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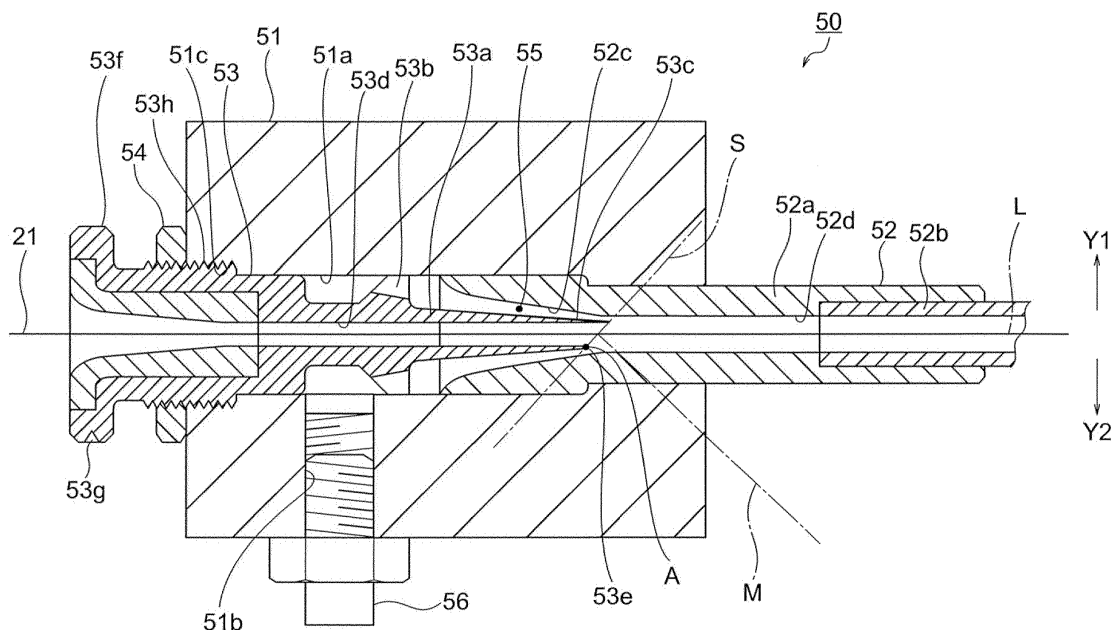
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(54) WEFT YARN TRANSFERRING NOZZLE FOR AIR JET LOOM

(57) A weft yarn transferring nozzle (50) for an air jet loom (100) includes a thread guide (53) having a weft passage (53d) through which the weft yarn (21) is introduced and guided, and a nozzle body (51) accommodating the thread guide (53) and forming an air path (55). The air path (55) extends so as to overlap with a weft path (52d) on a downstream side of the weft passage

(53d). The weft passage (53d) of the thread guide (53) has a circular section and has a tip portion (53c) cut along a surface (S, D1, D2) diagonal to a center axis line (L) of the weft passage (53d). The thread guide (53) includes an indication portion (53g, 53i, 53j) indicating a direction normal to the surface (S, D1, D2) in a portion of the thread guide (53) exposed from the nozzle body (51).

FIG. 2**EP 4 187 005 A1**

Description

BACKGROUND ART

[0001] The present invention relates to a weft yarn transferring nozzle for an air jet loom.

[0002] As a weft yarn transferring nozzle configured to discharge air to inject a weft yarn toward an inlet of a weft travel passage of a modified reed of an air jet loom, for example, a weft yarn transferring nozzle disclosed in Japanese Patent Application Publications No. 2003-20543 has been known. The above-described weft yarn transferring nozzle includes a thread guide. The thread guide has a weft passage having a circular section and has a tip portion that is cut along a flat surface diagonal to a center axis line of the weft passage.

[0003] However, according to an investigation conducted by the inventors, it has been found out that pressure of air discharged for the weft yarn injected by the weft yarn transferring nozzle to arrive at a target position at a target position arrival timing varies depending on the mounting position of the thread guide in the weft yarn transferring nozzle disclosed in the above-cited Publication. An optimum pressure of air discharged from the weft yarn transferring nozzle set for a specific air jet loom is not always optimum for other air jet looms in which mounting positions of the thread guides are different from that in the specific air jet loom.

[0004] The present invention is directed to providing a weft yarn transferring nozzle for an air jet loom, which achieves uniform pressure of air discharged for a weft yarn to arrive at a target position at a target position arrival timing among a plurality of air jet looms.

SUMMARY

[0005] In accordance with present invention, there is provided a weft yarn transferring nozzle for an air jet loom, the weft yarn transferring nozzle being configured to discharge air to inject a weft yarn toward an inlet of a weft travel passage of a modified reed. The weft yarn transferring nozzle includes a thread guide having a weft passage through which the weft yarn is introduced and guided, and a nozzle body accommodating the thread guide and forming an air path through which the air flows in a direction of the weft passage along an outer peripheral surface of the thread guide. The air path extends so as to overlap with a weft path on a downstream side of the weft passage of the thread guide. The thread guide has the weft passage having a circular section, and a tip portion that is cut along a surface diagonal to a center axis line of the weft passage. The thread guide includes an indication portion indicating a direction of a normal line to the surface in a portion of the thread guide exposed from the nozzle body.

[0006] Other aspects and advantages of the invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illus-

trating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the embodiments together with the accompanying drawings in which:

FIG. 1 is a schematic view of an air jet loom according to a first embodiment of the present invention;

FIG. 2 is a sectional plan view of a main nozzle according to the first embodiment of the present invention;

FIG. 3 is a perspective view illustrating a tip portion of a passage forming member of a thread guide illustrated in FIG. 2;

FIG. 4 is a side view of the thread guide illustrated in FIG. 2, as viewed from an upstream side along a center axis line of the thread guide;

FIG. 5 is a side view of a weft travel passage of a modified reed illustrated in FIG. 1, as viewed from the upstream side;

FIG. 6 is a graph showing a relation between a thread guide angle R and a pressure of air discharged from the main nozzle;

FIG. 7 is a sectional plan view of a main nozzle according to a second embodiment of the present invention;

FIG. 8 is a side view of a thread guide illustrated in FIG. 7, as viewed from an upstream side along a center axis line of the thread guide;

FIG. 9 is a sectional plan view illustrating a positioning portion of a ring-shaped portion according to a first modification;

FIG. 10 is a side view of the ring-shaped portion illustrated in FIG. 9;

FIG. 11 is a sectional plan view illustrating a positioning portion of a ring-shaped portion according to a second modification;

FIG. 12 is a side view of the ring-shaped portion illustrated in FIG. 11;

FIG. 13 is a sectional plan view illustrating a tip portion according to a third modification; and

FIG. 14 is a plan section view illustrating a tip portion according to a fourth modification.

DETAILED DESCRIPTION OF THE EMBODIMENTS

First embodiment

[0008] The following will describe an air jet loom according to a first embodiment of the present invention in details with reference to the accompanying drawings.

[0009] FIG. 1 is a schematic view of the air jet loom according to the first embodiment. An air jet loom 100 includes a yarn supply device 20, a storage drum 22 storing a weft yarn 21 drawn from the yarn supply device 20,

and a weft insertion device 40 disposed on a downstream side of the storage drum 22 and configured to insert the weft yarn 21 through a modified reed 30. An electromagnetic pin 23 configured to release the weft yarn 21 from the storage drum 22 and to stop the weft yarn 21, and a balloon sensor 24 configured to detect whether or not the weft yarn 21 has been released from the storage drum 22 are disposed on the downstream side of the storage drum 22.

[0010] The weft insertion device 40 includes a tandem nozzle 60 and a main nozzle 50. The tandem nozzle 60 and the main nozzle 50 are configured to discharge compressed air (air) supplied from an air tank 41. Each of the tandem nozzle 60 and the main nozzle 50 includes a solenoid valve (not illustrated), which may be opened to discharge air and closed to stop the air. The tandem nozzle 60 discharges the air to draw the weft yarn 21 from the storage drum 22 and inject the weft yarn 21 to the main nozzle 50 that is disposed on the downstream side.

