which is connected to the fixing portion 54A and extends in the left and right direction. The extension portion 54B is connected to the front end portion of the fixing portion 54A. The support portion 54C is connected to the extension portion 54B and extends in the up and down direction. The support portion 54C is connected to the right end portion of the extension portion 54B. The support portion 54C is connected to the lower portions of the first blade 50 and the second blade 51 and supports the first blade 50 and the second blade 51. The extension portion 54B and the support portion 54C are positioned on the front side of the crossing portion C between the first blade portion 50A and the second blade portion 51A when viewed from the left and right direction. That is, the extension portion 54B and the support portion 54C do not have any portion positioned on the rear side of the crossing portion C when viewed from the left and right direction.

[0056] The cutting unit 5 is fixed to the housing 20 of the take-up apparatus 3. The cutting unit 5 is fixed to the housing 20 in which the yarn breakage-treating device 4 is installed. That is, the yarn breakage-treating device 4 and the cutting unit 5 are fixed to the same member. In this embodiment, the cutting unit 5 is installed in the housing 20 of each take-up apparatus 3 of the plurality of spinning take-up apparatuses 1.

[0057] The housing 20 is provided at one longitudinal end portion of the guide rail 8. The housing 20 includes a front portion (other side portion) 20A which is provided with an operation portion (first operation portion) 22, a rear portion 20B which is disposed to face the winding

portion 10, and a pair of side portions 20C and 20D which connects the front portion 20A and the rear portion 20B to each other. The pair of side portions 20C and 20D faces each other in the left and right direction. A side surface 20S of the side portion 20C is orthogonal to the left and right direction (array direction). The side portion 20D is provided with a waste yarn pipe 21 for discharging waste yarns.

[0058] The front portion 20A is disposed to face the work area A. The work area A is an area in which the operator is positioned during a cutting operation. As shown in FIG. 9, the work area A is provided on the front side (one side) with respect to the suction portion 44 of the yarn breakage-treating device 4 in the front and rear direction (orthogonal direction) orthogonal to the array direction of the plurality of yarns Y (left and right direction) in the horizontal plane. The work area A is an area (space) on a passage T provided in front of the housing 20. In this embodiment, as shown in FIG. 2, the spinning take-up apparatuses 1 are arranged side by side in the left and right direction (arrangement direction) and the passage T through which the operator passes also extends in the left and right direction. The extension direction of the passage T is orthogonal to (intersects) the side surface 20S of the side portion 20C of the housing 20. The work area A is provided on the passage T extending in the left and right direction. In this embodiment, the front portion 20A of the housing 20 faces the passage T. Therefore, it is possible to operate the operation portion 22 provided in the front portion 20A of the housing 20 in the work area A. In FIG. 9, for convenience of description, the work area A is shown in a rectangular shape with dashed lines, but it does not show that the shape of the work area A is a rectangle.

[0059] As shown in FIGS. 3, 4, and 5, the cutting unit 5 is fixed to the side portion (one side portion) 20C of the housing 20. The cutting unit 5 is positioned so that the cut portion of the plurality of yarns Y in the cutting unit 5, that is, the crossing portion C between the first blade 50 and the second blade 51 is separated from the side portion 20C by the attachment member 54.

[0060] The cutting unit 5 is disposed in the vicinity of the suction port 44A of the suction portion 44 positioned at the first position P1 (see FIG. 7C). The vicinity means, for example, that the distance from the suction port 44A is 100 mm or less. Specifically, this is a distance between the suction port 44A and the guide member 52 of the upper end portion of the cutting unit 5 in the front and rear direction. In this embodiment, the distance between the suction port 44A and the upper end portion of the guide member 52 of the cutting unit 5 in the front and rear direction is, for example, about 80 mm.

[0061] The cutting unit 5 is disposed so that the front faces the work area A. The cutting unit 5 is disposed so that the operator can visually recognize the crossing portion C between the first blade 50 and the second blade 51 when the operator is positioned at the work area A. Specifically, the cutting unit 5 is disposed so that the over-

lapping direction of the first blade 50 and the second blade 51 is orthogonal to the left and right direction and the crossing portion C is visible when viewed from front to rear in the front and rear direction. The cutting unit 5 cuts the plurality of yarns Y entering the crossing portion C from above. The direction in which the plurality of yarns Y enter the cutting unit 5 is the up and down direction.

[0062] The crossing portion C between the first blade 50 and the second blade 51 of the cutting unit 5 is positioned above the suction portion 44 in the up and down direction. As shown in FIG. 4, the cutting unit 5 is disposed at a position separated from the side portion 20C in the left and right direction compared to the tip (suction port 44A) of the suction portion 44 positioned at the first position P1 in the yarn breakage-treating device 4.

[0063] As shown in FIG. 5, the first blade 50, the second blade 51, and the guide member 52 of the cutting unit 5 are arranged to be inclined when viewed from the left and right direction. Specifically, these members are inclined so that the upper portions of the first blade 50, the second blade 51, and the guide member 52 are positioned on the rear side and the lower portions of the first blade 50, the second blade 51, and the guide member 52 are positioned on the front side when viewed from the left and right direction. That is, the upper portions of the first blade 50, the second blade 51, and the guide member 52 are inclined in a direction moving away from the work area A. When viewed from the left and right direction, it can be mentioned that the distance between the position below the first blade 50, the second blade 51, and the guide member 52 and the position of the suction portion 44 in the front and rear direction is shorter than the distance between the position above the first blade 50, the second blade 51, and the guide member 52 and the position of the suction portion 44 in the front and rear direction.

[0064] For example, the first blade 50, the second blade 51, and the guide member 52 are inclined in a range larger than 0° and smaller than 90° with respect to the up and down direction. The angle is 0° when the first blade 50, the second blade 51, and the guide member 52 follow the up and down direction and is 90° when the first blade 50, the second blade 51, and the guide member 52 follow the front and rear direction. In this embodiment, the inclination angle θ is, for example, 35°.

[0065] Next, an electrical configuration of the spinning take-up apparatus 1 will be described. The spinning take-up apparatus 1 includes a control device 23. The control device 23 is a processor mounted with an integrated circuit or a computer system equipped with the processor. The control device 23 is a part that controls various operations in the spinning take-up apparatus 1 and includes a CPU (Central Processing Unit), a ROM (Read Only Memory), a RAM (Random Access Memory), an input/output interface, and the like.

[0066] The control device 23 controls a first godet motor driving the first godet roller 6, a second godet motor driving the second godet roller 7, and a cylinder. Accord-

ingly, the first godet roller 6 and the second godet roller 7 are driven. The control device 23 controls a solenoid valve (not shown) provided in the suction device 41. Accordingly, the solenoid valve is driven to be opened and closed. The control device 23 controls the driving device 49. Accordingly, the cylinder 45 of the suction device 41 is driven and the cylinder rod 46 attached to the cylinder 45 advances and retreats, so that the suction portion 44 connected thereto advances and retreats in the left and right direction. The control device 23 sends a signal to the control unit 24 of the winding portion 10. The control unit 24 controls the traverse guide 12, the turret 13, and the bobbin holder 14 provided in the winding portion 10.

[0067] Next, a method of threading the plurality of yarns Y spun out from the spinning apparatus 2 to the take-up apparatus 3 in the spinning take-up apparatus 1 will be described. Here, in the melt spinning equipment 100, a case in which all of the plurality of spinning take-up apparatuses 1 perform a threading operation at once will be described.

[0068] First, a method of temporarily holding the plurality of yarns Y spun out from the spinning apparatus 2 in the yarn breakage-treating device 4 will be described. The operator acquires the plurality of yarns Y spun out from the spinning apparatus 2 at the lower side of the spinning apparatus 2 (work area A). Next, the operator grips the plurality of yarns Y with both hands, bundles the plurality of yarns Y so that the cutting unit 5 is positioned between one hand and the other hand in the front and rear direction, and inserts the bundle of the plurality of yarns Y into the cutting unit 5 between one hand and the other hand. Then, the operator pushes down the bundle of the plurality of yarns Y at the cutting unit 5 to cut the bundle of the plurality of yarns Y at once. Specifically, the hand positioned on the rear side is moved downward to push down the bundle of the plurality of yarns Y while the height position of the hand positioned on the front side is fixed. After cutting, the operator brings the plurality of yarns Y to the suction port 44A of the suction portion 44 of the yarn breakage-treating device 4 and sucks the yarns from the suction port 44A. Accordingly, the yarn breakage-treating device 4 holds the plurality of yarns Y cut at the end portions thereof. Even in the other spinning take-up apparatus 1, the operator temporarily holds the plurality of yarns Y at the yarn breakage-treating device 4 according to the same method.

[0069] Additionally, a method of cutting the plurality of yarns Y in the cutting unit 5 is not limited to the above-described method and the plurality of yarns may be cut according to another method. The operator may cut the plurality of yarns Y while applying a tension thereto.

[0070] Next, a method of threading the plurality of yarns Y held in the yarn breakage-treating device 4 to the take-up apparatus 3 will be described. The operator cuts the plurality of yarns Y held in the yarn breakage-treating device 4 with scissors and causes the suction gun 110 to suck the plurality of yarns Y spun out from the spinning apparatus 2. The operator sets the plurality

of yarns Y sucked by the suction gun 110 on the yarn restricting mechanism 9 and winds them around the first godet roller 6 and the second godet roller 7 in this order. At this time, the second godet roller 7 is positioned at the threading position. Then, the plurality of yarns Y are set on the winding portion 10 by a predetermined procedure.