[0011] The main nozzle 50 injects the weft yarn 21 injected from the tandem nozzle 60 toward an inlet of a weft travel passage 31 of the modified reed 30. A plurality of sub-nozzle valves 34 and a plurality of sub-nozzles 32 are arranged along the weft travel passage 31 of the modified reed 30. The sub-nozzle valves 34 are solenoid valves and connected to a sub-tank 35, and the sub-nozzles 32 are connected to their associated sub-nozzle valves 34. The sub-nozzle valves 34 are opened and closed so that the sub-nozzles 32 discharge air for transferring the weft yarn 21 along the weft travel passage 31 from a side on which the main nozzle 50 is provided, i.e., a left end of the air jet loom 100 in FIG. 1, to a right end of the air jet loom 100. The left end of the air jet loom 100 corresponds to an upstream side of the air jet loom 100, and the right end of the air jet loom 100 corresponds to a downstream side of the air jet loom 100. It is noted that the main nozzle corresponds to a weft yarn transferring nozzle.

[0012] A RH feeler 12 detecting a travelling condition of a weft yarn is disposed on a right end side of the modified reed 30. The RH feeler 12 is connected to a main control device 11 of the air jet loom 100. The main control device 11 is connected to and controls the electromagnetic pin 23, the balloon sensor 24, the tandem nozzle 60, the main nozzle 50, the sub-nozzle valves 34, and the RH feeler 12 that are components of the air jet loom 100. Results of detection by the balloon sensor 24 and the RH feeler 12 are inputted to the main control device 11. The main control device 11 is also connected to a function panel 13. The function panel 13 is a touch panel that displays a state of the air jet loom 100 and is for a user to operate the air jet loom 100.

[0013] FIG. 2 is a sectional plan view of the main nozzle 50, as viewed from above in the vertical direction of the air jet loom 100 (see FIG. 1). An arrow Y1 in FIG. 2 indicates a direction toward the rear of the air jet loom 100, i.e., a direction in which the modified reed 30 is located. An arrow Y2 indicates a direction toward the front of the

air jet loom 100. In the following description with reference to FIG. 2 and subsequent drawings, the upstream side and the downstream side correspond to the left end side and the right end side, respectively, of the air jet loom 100 in FIG. 1.

[0014] The main nozzle 50 includes a nozzle body 51 having a cylindrical shape, an acceleration pipe 52 inserted into an inner portion 51a of the nozzle body 51, a thread guide 53 screwed into and accommodated in the inner portion 51a of the nozzle body 51, and a lock nut 54 for fixing the thread guide 53 to the nozzle body 51.

[0015] The thread guide 53 includes a passage forming portion 53a having a conical surface shape formed at a downstream end of the thread guide 53. The passage forming portion 53a includes a plurality of positioning fins 53b disposed at predetermined intervals in a circumferential direction of the passage forming portion 53a. The thread guide 53 includes a ring-shaped portion 53f at an upstream end of the thread guide 53. The ring-shaped portion 53f is exposed from the nozzle body 51 and protruded outward in a radial direction of the thread guide 53. The thread guide 53 further includes a thread guide screw portion 53h that is formed on a downstream side of the ring-shaped portion 53f and is screwed into a nozzle body screw portion 51c formed in the inner portion 51a of the nozzle body 51. A portion of the thread guide 53 between the thread guide screw portion 53h and the ring-shaped portion 53f is exposed from the nozzle body 51. The lock nut 54 is screwed onto the thread guide screw portion 53h. The thread guide 53 also includes a weft passage 53d having a circular section and formed inside the thread guide 53. In other words, the weft passage 53d has a circular shape in cross section.

[0016] The acceleration pipe 52 includes a base pipe 52a fitted into the nozzle body 51, and a narrow pipe 52b fitted radially inside the base pipe 52a. A tip portion 53c corresponding to the downstream end portion of the passage forming portion 53a of the thread guide 53 is inserted inside an inner tapered portion 52c of the base pipe 52a in the radial direction. An air path 55 having a ring shape is formed between the inner portion 51a of the nozzle body 51 and the tip portion 53c and between the inner tapered portion 52c and the tip portion 53c. In other words, an air path through which air flows along an outer peripheral surface of the thread guide 53 in a direction along the weft passage 53d is formed. The base pipe 52a and the narrow pipe 52b of the acceleration pipe 52 correspond to a traction passage 52d.

[0017] The nozzle body 51 includes a connection port 51b that communicates with the inner portion 51a and extends perpendicularly to an axial direction of the main nozzle 50 along the arrow Y2. An air supply pipe 56 is connected to the connection port 51b. Air supplied from the air supply pipe 56 flows through the air path 55, the base pipe 52a, and the narrow pipe 52b. The weft yarn 21 is introduced and guided through the weft passage 53d of the thread guide 53 and the traction passage 52d inside the acceleration pipe 52 by air. In other words, the

traction passage 52d forms a weft path on the downstream side of the weft passage 53d of the thread guide 53. The traction passage 52d is extended from and overlapped with the air path 55.

[0018] FIG. 3 is a perspective view illustrating the tip portion 53c of the passage forming portion 53a of the thread guide 53 illustrated in FIG. 2. Referring to FIGS. 2 and 3, a deflecting inflow portion 53e is formed in the tip portion 53c. The deflecting inflow portion 53e is formed by cutting the tip portion 53c along a flat surface S that is diagonal to a center axis line L of the weft passage 53d and faces the downstream side of the thread guide 53. In other words, the deflecting inflow portion 53e is disposed on the flat surface S that is a single surface. A normal line M extends perpendicularly to the flat surface S and toward a downstream side. The normal line M extends in a direction that approaches the direction of the arrow Y2 corresponding to the front direction of the air jet loom 100 (see FIG. 1). That is, the normal line M extends in a direction away from the modified reed 30.

[0019] FIG. 4 is a side view of the thread guide 53 illustrated in FIG. 2, as viewed from the upstream side along the center axis line L. Referring to FIGS. 2 and 4, a positioning portion 53g having a conical shape is formed along the radial direction in an outer peripheral surface of the ring-shaped portion 53f disposed on the upstream end of the thread guide 53. As illustrated in FIG. 4, the positioning portion 53g is formed on a line N extending in a direction in which a direction in which a point A corresponding to the most upstream end of the deflecting inflow portion 53e is positioned with respect to the center axis line L coincides with a direction in which the positioning portion 53g of the ring-shaped portion 53f is positioned with respect to the center axis line L, when the thread guide 53 is viewed from the upstream side along the center axis line L. Therefore, a direction of a tip end of the positioning portion 53g indicates the direction of the arrow Y2 that is a direction to which the normal line M extending perpendicularly to the flat surface S formed by the deflecting inflow portion 53e of the thread guide 53 approaches. In other words, the positioning portion 53g corresponds to an indication portion indicating a direction of the normal line M normal to the flat surface S that is diagonal to the center axis line L of the weft passage 53d.

[0020] The positioning portion 53g having a conical shape may be easily formed by processing the outer peripheral portion of the ring-shaped portion 53f with, for example, a drilling tool such as a drill. Since the positioning portion 53g is formed in the outer peripheral surface of the ring-shaped portion 53f, the positioning portion 53g is easily visible from the front side of the air jet loom 100.

[0021] The following will describe an operation of the air jet loom according to the first embodiment. The main nozzle 50 illustrated in FIG. 2 is assembled before the air jet loom 100 illustrated in FIG. 1 is activated. In assembling the main nozzle 50, the acceleration pipe 52 is fitted into the inner portion 51a of the nozzle body 51.

Then, the lock nut 54 is screwed onto the thread guide screw portion 53h of the thread guide 53. The thread guide 53 is then inserted into the inner portion 51a of the nozzle body 51, and the thread guide screw portion 53h is screwed into the nozzle body screw portion 51c of the inner portion 51a.

[0022] At this time, the thread guide 53 is screwed into the nozzle body 51 so that the positioning portion 53g formed in the ring-shaped portion 53f of the thread guide 53 is positioned in the direction of the arrow Y2, i.e., the horizontal frontward direction of the air jet loom 100 (see FIG. 1). As a result, the normal line M perpendicular to the flat surface S formed by the deflecting inflow portion 53e of the thread guide 53 extends in the horizontal direction and in a direction approaching the front side of the air jet loom 100 (a direction away from the modified reed 30), i.e., in the horizontal direction and in a direction approaching the direction of the arrow Y2. The point A corresponding to the most upstream end of the deflecting inflow portion 53e is disposed in a direction approaching the direction of the arrow Y2, i.e., in the direction away from the modified reed 30.

[0023] Subsequently, as illustrated in FIG. 1, the main control device 11 controls the main nozzle 50, the tandem nozzle 60, the solenoid valves, and the sub-nozzle valves 34 so that air is discharged from the main nozzle 50 for injecting the weft yarn 21 from the main nozzle 50. Thus, the weft yarn 21 travels through the weft travel passage 31 of the modified reed 30. In the above state, a period from a reference time when the weft yarn 21 is released from the storage drum 22 for weft insertion to a time when the weft yarn 21 is detected by the RH feeler 12 is defined as a target position arrival timing Tw.