[0071] As described above, the melt spinning equipment 100 according to this embodiment includes the cutting unit 5 used for the operation of cutting the plurality of yarns Y by the operator. That is, the melt spinning equipment 100 includes the cutting unit 5 dedicated for cutting the bundle of the plurality of yarns Y to be threaded to the take-up apparatus 3 when the plurality of yarns Y spun out from the spinning apparatus 2 are threaded to the take-up apparatus 3. Accordingly, the operator can cut the bundle of the plurality of yarns Y at once by the cutting unit 5 without using the cutting tool or the cutter. Thus, it is possible to improve the workability and safety when threading the plurality of yarns spun out from the spinning apparatus 2 to the take-up apparatus 3 and to prevent troubles occurring in the cutter of the yarn breakage-treating device in a case in which the plurality of spinning take-up apparatuses 1 are installed.

[0072] In the melt spinning equipment 100 according to this embodiment, the suction portion 44 of the yarn breakage-treating device 4 holds the plurality of yarns Y cut by the cutting unit 5. Therefore, even when the suction gun 110 cannot receive the yarn Y spun out from the spinning apparatus 2, the suction portion 44 can temporarily keep the yarn Y

[0073] In the melt spinning equipment 100 according to this embodiment, the cutting unit 5 is installed in the take-up apparatus 3 in each of the plurality of spinning take-up apparatuses 1. In this configuration, since the plurality of yarns Y can be cut by the cutting unit 5 installed in the take-up apparatus 3 of each spinning take-up apparatus 1, it is possible to further improve the workability.

[0074] The melt spinning equipment 100 according to this embodiment includes the plurality of suction guns 110 capable of sucking the plurality of yarns Y spun out from the spinning apparatus 2. The number of the plurality of installed suction guns 110 is smaller than the number of the plurality of installed spinning take-up apparatuses 1. In this configuration, in a situation in which the threading operations are performed at the same timing in the plurality of spinning take-up apparatuses 1, when the threading operation is performed on one spinning take-up apparatus 1, the yarn Y spun out from the spinning apparatus 2 may not be received by the suction gun 110 in the other spinning take-up apparatus 1. Therefore, in the configuration in which the number of the plurality of installed suction gun 110 is smaller than the number of the plurality of installed spinning take-up apparatuses 1, since there is no standby time for using the suction gun 110 by holding the plurality of yarns Y cut by the cutting unit 5 in the suction portion 44 of the yarn breakage-treating device 4 of each spinning take-up apparatus 1, it is possible to improve workability.

[0075] In the melt spinning equipment 100 according to this embodiment, the cutting unit 5 is disposed in the vicinity of the suction port 44A of the suction portion 44 of the yarn breakage-treating device 4. In this embodiment, the suction portion 44 of the yarn breakage-treating device 4 is provided to be movable in the left and right direction between the first position P1 which is an advancing position and the second position P2 which is a retreating position from the first position P1. The cutting unit 5 is disposed in the vicinity of the suction port 44A of the suction portion 44 positioned at the first position P1. In this configuration, the plurality of yarns Y cut by the cutting unit 5 can be easily guided to the suction port 44A of the suction portion 44.

[0076] In the melt spinning equipment 100 according to this embodiment, the yarn breakage-treating device 4 and the cutting unit 5 are fixed to the side portion 20C of the housing 20 in the take-up apparatus 3. In this configuration, the plurality of yarns Y cut by the cutting unit 5 can be easily guided to the suction port 44A of the suction portion 44.

[0077] In the melt spinning equipment 100 according to this embodiment, in the front and rear direction, the work area A where the operator is positioned during the cutting operation is provided on the front side of the suction portion 44 of the yarn breakage-treating device 4 and the cutting unit 5 is provided on the rear side of the suction portion 44. In this configuration, since the work area A and the cutting unit 5 face each other in the front and rear direction, the cutting unit does not disturb the threading operation by the suction gun 110.

[0078] In the melt spinning equipment 100 according to this embodiment, the cutting unit 5 is disposed at a position farther from the side surface 20S in the left and right direction than the suction port 44A of the suction portion 44 of the yarn breakage-treating device 4 when viewed from front to rear in the front and rear direction. In this configuration, in a case in which the operator performs a work while being positioned in the work area A, the suction portion 44 does not disturb the operation in which the plurality of yarns Y cut by the cutting unit 5 are guided to the suction port 44A of the suction portion 44. Therefore, the plurality of yarns cut by the cutting unit 5 can be easily guided to the suction port 44A of the suction portion 44.

[0079] In the melt spinning equipment 100 according to this embodiment, the cutting unit 5 includes the first blade 50 including the first blade portion 50A and the second blade 51 disposed to overlap the first blade 50 and including the second blade portion 51A. When viewed in the overlapping direction in which the first blade 50 overlaps the second blade 51, the first ridge 50R of the cutting edge of the first blade portion 50A intersects the second ridge 51R of the cutting edge of the second blade portion 51A to form the crossing portion C in which the first blade portion 50A and the second blade portion 51A intersect each other. In the melt spinning equipment 100, the work area A in which the operator is positioned

during the cutting operation is provided on the front side of the suction portion 44 in the front and rear direction. In the melt spinning equipment 100, the cutting unit 5 is fixed to the side portion 20C of the housing 20 so that the left and right direction is orthogonal to the overlapping direction of the cutting unit 5 and the crossing portion C is visible when viewed from front to rear in the front and rear direction.

[0080] In the melt spinning equipment 100 according to this embodiment, the crossing portion C in which the first blade 50 and the second blade 51 intersect each other is positioned above the suction portion 44 in the up and down direction. In this configuration, the plurality of yarns Y cut in the first blade 50 and the second blade 51 of the cutting unit 5 can be easily guided to the suction port 44A of the suction portion 44.

[0081] In the melt spinning equipment 100 according to this embodiment, the cutting unit 5 cuts the plurality of yarns Y entering the crossing portion C from above. In this configuration, the operator can cut the plurality of yarns Y by the operation of moving the plurality of yarns Y from top to bottom with respect to the cutting unit 5. Therefore, the plurality of yarns Y can be easily cut.

[0082] In the melt spinning equipment 100 according to this embodiment, the first blade 50 and the second blade 51 are inclined so that the upper portions of the first blade 50 and the second blade 51 are positioned on the rear side in the front and rear direction and the lower portions of the first blade 50 and the second blade 51 are positioned on the front side in the front and rear direction when viewed from the left and right direction. During the cutting operation, the operator grips the plurality of yarns Y with both hands, bundles the plurality of yarns Y, inserts the bundle of the plurality of yarns Y into the cutting unit 5 in a portion between one hand and the other hand, and moves the plurality of yarns Y from top to bottom. At this time, the hand positioned on the rear side is moved downward to push down the bundle of the plurality of yarns Y while the height position of the hand positioned on the front side is fixed. Since it becomes easier to apply a shearing force to the plurality of yarns Y if the first blade 50 and the second blade 51 are inclined as described above when performing such an operation, the plurality of yarns Y can be easily cut.

[0083] In the melt spinning equipment 100 according to this embodiment, the cutting unit 5 includes the attachment member 54 that attaches the first blade 50 and the second blade 51 to the side portion 20C of the housing 20. The attachment member 54 includes the fixing portion 54A which is fixed to the side portion 20C, the extension portion 54B which is connected to the fixing portion 54A and extends in the left and right direction, and the support portion 54C which is connected to the extension portion 54B, extends in the up and down direction, is connected to a lower portion of a holding member 53, and supports the holding member 53. In this configuration, the extension portion 54B extends in the left and right direction and the support portion 54C connected to this extension

portion 54B extends in the up and down direction. In this way, it is possible to prevent the attachment member 54 from disturbing the cutting operation or to prevent the plurality of yarns Y from being caught by the attachment member 54 by a configuration without a portion in which the extension portion 54B and the support portion 54C protrude in the front and rear direction when viewed from the left and right direction. Further, in the configuration in which the fixing portion 54A is fixed to the side portion 20C, the extension portion 54B does not have to be long when the cutting unit 5 is disposed in the vicinity of the suction port 44A of the suction portion 44. Accordingly, the attachment member 54 can be ensured to have sufficient strength to withstand the load applied to the cutting unit 5 during the cutting operation.

[0084] In the melt spinning equipment 100 according to this embodiment, the housing 20 is provided with the operation portion 22 operated by the operator. The operation portion 22 is provided in the front portion 20A different from the side portion 20C in which the cutting unit 5 is fixed in the housing 20. The work area A in which the operator is positioned during the cutting operation is provided at a position in which the operation portion 22 can be operated. In this configuration, the operation of cutting the yarn Y and the operation of the operation portion 22 can be performed in the work area A. Thus, the work area A can be efficiently used in a space such as a factory in which the melt spinning equipment 100 is installed.

[0085] In the melt spinning equipment 100 according to this embodiment, the plurality of spinning take-up apparatuses 1 are arranged side by side in the left and right direction. In the melt spinning equipment 100, the passage T through which the operator passes is provided to extend in the left and right direction. The work area A in which the operator is positioned during the cutting operation is provided on the passage T. In this configuration, since the passage T is provided in a straight line to extend in the left and right direction, the operator can easily move. Further, since the cutting unit is not disposed on the passage T, it is possible to prevent the operator passing through the passage T from contacting the cutting unit.

[0086] Although the embodiment of the present disclosure has been described above, the present disclosure is not necessarily limited to the above-described embodiment, and various modifications can be made without departing from the scope of the invention.

[0087] In the above-described embodiment, an embodiment in which the cutting unit 5 is disposed on the rear side of the suction portion 44 in the side portion 20C of the housing 20 has been described as an example. However, the cutting unit 5 may be disposed on the front side (the side of the work area A) with respect to the suction portion 44.

[0088] In the above-described embodiment, an embodiment in which the cutting unit 5 includes the first blade 50, the second blade 51, the guide member 52,

and the attachment member 54 has been described as an example. However, the cutting unit may have any configuration if the plurality of yarns Y can be bundled and cut together.

[0089] In the above-described embodiment, an embodiment in which the cutting unit 5 is installed in the side portion 20C of the housing 20, that is, the take-up apparatus 3 has been described as an example. However, the cutting unit 5 may be installed in the yarn breakage-treating device 4. Further, the cutting unit 5 may be installed in the take-up apparatus 3 and the yarn breakage-treating device 4. A plurality of the cutting units 5 may be installed in each of the take-up apparatus 3 and the yarn breakage-treating device 4.

[0090] In the above-described embodiment, an embodiment in which the fixing portion 54A of the attachment member 54 is fixed to the side portion 20C of the housing 20 has been described. However, the fixing portion 54A may be fixed to, for example, the upper portion of the housing 20 and the like.

[0091] In the above-described embodiment, an embodiment in which the cutting unit 5 is fixed to the side portion 20C of the housing 20 by the attachment member 54 has been described as an example. However, for example, the cutting unit 5 may be accommodated inside the housing 20 when not in use and protrude from the housing 20 when in use.

[0092] In the above-described embodiment, an embodiment in which the cutting unit 5 is disposed so that the front faces the work area A has been described as an example. However, the direction of the cutting unit 5 is not limited thereto.

[0093] In the above-described embodiment, an embodiment in which the yarn breakage-treating device 4 includes one cutter 42 has been described as an example. However, the yarn breakage-treating device 4 may include two or more cutters.

[0094] In the above-described embodiment, an embodiment in which the cutter 42 moves together with the suction portion 44 to cut the yarn Y in the yarn breakage-treating device 4 has been described as an example. However, the cutter may be fixed in the yarn breakage-treating device. In this configuration, for example, a guide mechanism or the like is provided to guide the plurality of yarns to the cutter and the cutter cuts the plurality of yarns guided to the cutter by the guide mechanism. The guide mechanism moves the plurality of yarns in the array direction to guide the plurality of yarns to the cutter. For example, the guide mechanism may guide the plurality of yarns to the cutter by hooking the plurality of yarns with a hook or moving a defining portion that defines the interval of the plurality of yarns Y in the array direction. Further, the yarn breakage-treating device may include a guide mechanism or the like that guides the plurality of yarns to the cutter. Then, the guide mechanism guides the plurality of yarns to the cutter and the cutter may move relative to the guide mechanism so that the cutter cuts the plurality of yarns.

[0095] In the above-described embodiment, an embodiment in which the cutting unit 5 is provided in each of the plurality of spinning take-up apparatuses 1 has been described as an example. However, one cutting unit 5 may be provided in the plurality of spinning take-up apparatuses 1. For example, as shown in FIG. 10, only one spinning take-up apparatus 1 (on the left side in the drawing) may be provided with the cutting unit 5 and the other spinning take-up apparatus 1 (on the right side in the drawing) may not be provided with the cutting unit 5 among the spinning take-up apparatuses 1 arranged adjacently. In the example shown in FIG. 10, in the spinning take-up apparatuses 1 arranged adjacently, the yarn breakage-treating device 4 and the like are arranged in the housing 20 to face each other.

[0096] In a case in which the plurality of yarns Y spun out from the spinning apparatus 2 are temporarily held by the yarn breakage-treating device 4 in the other spinning take-up apparatus 1, the plurality of yarns Y are cut by the cutting unit 5 provided in one spinning take-up apparatus 1. After cutting, the operator brings the plurality of yarns Y to the suction port 44A of the suction portion 44 of the yarn breakage-treating device 4 of the other spinning take-up apparatus 1 and sucks the yarns from the suction port 44A.

[0097] In the above-described embodiment, as shown in FIG. 2, an embodiment in which the spinning take-up apparatuses 1 are arranged side by side in the left and right direction and the work area A is provided on the passage T extending in the arrangement direction of the spinning take-up apparatus 1 has been described as an example. However, the work area A may be appropriately set in accordance with the arrangement of the spinning take-up apparatus 1. For example, as shown in FIG. 11A, in the configuration in which the plurality of spinning take-up apparatuses 1 are arranged with their positions shifted in the front and rear direction, the work area A may be provided in front of the housing 20 of the take-up apparatus 3 of each spinning take-up apparatus 1. For example, as shown in FIG. 11B, in the configuration in which the plurality of spinning take-up apparatuses 1 are arranged on a circular track, the work area A may be provided in front of the housing 20 of the take-up apparatus 3 of each spinning take-up apparatus 1 (on the center side of the circle). For example, as shown in FIG. 11C, in the configuration in which the plurality of spinning take-up apparatuses 1 are arranged to face each other, the work area A may be provided between the spinning take-up apparatuses 1 arranged to face each other.

[0098] In addition to the above-described embodiment, the winding portion 10 may include an operation portion (second operation portion) operated by the operator. In this configuration, the operation portion 22 provided in the housing 20 and the operation portion provided in the winding portion 10 may be provided to face the same direction (the front side of the front and rear direction). In this configuration, the operator can operate the operation portion while confirming (seeing) both the operation

portion 22 provided in the housing 20 and the operation portion provided in the winding portion 10.

REFERENCE SIGNS LIST

[0099]

1 Spinning take-up apparatus
2 Spinning apparatus
3 Take-up apparatus
4 Yarn breakage-treating device
5 Cutting unit
10 Winding portion
20 Housing (member)
20A Front portion (other side portion)
20C Side portion (one side portion)
20S Side surface
22 Operation portion (first operation portion)
42 Cutter
44 Suction portion
44A Suction port
50 First blade
50A First blade portion
50R first ridge
51 Second blade
51A Second blade portion
51R Second ridge
54 Attachment member
54A Fixing portion
54B Extension portion
54C Support portion
100 Melt spinning equipment
110 Suction gun
A Work area
C Crossing portion
T Passage
Y Yarn

Claims

1. Melt spinning equipment (100) comprising:

a plurality of spinning take-up apparatuses (1);
and
a cutting unit (5),
wherein each of the plurality of spinning take-up apparatuses (1) includes a spinning apparatus (2) which spins out a plurality of yarns (Y), a take-up apparatus (3) which takes in the plurality of yarns (Y), and a yarn breakage-treating device (4) which temporarily keeps the plurality of yarns (Y),
wherein the cutting unit (5) is a cutting unit used for an operation of cutting the plurality of yarns (Y) by an operator, is able to cut a bundle of the plurality of yarns (Y) to be threaded to the take-up apparatus (3), and is installed in at least one

of the take-up apparatus (3) and the yarn breakage-treating device (4), and
wherein the yarn breakage-treating device (4) includes at least one cutter (42) which continuously cuts one or more of the plurality of yarns (Y) in an array direction of the plurality of yarns (Y) and a suction portion (44) which holds the plurality of yarns (Y) cut by the cutter (42) and the plurality of yarns (Y) cut by the cutting unit (5).

2. The melt spinning equipment (100) according to claim 1,
wherein the cutting unit (5) is installed in at least one of the take-up apparatus (3) and the yarn breakage-treating device (4) in each of the plurality of spinning take-up apparatuses (1).

3. The melt spinning equipment (100) according to claim 1 or 2, further comprising:

a plurality of suction guns (110) capable of sucking the plurality of yarns (Y) spun out from the spinning apparatus (2),
wherein the number of the plurality of installed suction guns (110) is smaller than the number of the plurality of installed spinning take-up apparatuses (1).

4. The melt spinning equipment (100) according to any one of claims 1 to 3,
wherein the cutting unit (5) is disposed in the vicinity of a suction port (44A) of the suction portion (44).

5. The melt spinning equipment (100) according to any one of claims 1 to 4,
wherein the yarn breakage-treating device (4) and the cutting unit (5) are fixed to one side portion (20C) in the same member (20) in the take-up apparatus (3).

6. The melt spinning equipment (100) according to claim 5,

wherein a side surface (20S) of the one side portion (20C) intersects the array direction, and
wherein a work area (A) in which the operator is positioned during the cutting operation is provided on one side with respect to the suction portion (44) and the cutting unit (5) is provided on the other side with respect to the suction portion (44) in an orthogonal direction orthogonal to the array direction in a horizontal plane.