[0024] The first embodiment offers the following advantageous effects. FIG. 5 is a side view of the weft travel passage 31 of the modified reed 30 (see FIG. 1), as viewed from the upstream side. The weft travel passage 31 is a passage surrounded by an upper wall surface 31a, an innermost wall surface 31b, and a lower wall surface 31c. When air is discharged from the main nozzle 50 in a configuration in which the normal line M perpendicular to the flat surface S extends horizontally in the direction approaching the direction of the arrow Y2, as illustrated in FIG. 2, the center of pressure where the pressure of air discharged from the main nozzle 50 is the highest on the most upstream side of the weft travel passage 31 is positioned at a point C1, as illustrated in FIG. 5. The point C1 is positioned at a distance P1 from the innermost wall surface 31b.

[0025] The following measurement is performed in the air jet loom 100 of the first embodiment. A thread guide angle R corresponding to an angle of the thread guide 53 of the main nozzle 50 relative to the nozzle body 51 with the thread guide 53 screwed into the nozzle body 51 is set to various values. The thread guide angle R may take any value depending on a state of the thread guide 53 screwed into the nozzle body 51. An orientation of the flat surface S of the deflecting inflow portion 53e diagonal

to the center axis line L of the weft passage 53d and the direction of the normal line M vary according to the thread guide angles R. A required pressure for the air discharged from the main nozzle 50 for the weft yarn 21 to arrive at the RH feeler 12 at a predetermined target position arrival timing Tw is measured for each of the values of the thread guide angle R.

[0026] FIG. 6 is a graph showing a relation between the thread guide angle R and the pressure of the air discharged from the main nozzle 50. Angular values of 180 degree, 540 degree, and 900 degree indicate cases where the normal line M perpendicular to the flat surface S of the deflecting inflow portion 53e extends horizontal frontward direction of the air jet loom 100, i.e., the normal line M extending horizontally in the direction approaching the direction of the arrow Y2, as illustrated in FIG. 2. Angular values of 0 degree, 360 degree, and 720 degree indicate cases where the normal line M extends in the horizontal rearward direction of the air jet loom 100, i.e., the normal line M extending horizontally in a direction approaching the direction of the arrow Y1, which will be described later. Angular values of 90 degree, 450 degree, and 810 degree indicate cases where the normal line M extends vertically in an upper direction of the air jet loom 100. Angular values of 270 degree, 630 degree, and 990 degree indicate cases where the normal line M extends vertically in a lower direction of the air jet loom 100.

[0027] As in the first embodiment where the normal line M perpendicular to the flat surface S of the deflecting inflow portion 53e of the thread guide 53 of the main nozzle 50 extends horizontally in the direction approaching the direction of the arrow Y2 as illustrated in FIG. 2, i.e., when the thread guide angle R is 180 degree, 540 degree, or 900 degree, the center of pressure of the air discharged from the main nozzle 50 on the most upstream side of the weft travel passage 31 is at the point C1, as illustrated in FIG. 5. Since the point C1 is positioned at the distance P1 from the innermost wall surface 31b, an efficiency of traveling of the weft yarn 21 through the weft travel passage 31 is increased. Therefore, as illustrated in FIG. 6, the required pressure for the air discharged from the main nozzle 50 for the weft yarn 21 to arrive at the target position at the target position arrival timing Tw is reduced, as compared with a case where the thread guide angle R is not 180 degree, 540 degree, or 900 degree, which reduces the amount of the air discharged from the main nozzle 50.

[0028] In addition, the required pressure for the air discharged from the main nozzle 50 for the weft yarn 21 to arrive at the target position at the target position arrival timing Tw becomes uniform among a plurality of air jet looms 100 when the positioning portions 53g of the thread guides 53 are set to the same positions.

[0029] As described above, the weft yarn transferring nozzle according to the first embodiment is the weft yarn transferring nozzle for the air jet loom 100 that is configured to inject the weft yarn 21 into the weft travel passage 31 by discharging air toward the inlet of the weft travel

passage 31 of the modified reed 30 and includes the thread guide 53 having the weft passage 53d through which the weft yarn 21 is introduced and guided, and the nozzle body 51 accommodating the thread guide 53 and forming the air path 55 through which air flows along the outer peripheral surface of the thread guide 53 in the direction along the weft passage 53d. The air path 55 extends so as to overlap with the traction passage 52d on the downstream side of the weft passage 53d. The weft passage 53d of the thread guide 53 has a circular section. The tip portion 53c of the thread guide 53 is cut along the flat surface S diagonal to the center axis line L of the weft passage 53d. Since the thread guide 53 has the positioning portion 53g indicating the direction of the normal line M normal to the flat surface S in a portion exposed from the nozzle body 51, the pressure of air discharged for the weft yarn 21 to arrive at the target position at the target position arrival timing Tw becomes uniform among the plurality of the air jet looms 100.

[0030] The positioning portion 53g is formed so that the direction of the normal line M normal to the flat surface S extends horizontally in the direction away from the modified reed 30 when the positioning portion 53g is disposed in the horizontal frontward direction of the air jet loom 100. By tightening the lock nut 54 in this state, the thread guide 53 may be assembled at the thread guide angle R at which the required pressure for the air discharged from the main nozzle 50 for the weft yarn 21 to arrive at the target position at the target position arrival timing Tw becomes minimum, which allows the thread guide angle R to be adjusted easily.

Second embodiment

[0031] The following will describe an air jet loom according to a second embodiment of the present invention. In the following description, reference numerals the same as those of the first embodiment in FIGS. 1 through 6 represent the same or similar components, and the detailed descriptions thereof will be omitted. The air jet loom according to the second embodiment differs from the air jet loom of the first embodiment in that an angle of the flat surface S on which the deflecting inflow portion 53e of the thread guide 53 of the main nozzle 50 is disposed is changed.

[0032] FIG. 7 is a sectional plan view of the main nozzle 50 of the second embodiment, as viewed from above in the vertical direction of the air jet loom 100 (see FIG. 1). Referring to FIG. 7, the thread guide 53 of the main nozzle 50 has the normal line M perpendicular to the flat surface S on which the deflecting inflow portion 53e of the tip portion 53c of the thread guide 53 of the main nozzle 50 is disposed, extending in the horizontal rearward direction of the air jet loom 100, i.e., the normal line M extending horizontally in the direction approaching the direction of the arrow Y1. The point A corresponding to the most upstream end of the deflecting inflow portion 53e is disposed in a direction approaching the direction of the ar-

row Y1, i.e., in a direction approaching the modified reed 30.

[0033] FIG. 8 is a side view of the thread guide 53 illustrated in FIG. 7, as viewed from the upstream side along the center axis line L. Referring to FIGS 7 and 8, the positioning portion 53g on the ring-shaped portion 53f of the thread guide 53 is disposed in a direction rotated by 180 degrees around the center axis line L from the direction in which the point A corresponding to the most upstream end of the deflecting inflow portion 53e is disposed with respect to the center axis line L, when the thread guide 53 is viewed from the upstream side along the center axis line L. In other words, the thread guide 53 of the second embodiment differs from that of the first embodiment in that the positional relation between the positioning portion 53g and the point A is rotated by 180 degrees around the center axis line L. The rest of the configuration of the air jet loom is the same as that of the first embodiment.

[0034] The second embodiment offers the following advantageous effects. As illustrated in FIGS. 7 and 8, when air is discharged from the main nozzle 50 in the state where the normal line M perpendicular to the flat surface S extends horizontally in the direction approaching the direction of the arrow Y1, the center of pressure where the pressure of air discharged from the main nozzle 50 is highest on the most upstream side of the weft travel passage 31 is positioned at a point C2, as illustrated in FIG. 5. The point C2 is located at a distance P2 from the innermost wall surface 31b. The distance P2 is greater than the distance P1 from the innermost wall surface 31b to the point C1 which is the center of pressure in the first embodiment.

[0035] As in the second embodiment where the normal line M perpendicular to the flat surface S of the deflecting inflow portion 53e of the thread guide 53 of the main nozzle 50 extends horizontally in the direction approaching the direction of the arrow Y1 as illustrated in FIG. 7, i.e., when the thread guide angle R is 0 degree, 360 degree, or 720 degree, the center of pressure of the air discharged from the main nozzle 50 on the most upstream side of the weft travel passage 31 is positioned at the point C2, as illustrated in FIG. 5. In this case, the required pressure for the air discharged from the main nozzle 50 for the weft yarn 21 to arrive at a target position at the target position arrival timing Tw increases, as illustrated in FIG. 6, as compared with a case where the thread guide angle R is not 0 degree, 360 degree, or 720 degree, which allows weft insertion of the weft yarn 21 by the main nozzle 50 to be controlled easily.

[0036] Since the positioning portion 53g is formed so that the normal line M normal to the flat surface S extends horizontally in the direction approaching the modified reed 30 when the positioning portion 53g is disposed in the horizontal frontward direction of the air jet loom 100, the required pressure for the air discharged from the main nozzle 50 for the weft yarn 21 to arrive at the target position at the target position arrival timing Tw increases.

As a result, the weft insertion of the weft yarn 21 by the main nozzle 50 is easily controlled.

[0037] According to the second embodiment, the positioning portion 53g is disposed in the direction rotated by 180 degrees around the center axis line L from the direction in which the point A corresponding to the most upstream end of the deflecting inflow portion 53e is disposed with respect to the center axis line L, when the thread guide 53 is viewed from the upstream side along the center axis line L. However, it is not limited thereto. For example, a thread guide 53 having a positioning portion 53g formed on the line N extending in the direction in which the direction in which the point A corresponding to the most upstream end of the deflecting inflow portion 53e is positioned with respect to the center axis line L coincides with the direction in which the positioning portion 53g is positioned with respect to the center axis line L, when the thread guide 53 is viewed from the upstream side in the direction along the center axis line L, similarly to the thread guide 53 of the first embodiment, may be used. In this case, the thread guide 53 may be fixed at an angle so that the point A corresponding to the most upstream end of the deflecting inflow portion 53e is disposed in the direction approaching the direction of the arrow Y1, i.e., in the direction approaching the modified reed 30.

[0038] The thread guides 53 of the first embodiment and the second embodiment of the present invention may be used at any thread guide angle R other than the above-described thread guide angle R of the first embodiment and the second embodiment.

[0039] In the first embodiment and the second embodiment of the present invention, the positioning portion 53g of the ring-shaped portion 53f of the thread guide 53 illustrated in FIGS. 2 and 4 has a conical shape. However, the shape of the positioning portion is not limited to a conical shape, but may be other shapes. FIG. 9 is a sectional plan view illustrating a positioning portion 53i of a ring-shaped portion 53f according to a first modification, and FIG. 10 is a side view of the ring-shaped portion 53f illustrated in FIG. 9. As illustrated in FIGS. 9 and 10, the positioning portion 53i may have a columnar shape extending in a radial direction of the ring-shaped portion 53f. The positioning portion 53i having a columnar shape may be easily formed in the outer peripheral portion of the ring-shaped portion 53f by using, for example, a drilling tool such as a drill.

[0040] FIG. 11 is a sectional plan view illustrating a positioning portion 53j of a ring-shaped portion 53f according to a second modification, and FIG. 12 is a side view of the ring-shaped portion 53f illustrated in FIG. 11. As illustrated in FIGS. 11 and 12, the positioning portion 53j may be a V-shaped groove extending along the center axis line L of the main nozzle 50. The positioning portion 53j of the V-shaped groove may be easily formed in the outer peripheral surface of the ring-shaped portion 53f by V-shaped groove processing along the center axis line L of the main nozzle 50.

[0041] In the above embodiments and modifications, the positioning portions 53g, 53i, and 53j of the thread guides 53 are formed in the ring-shaped portion 53f. However, the positioning portions 53g, 53i, and 53j may be formed in a portion of the thread guide 53 between the thread guide screw portion 53h and the ring-shaped portion 53f, exposed from the nozzle body 51.

[0042] In the first embodiment and the second embodiment, the deflecting inflow portion 53e of the tip portion 53c of the thread guide 53 is formed by cutting the tip portion 53c along the flat surface S that is diagonal to the center axis line L and faces the downstream side of the thread guide 53. However, the deflecting inflow portion 53e may be formed into another shape. FIG. 13 is a sectional plan section view of a tip portion 53c according to a third modification. As illustrated in FIG. 13, the deflecting inflow portion 53e may be formed by cutting the tip portion 53c of the thread guide 53 along a circumferential surface D1 that is a single plane and has the center of curvature located on the downstream side from the tip portion 53c. It is noted that the circumferential surface D1 is a surface diagonal to the center axis line L (see FIG. 2).

[0043] FIG. 14 is a sectional plan view of a tip portion 53c according to a fourth modification. As illustrated in FIG. 14, the deflecting inflow portion 53e may be formed by cutting the tip portion 53c along a circumferential surface D2 that is a single plane and has a center of curvature located on the upstream side from the tip portion 53c. It is noted that the circumferential surface D2 is a surface diagonal to the center axis line L (see FIG. 2).

[0044] Even in the configurations described in the third modification in which the deflecting inflow portion 53e is formed by cutting the tip portion 53c along the circumferential surface D1 illustrated in FIG. 13, and the fourth modification in which the deflecting inflow portion 53e is formed by cutting the tip portion 53c along the circumferential surface D2 illustrated in FIG. 14, the advantageous effects similar to those of the first embodiment and the second embodiment may be obtained by setting the normal line M normal to the circumferential surface D1 or to the circumferential surface D2 to extend horizontally in the direction approaching the modified reed 30 of the air jet loom 100 or horizontally in the direction away from the modified reed 30 of the air jet loom 100.

[0045] A weft yarn transferring nozzle (50) for an air jet loom (100) includes a thread guide (53) having a weft passage (53d) through which the weft yarn (21) is introduced and guided, and a nozzle body (51) accommodating the thread guide (53) and forming an air path (55). The air path (55) extends so as to overlap with a weft path (52d) on a downstream side of the weft passage (53d). The weft passage (53d) of the thread guide (53) has a circular section and has a tip portion (53c) cut along a surface (S, D1, D2) diagonal to a center axis line (L) of the weft passage (53d). The thread guide (53) includes an indication portion (53g, 53i, 53j) indicating a direction normal to the surface (S, D1, D2) in a portion of the thread

guide (53) exposed from the nozzle body (51).

Claims

1. A weft yarn transferring nozzle (50) for an air jet loom (100), the weft yarn transferring nozzle (50) being configured to discharge air to inject a weft yarn toward an inlet of a weft travel passage (31) of a modified reed (30), the weft yarn transferring nozzle (50) comprising:

a thread guide (53) having a weft passage (53d) through which the weft yarn (21) is introduced and guided; and
a nozzle body (51) accommodating the thread guide (53) and forming an air path (55) through which the air flows in a direction of the weft passage (53d) along an outer peripheral surface of the thread guide (53),
wherein the air path (55) extends so as to overlap with a weft path (52d) on a downstream side of the weft passage (53d), and
wherein the thread guide (53) has the weft passage (53d) having a circular section, and a tip portion (53c) that is cut along a surface (S, D1, D2) diagonal to a center axis line (L) of the weft passage (53d), **characterized in that**
the thread guide (53) includes an indication portion (53g, 53i, 53j) indicating a direction of a normal line to the surface (S, D1, D2) in a portion of the thread guide (53) exposed from the nozzle body (51).

2. The weft yarn transferring nozzle (50) according to claim 1, **characterized in that**
the indication portion (53g, 53i, 53j) is formed so that the direction of the normal line to the surface (S, D1, D2) extends horizontally in a direction away from the modified reed (30) when the indication portion (53g, 53i, 53j) is positioned in a horizontal frontward direction of the air jet loom (100).
3. The weft yarn transferring nozzle (50) according to claim 1, **characterized in that**
the indication portion (53g, 53i, 53j) is formed so that the direction of the normal line to the surface (S, D1, D2) extends horizontally in a direction approaching the modified reed (30) when the indication portion (53g, 53i, 53j) is positioned in a horizontal frontward direction of the air jet loom (100).