7. The melt spinning equipment (100) according to claim 6,
wherein the cutting unit (5) is disposed at a position farther from the side surface (20S) in the array di-

rection than a suction port (44A) of the suction portion (44) when viewed from one side to the other side in the orthogonal direction.

8. The melt spinning equipment (100) according to any one of claims 1 to 7,

wherein the cutting unit (5) includes a first blade (50) which has a first blade portion (50A) and a second blade (51) which is disposed to overlap the first blade (50) and has a second blade portion (51A),

wherein when viewed from an overlapping direction in which the first blade (50) and the second blade (51) overlap each other, a first ridge (50R) of a cutting edge of the first blade portion (50A) and a second ridge (51R) of a cutting edge of the second blade portion (51A) intersect each other and a crossing portion (C) is formed by intersecting the first blade portion (50A) and the second blade portion (51A), and

wherein the cutting unit (5) is provided so that the array direction is orthogonal to the overlapping direction and the crossing portion (C) is visible when viewed from one side to the other side in an orthogonal direction orthogonal to the array direction in a horizontal plane.

9. The melt spinning equipment (100) according to claim 8, wherein the crossing portion (C) is positioned above the suction portion (44) in an up and down direction.

10. The melt spinning equipment (100) according to claim 9, wherein the cutting unit (5) cuts the plurality of yarns (Y) entering the crossing portion (C) from above.

11. The melt spinning equipment (100) according to claim 10, wherein the first blade (50) and the second blade (51) are inclined so that upper portions of the first blade (50) and the second blade (51) are positioned on the other side in the orthogonal direction and lower portions of the first blade (50) and the second blade (51) are positioned on one side in the orthogonal direction when viewed from the array direction.

12. The melt spinning equipment (100) according to any one of claims 8 to 11,

wherein the yarn breakage-treating device (4) and the cutting unit (5) are fixed to the same member in the take-up apparatus (3), wherein the cutting unit (5) includes an attachment member (54) for attaching the first blade (50) and the second blade (51) to the member, and

wherein the attachment member (54) includes a fixing portion (54A) which is fixed to the member, an extension portion (54B) which is connected to the fixing portion (54A) and extends in the array direction, and a support portion (54C) which is connected to the extension portion (54B), extends in an up and down direction, is connected to the lower portions of the first blade (50) and the second blade (51), and supports the first blade (50) and the second blade (51).

13. The melt spinning equipment (100) according to any one of claims 1 to 12,

wherein the yarn breakage-treating device (4) and the cutting unit (5) are fixed to one side portion (20C) in the same member (20) in the take-up apparatus (3),

wherein the member (20) is provided with a first operation portion (22) which is operated by the operator,

wherein the first operation portion (22) is provided in the other side portion (20A) different from the one side portion (20C) in which the cutting unit (5) is fixed in the member (20), and wherein a work area (A) in which the operator is positioned during the cutting work is provided at a position in which the operation portion is operable.

14. The melt spinning equipment (100) according to claim 13,

wherein the take-up apparatus (3) includes a winding portion (10) which winds the plurality of yarns (Y),

wherein the winding portion (10) is provided with a second operation portion which is operated by the operator, and

wherein the first operation portion (22) and the second operation portion are arranged to face the same direction.

15. The melt spinning equipment (100) according to any one of claims 1 to 14,

wherein the plurality of spinning take-up apparatuses (3) are arranged in an arrangement direction,

wherein a passage (T) through which the operator passes is provided to extend in the arrangement direction,

wherein a work area (A) in which the operator is positioned during the cutting work is provided on the passage (T),

wherein the yarn breakage-treating device (4) and the cutting unit (5) are fixed to one side portion

tion (20C) in the same member (20) in the take-up apparatus (3), and wherein a side surface (20S) of the one side portion (20C) to which the cutting unit (5) is fixed intersects an extension direction of the passage (T).