FIG. 1

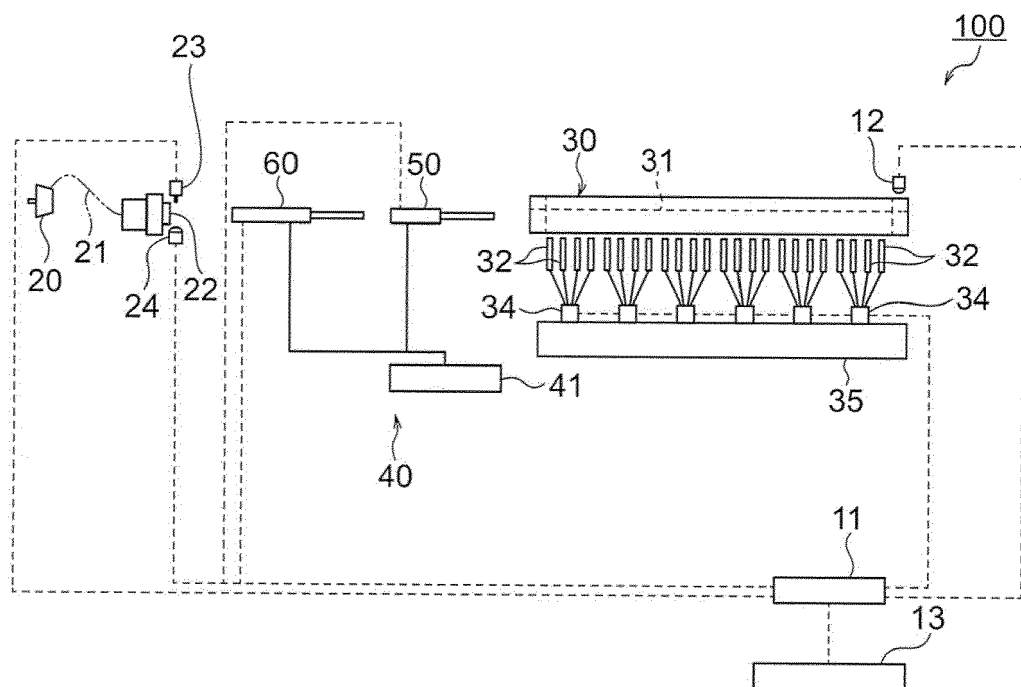


FIG. 3

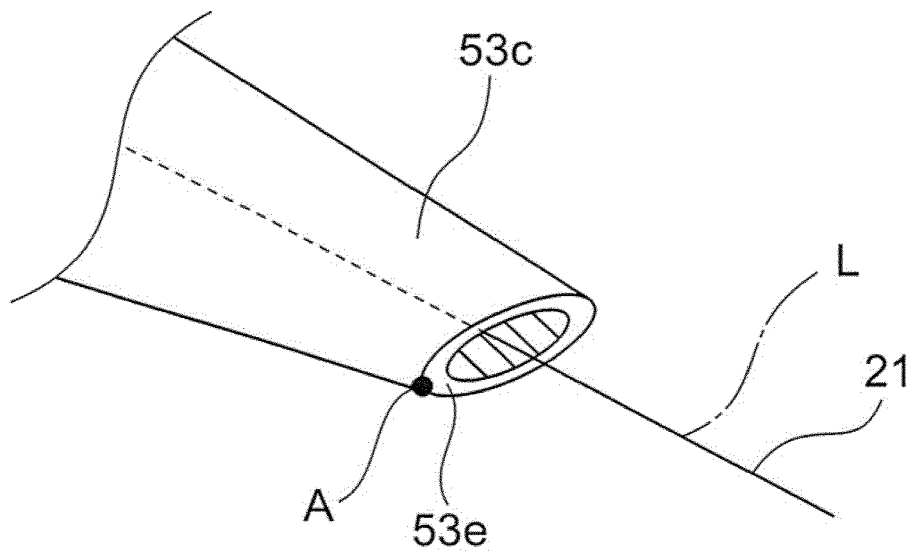


FIG. 4

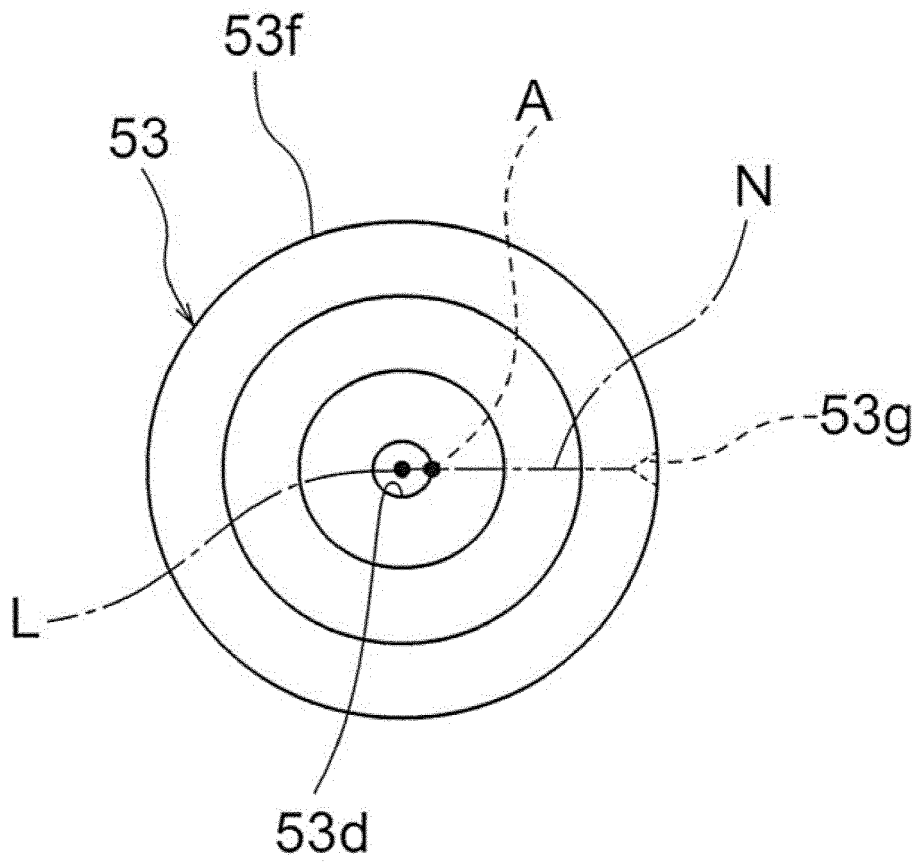


FIG. 5

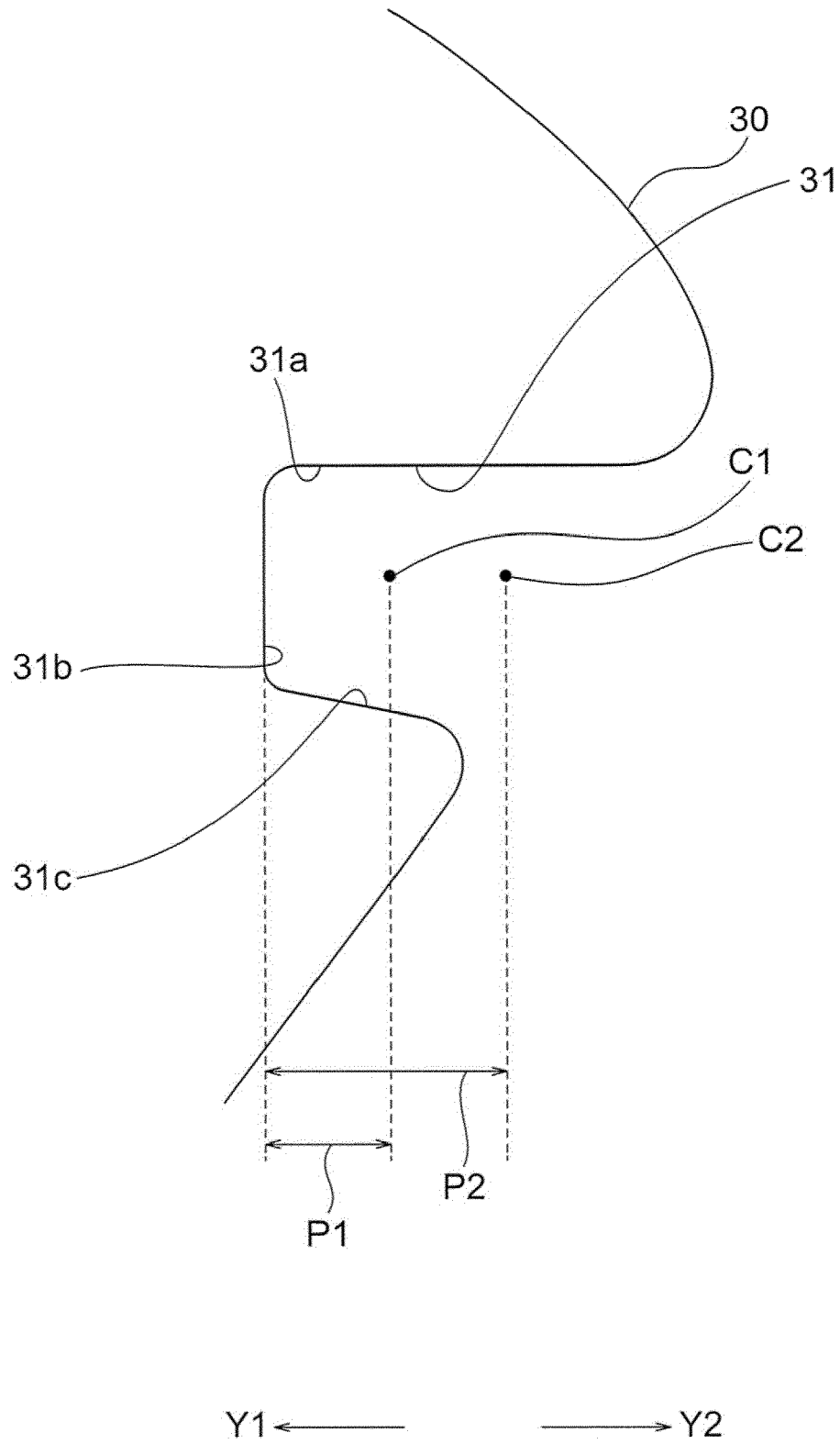


FIG. 6

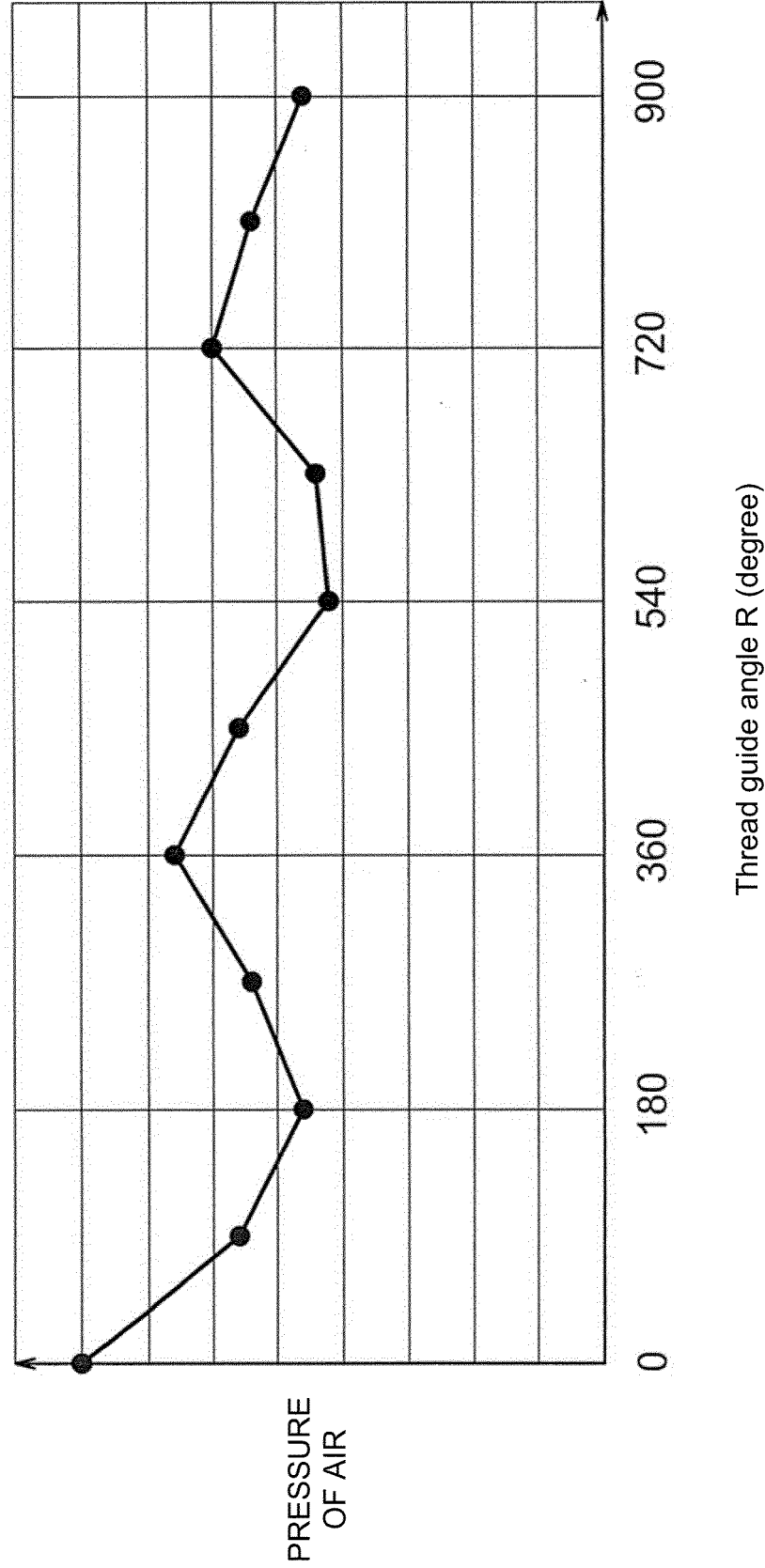


FIG. 7

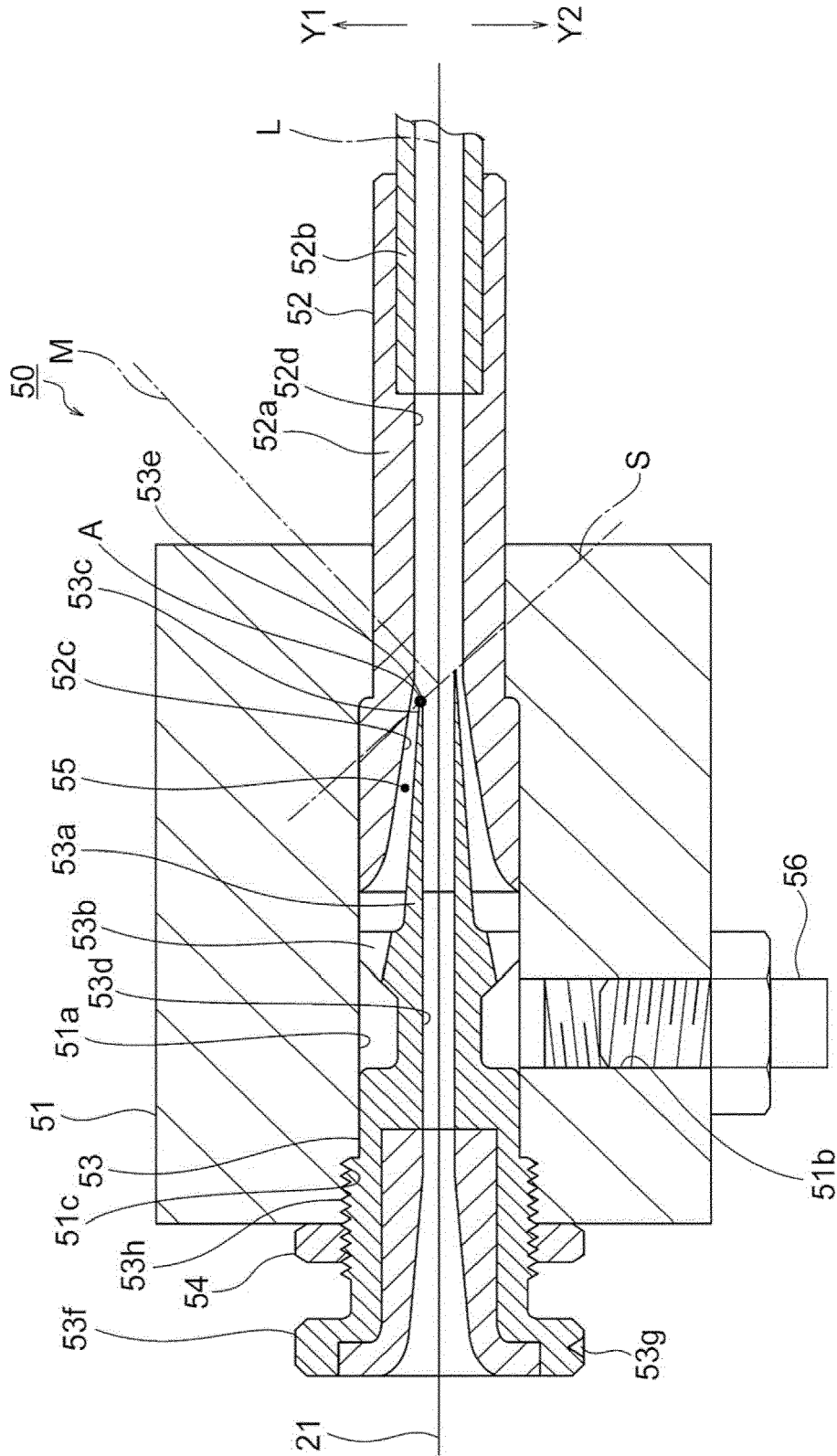