10

15

20

25

30

35

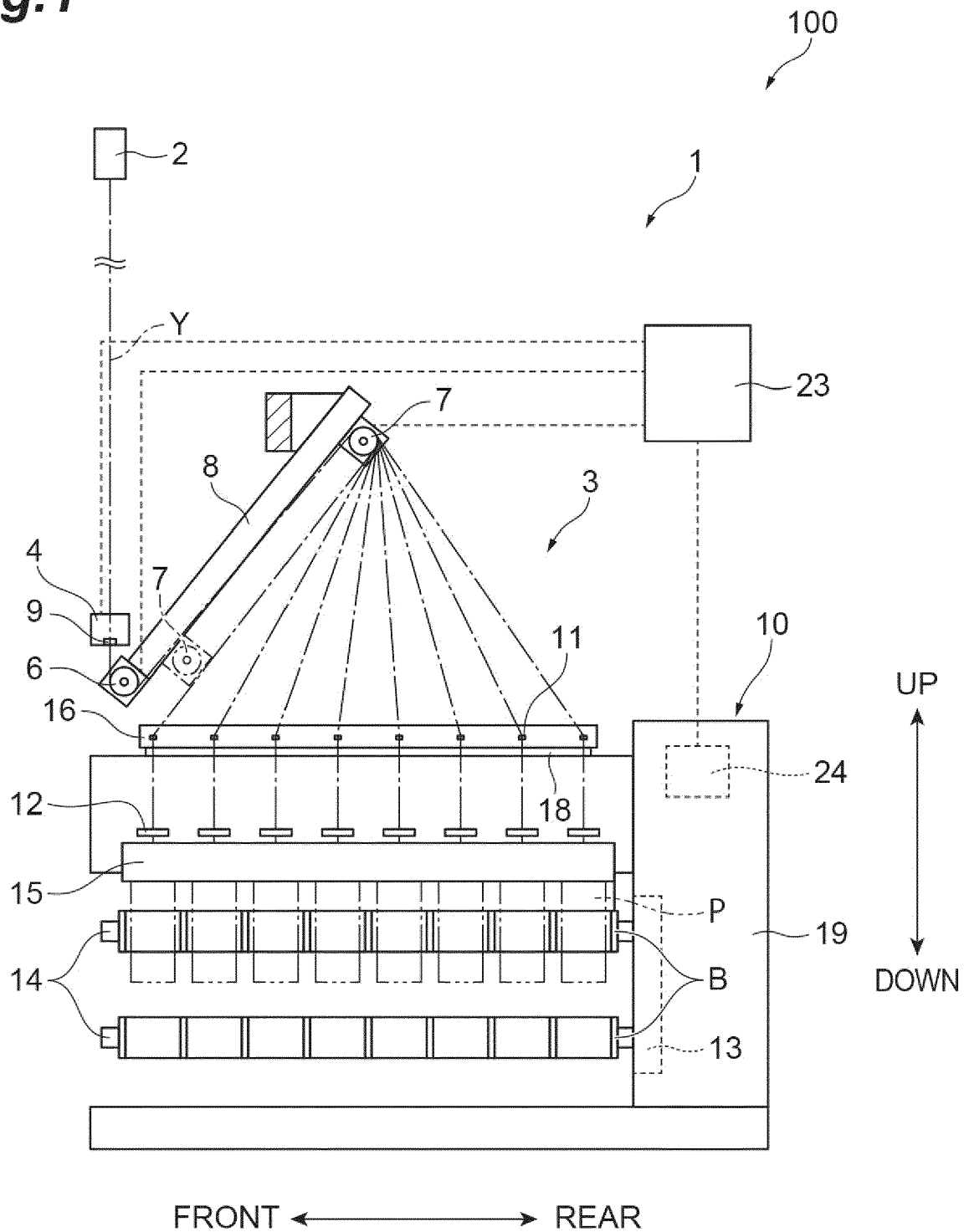
40

45

50

55

Fig.1



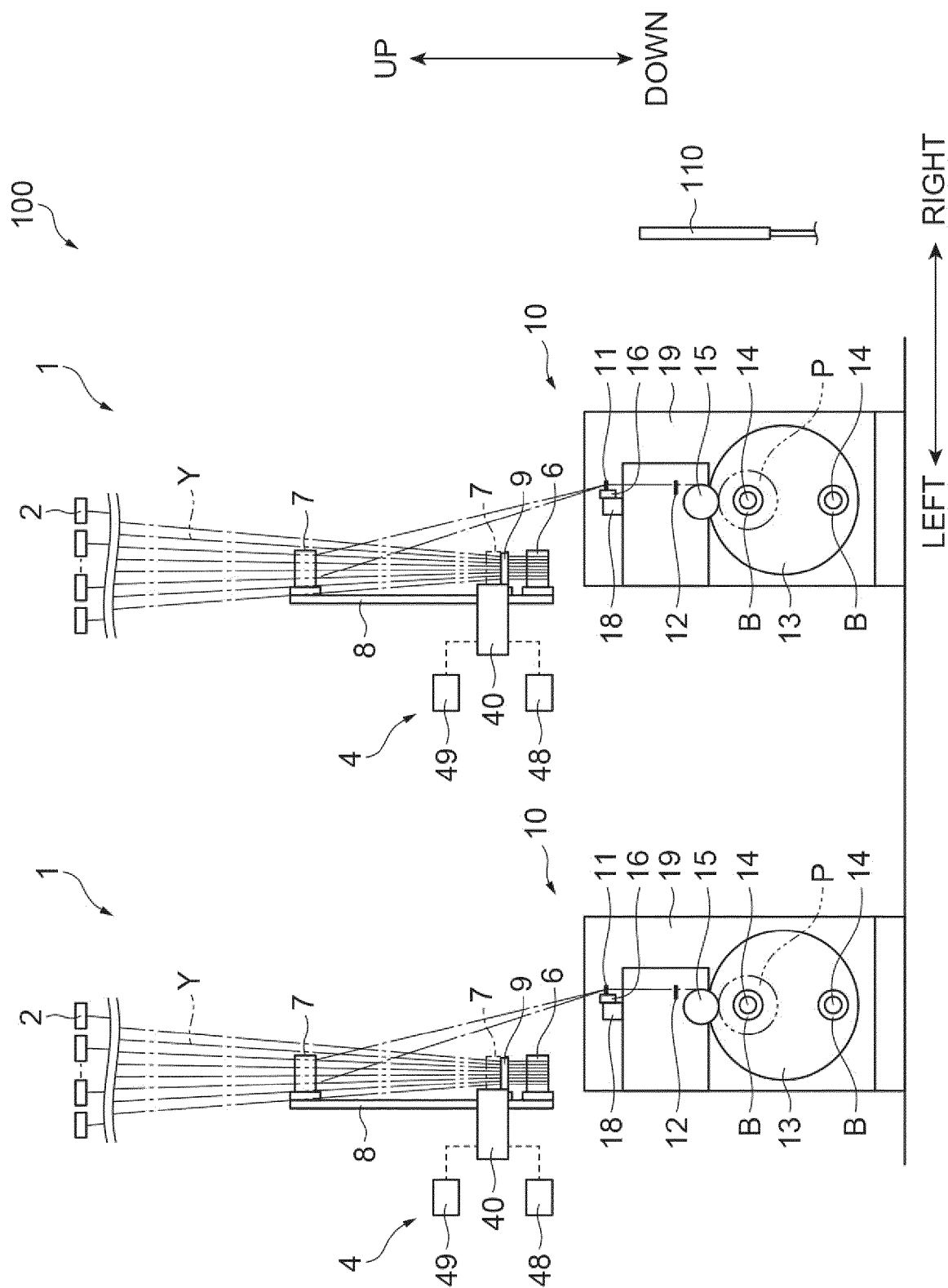


Fig.3

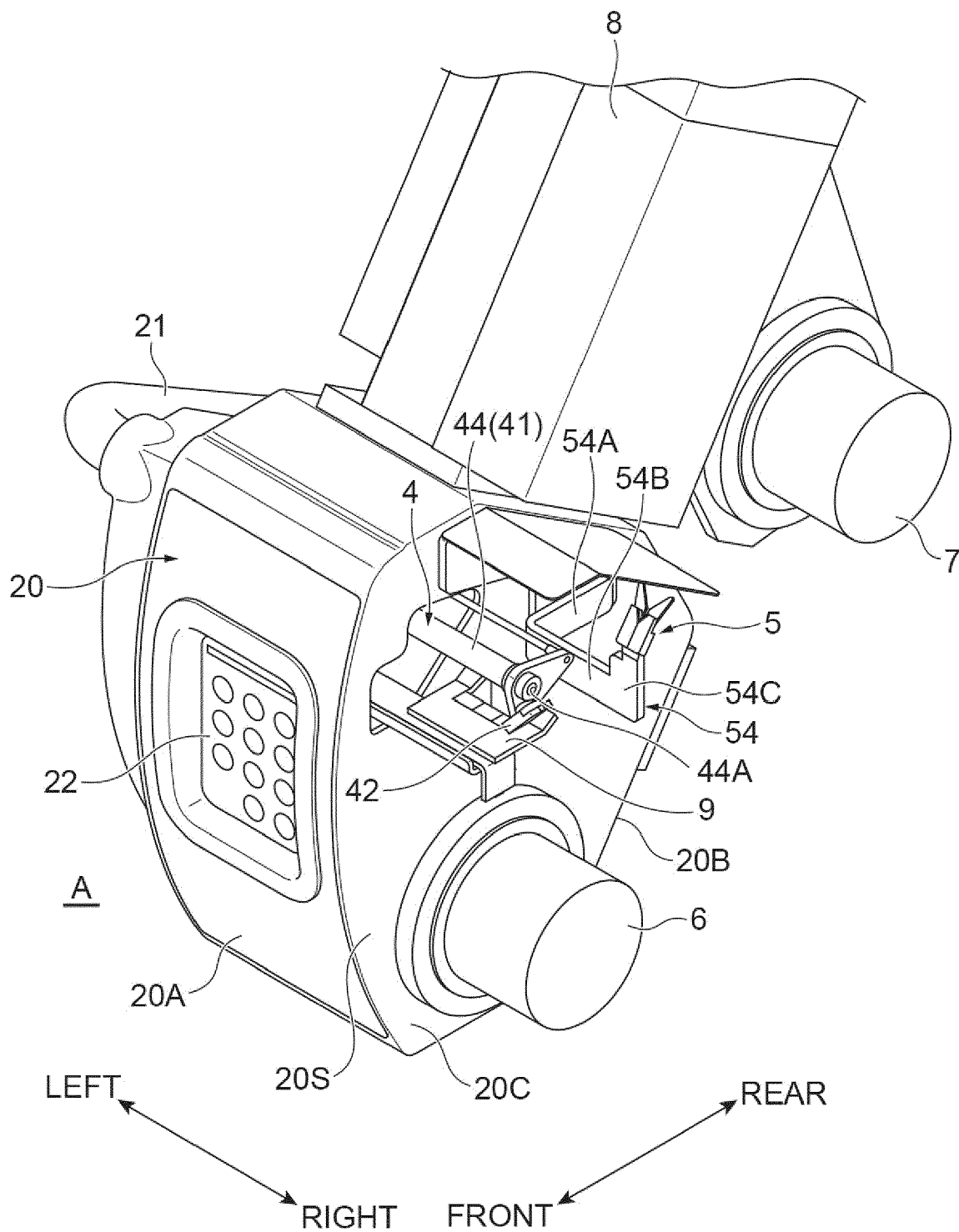


Fig.4

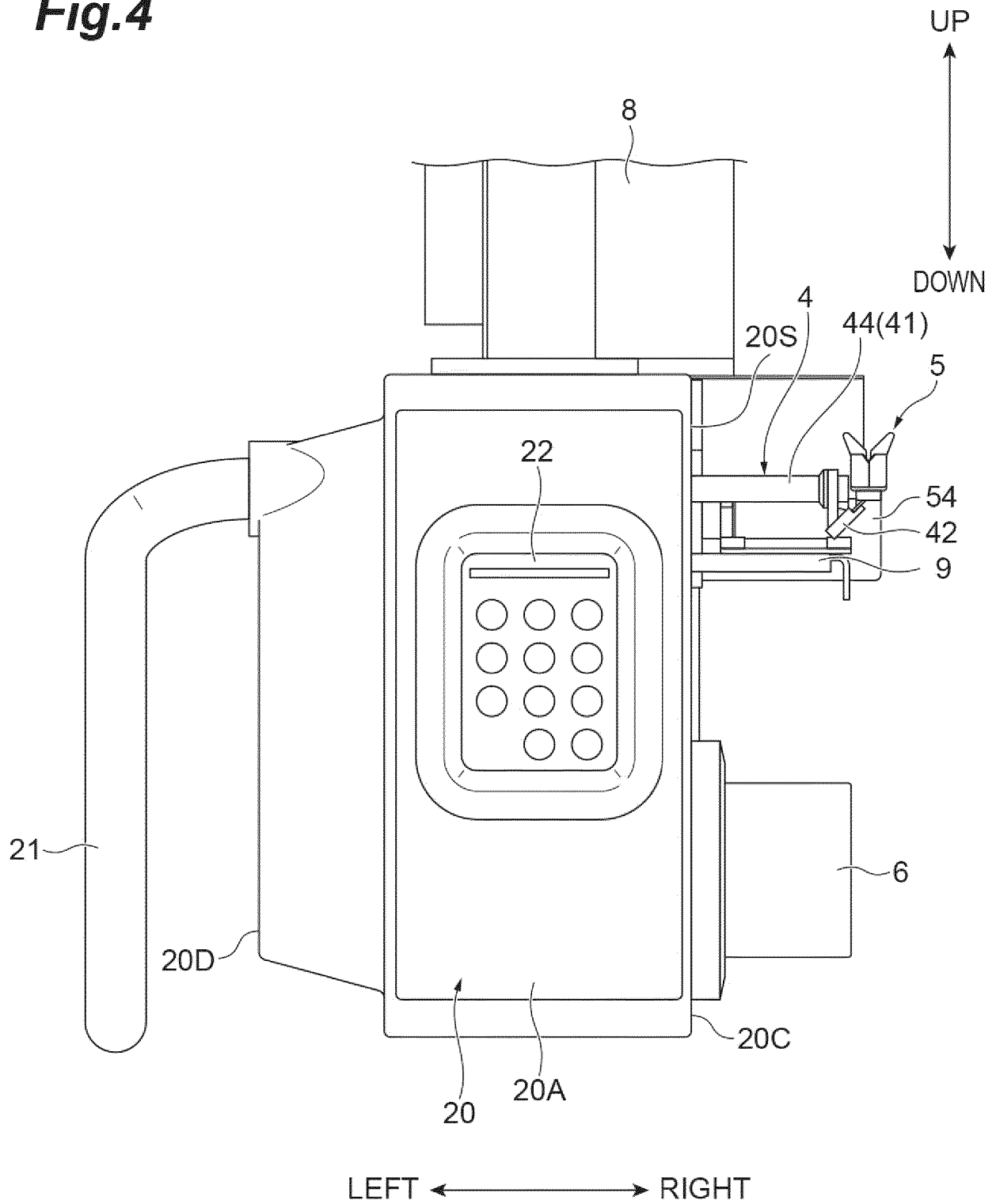


Fig.5

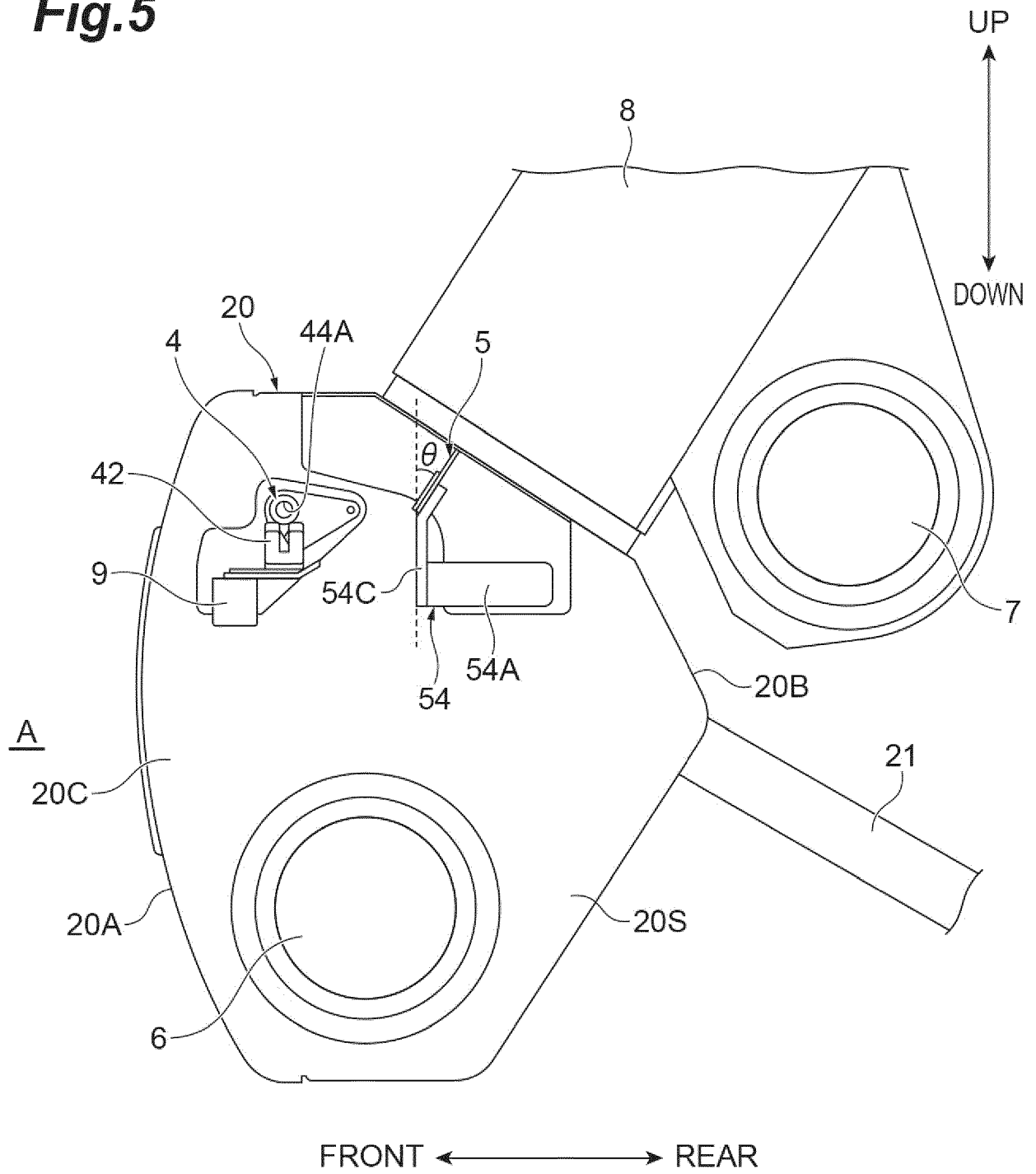


Fig.6

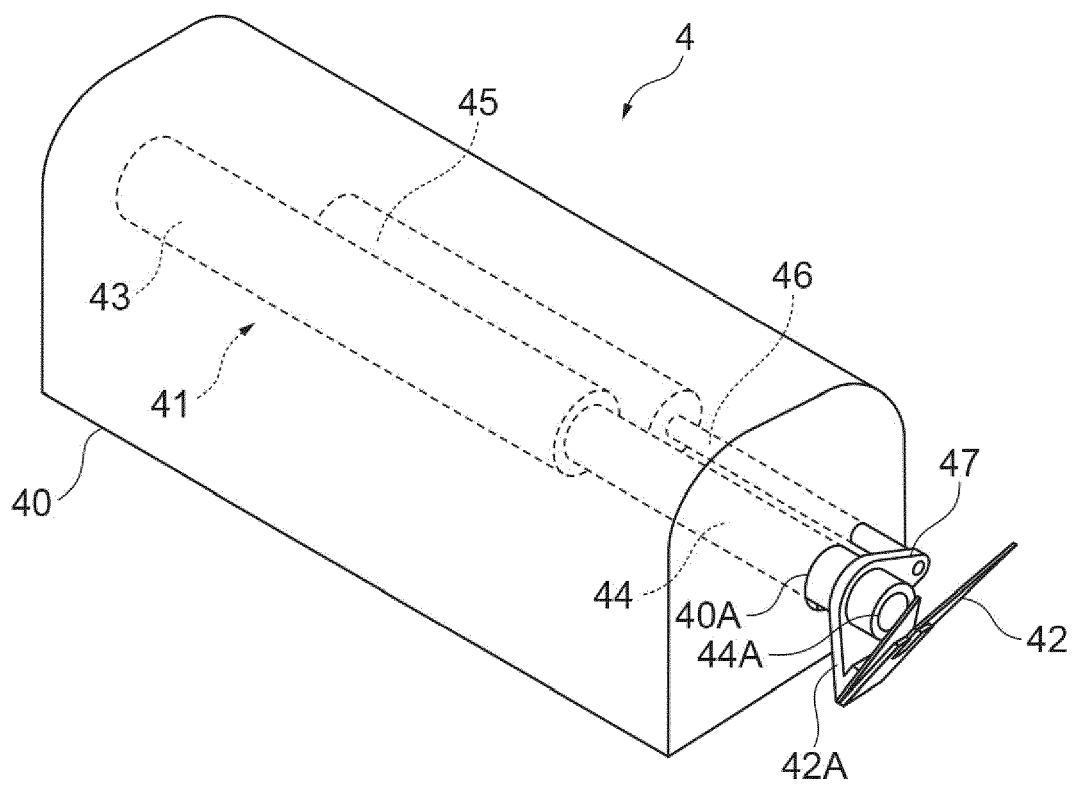


Fig.7

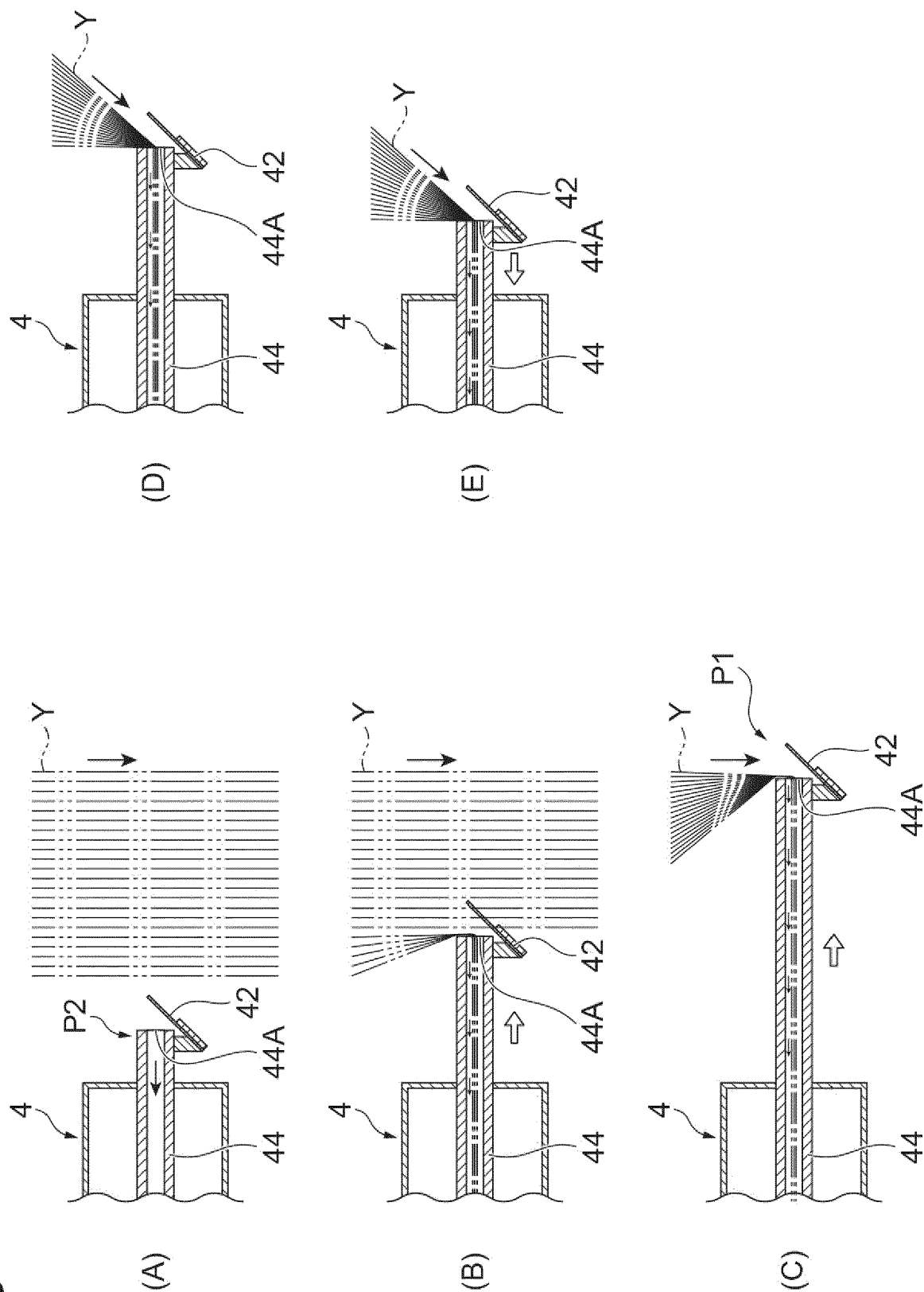


Fig.8

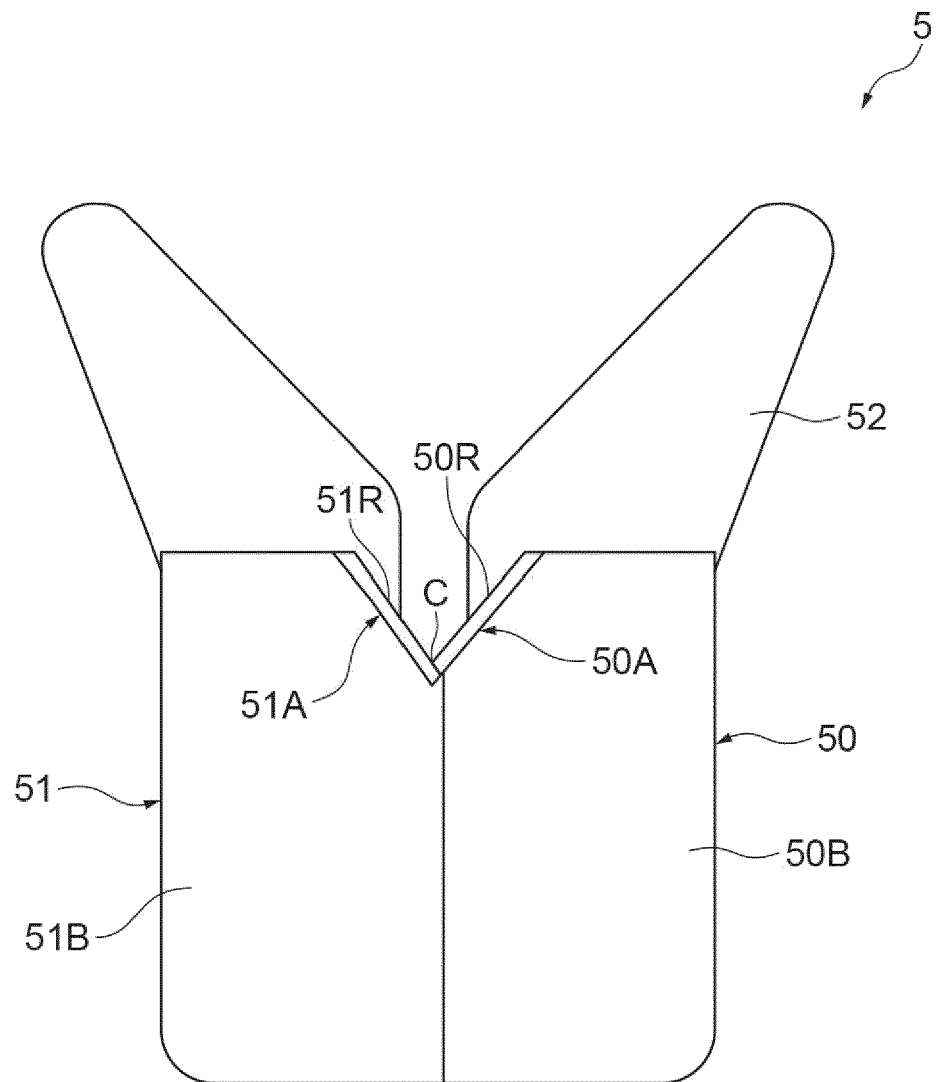


Fig.9

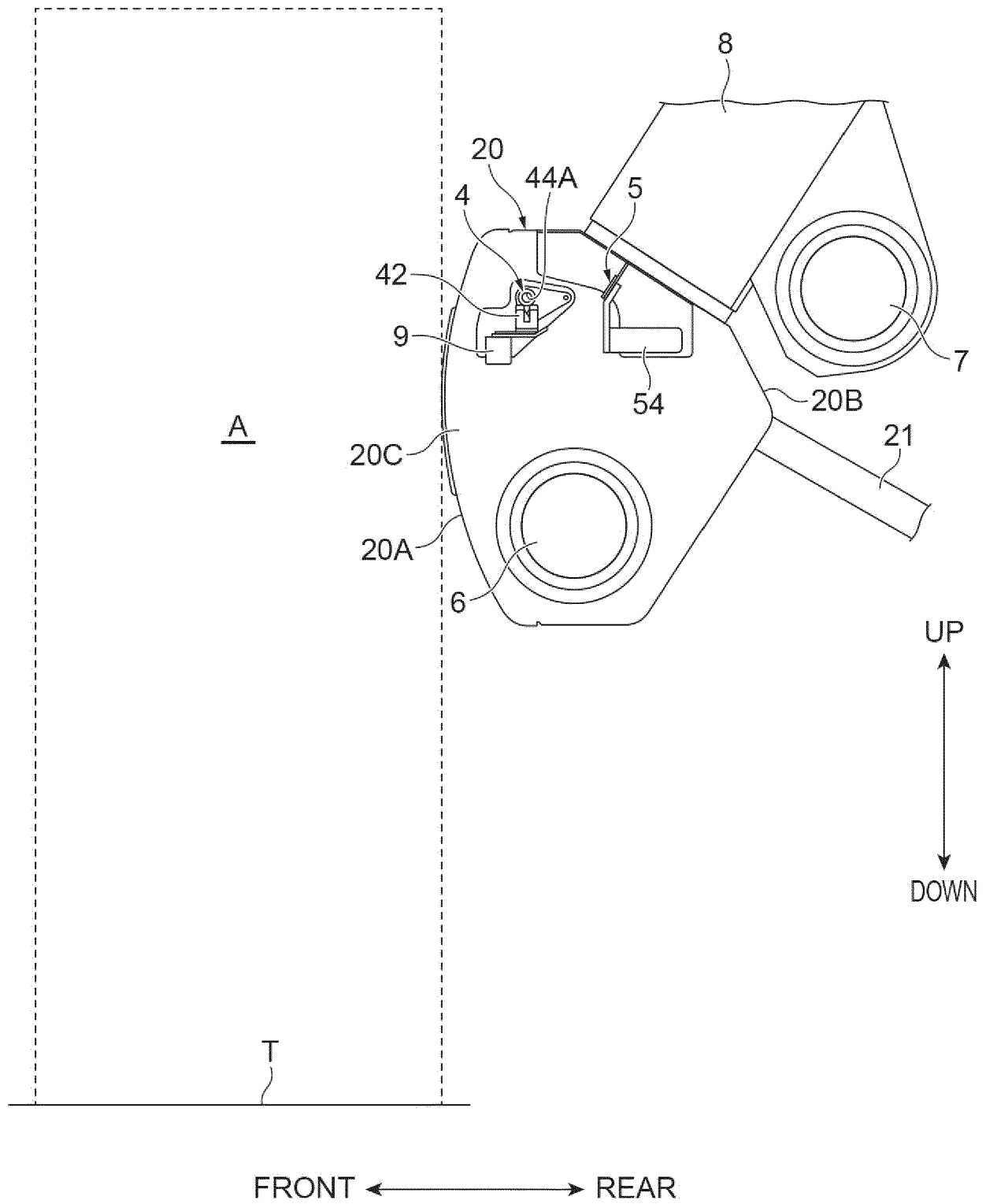


Fig.10