FIG. 8

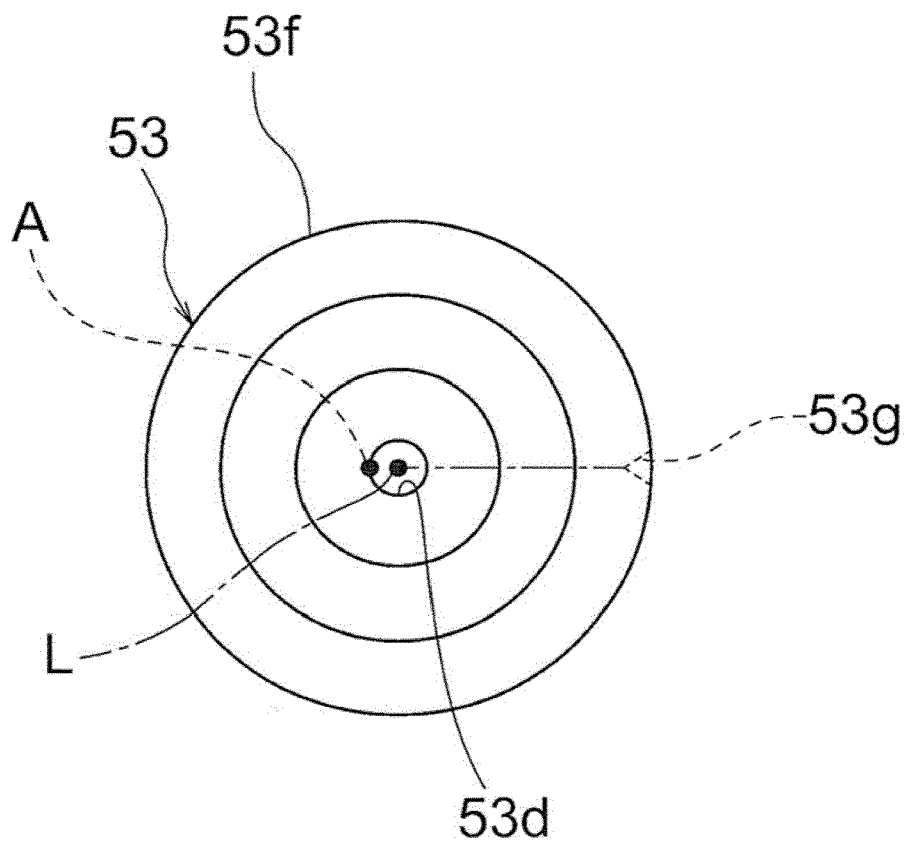


FIG. 9

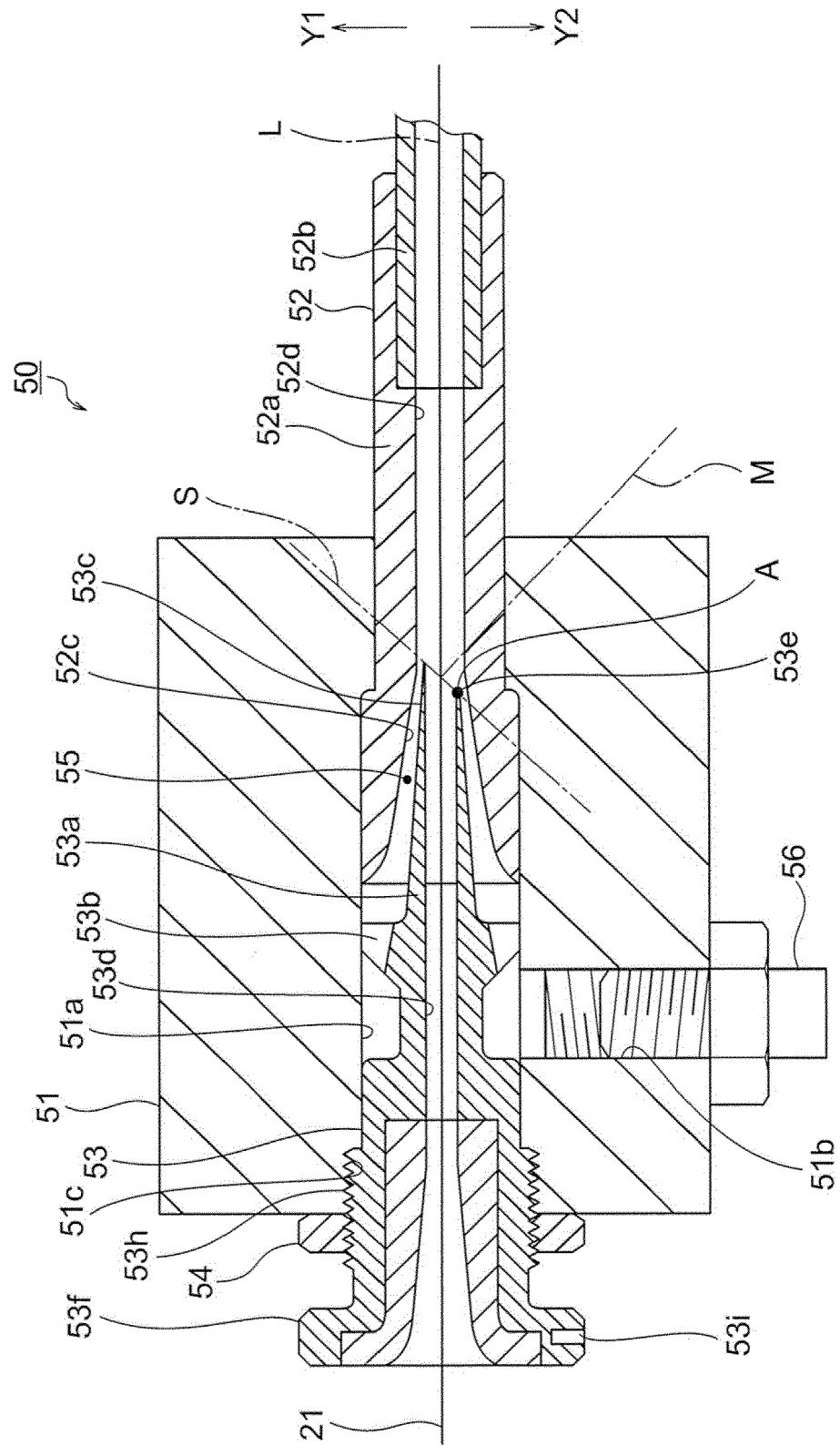


FIG. 10

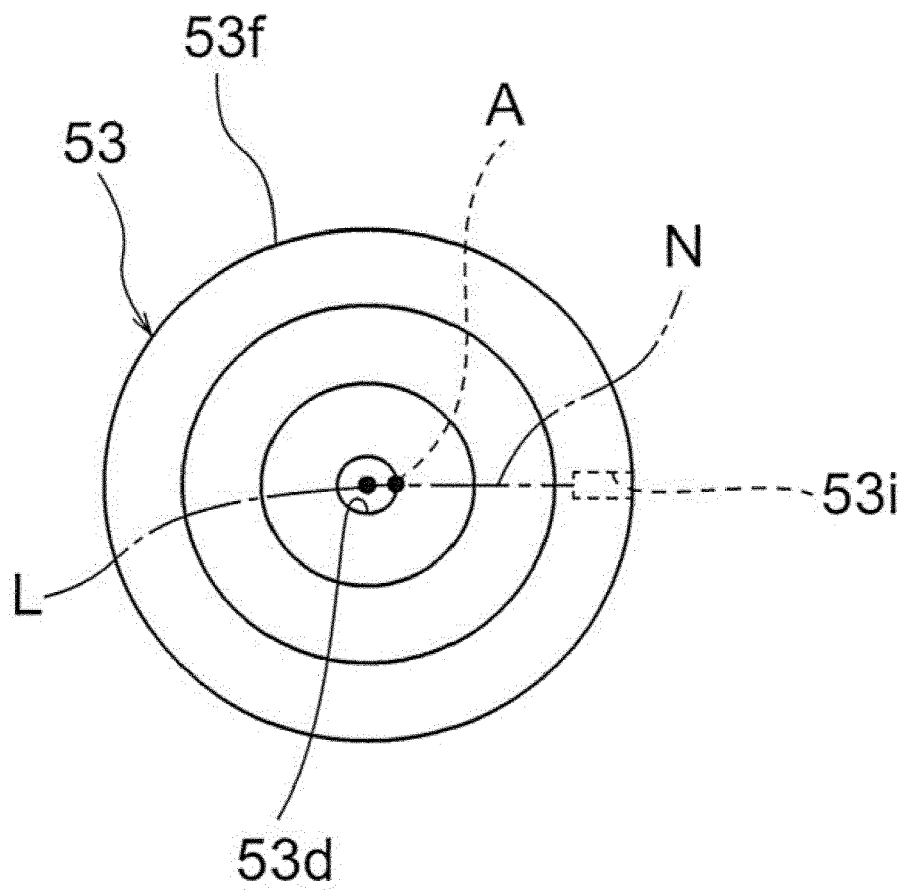