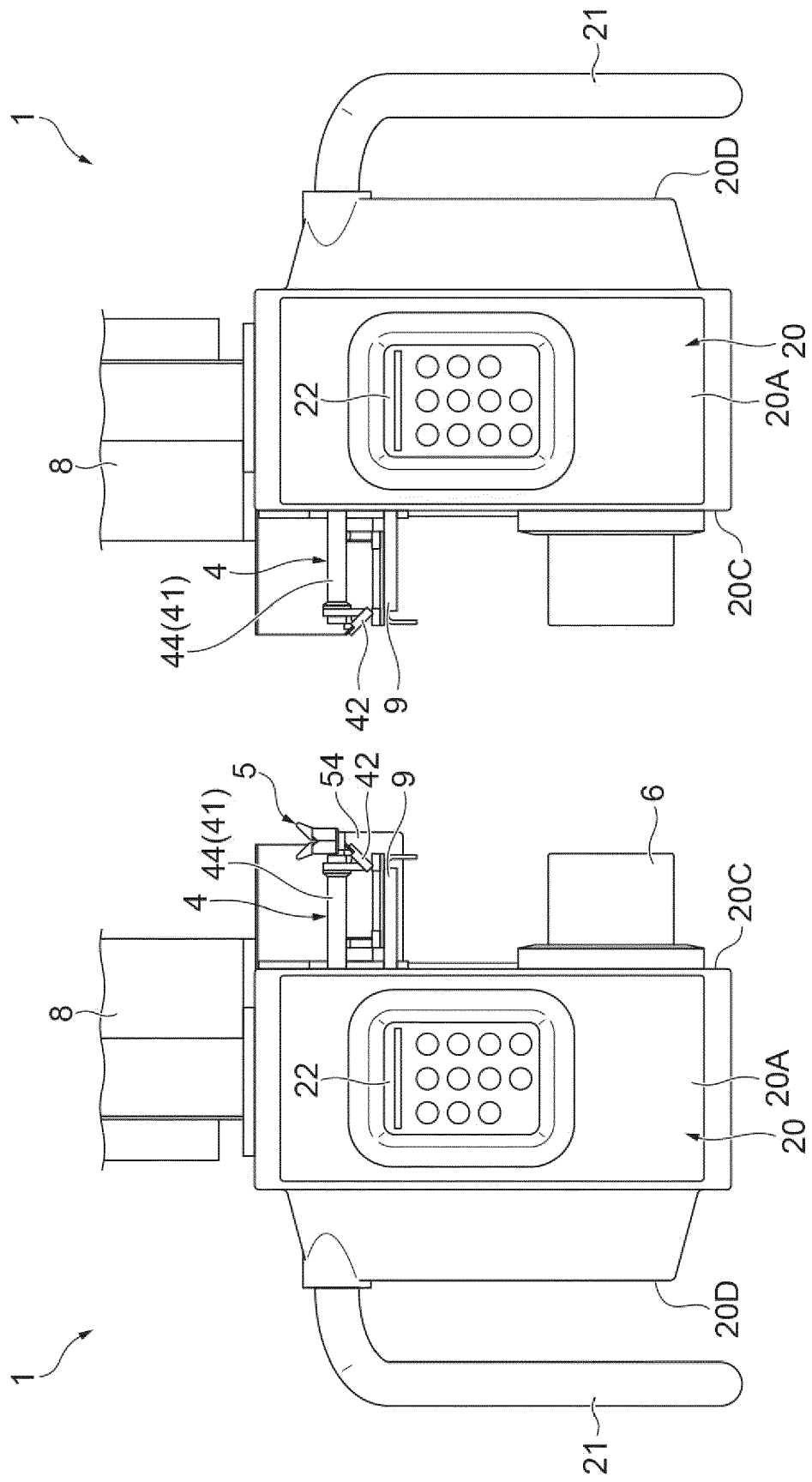
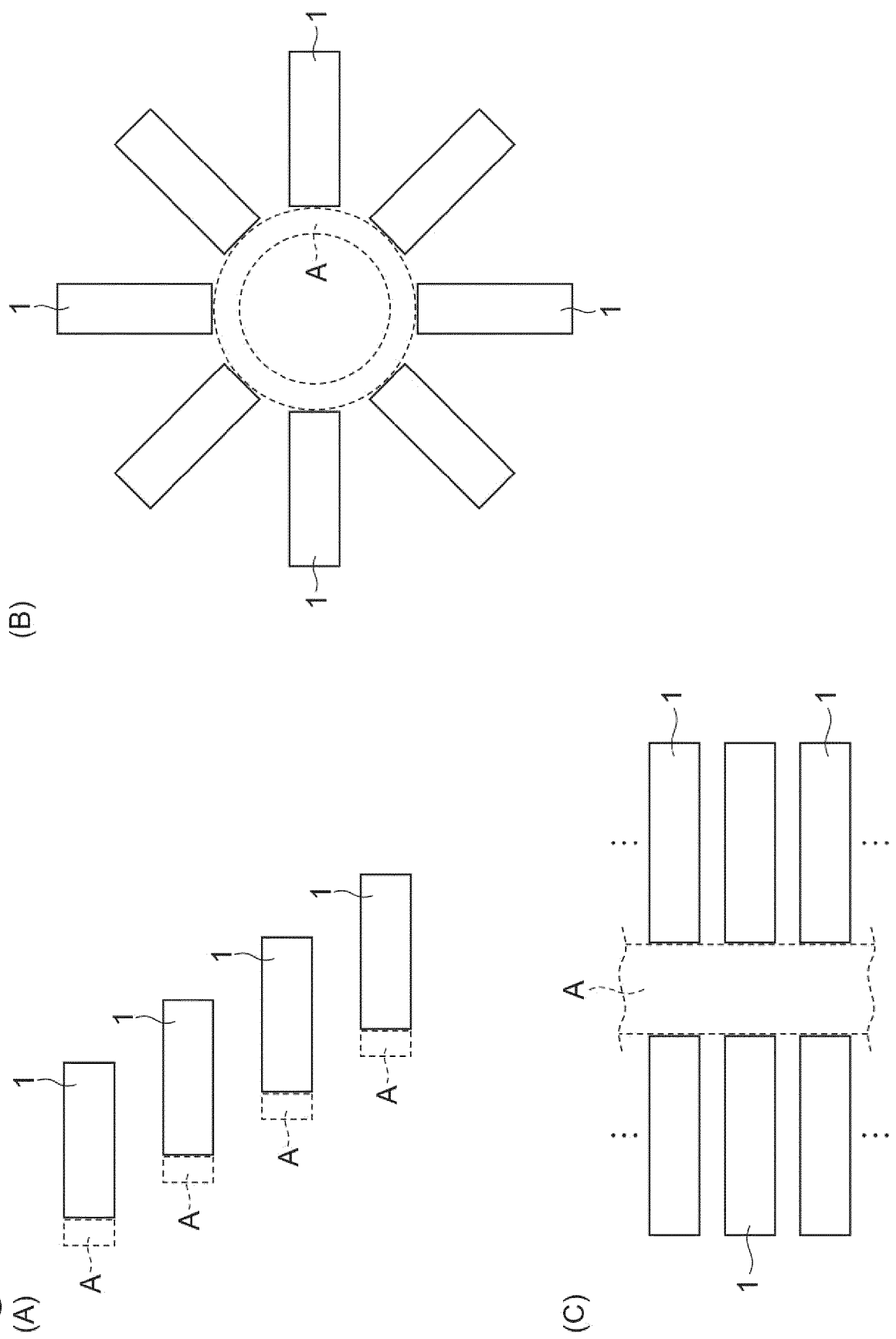


Fig. 11





EUROPEAN SEARCH REPORT

Application Number

EP 23 16 8926

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, D	JP 2013 057148 A (TMT MACHINERY INC) 28 March 2013 (2013-03-28) * abstract *	1-15	INV. B65H54/71 B65H54/88
A	& EP 2 567 919 A1 (TMT MACHINERY INC) 13 March 2013 (2013-03-13) * the whole document *	1-15	
A	JP 2016 006244 A (TMT MACHINERY INC) 14 January 2016 (2016-01-14) * paragraphs [0027] - [0031], [0050] - [0058]; figures 3, 4, 9-12 *	1	
A	WO 2015/198698 A1 (TMT MACHINERY INC [JP]) 30 December 2015 (2015-12-30) * paragraphs [0035] - [0037], [0054] - [0057], [0068]; figures 3, 12 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

1

Place of search

The Hague

Date of completion of the search

11 September 2023

Examiner

Pussemier, Bart

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 23 16 8926

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-09-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2013057148 A	28-03-2013	CN 102992108 A	27-03-2013
		EP 2567919 A1	13-03-2013
		JP 5854720 B2	09-02-2016
		JP 2013057148 A	28-03-2013

JP 2016006244 A	14-01-2016	CN 105297204 A	03-02-2016
		JP 6461705 B2	30-01-2019
		JP 2016006244 A	14-01-2016

WO 2015198698 A1	30-12-2015	CN 106414819 A	15-02-2017
		JP 6291049 B2	14-03-2018
		JP WO2015198698 A1	20-04-2017
		WO 2015198698 A1	30-12-2015

FORM P0459

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2013057148 A [0002]