FIG. 11

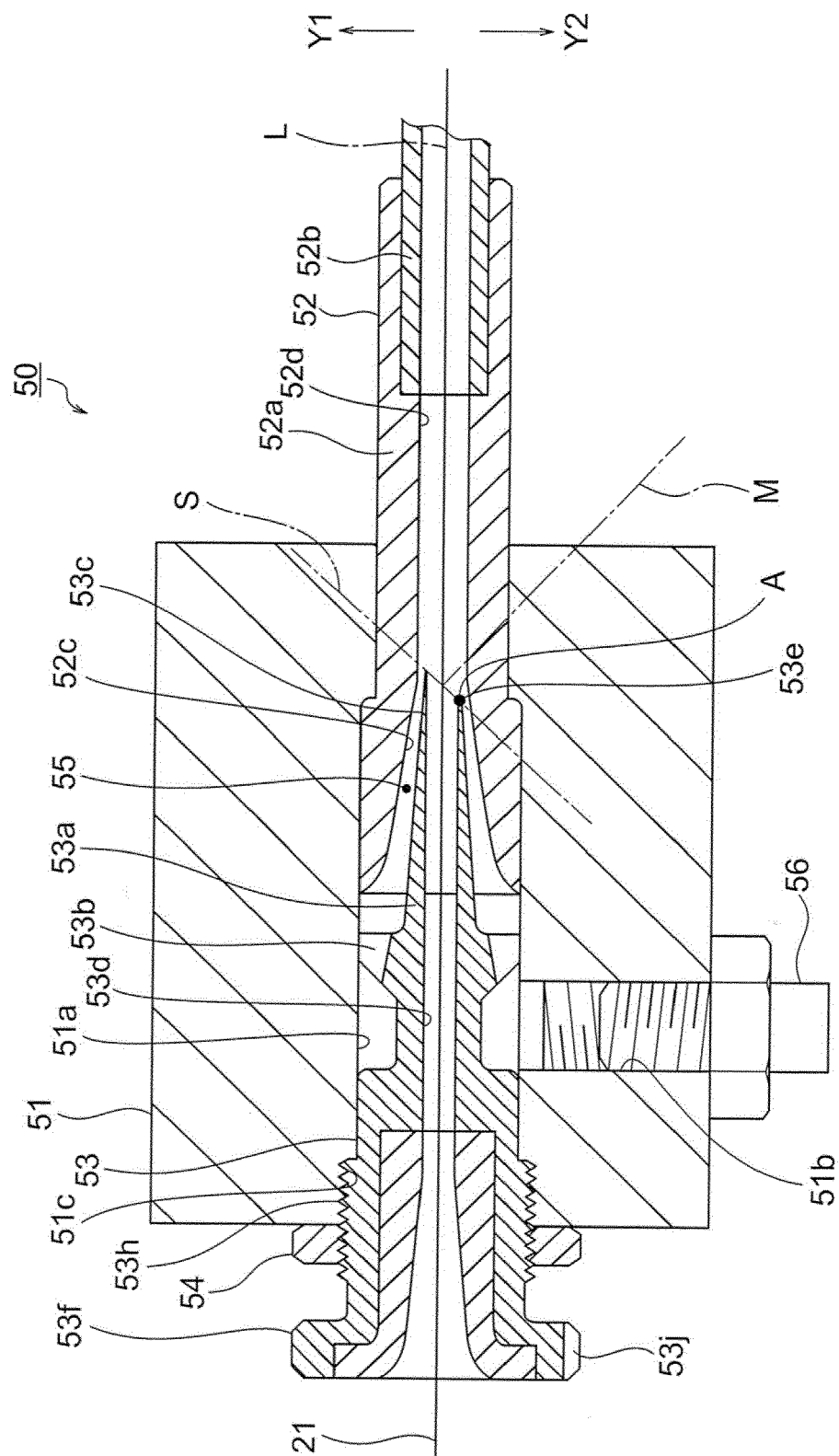


FIG. 12

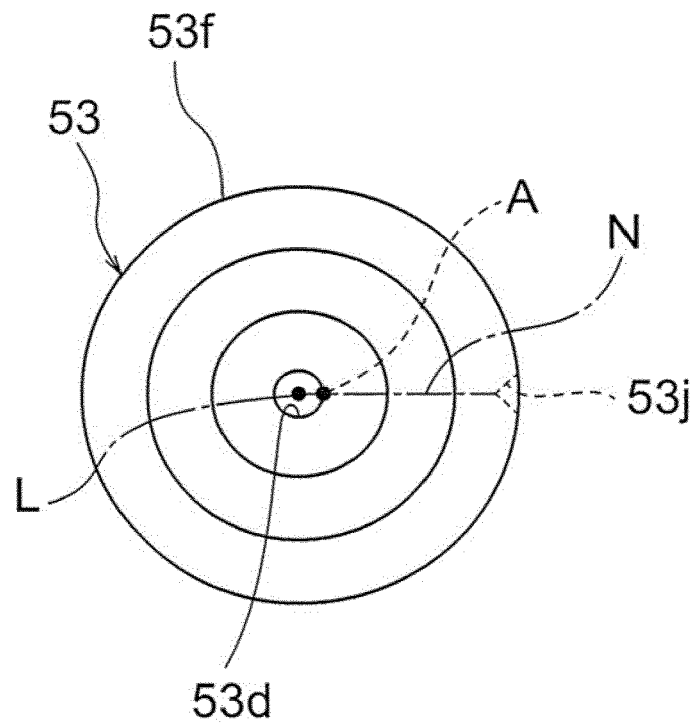


FIG. 13

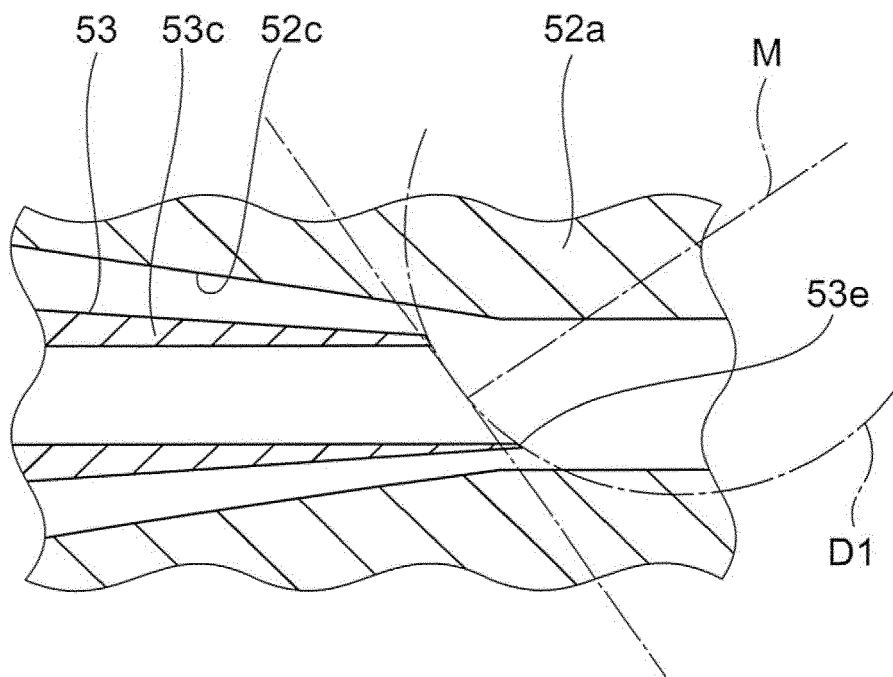
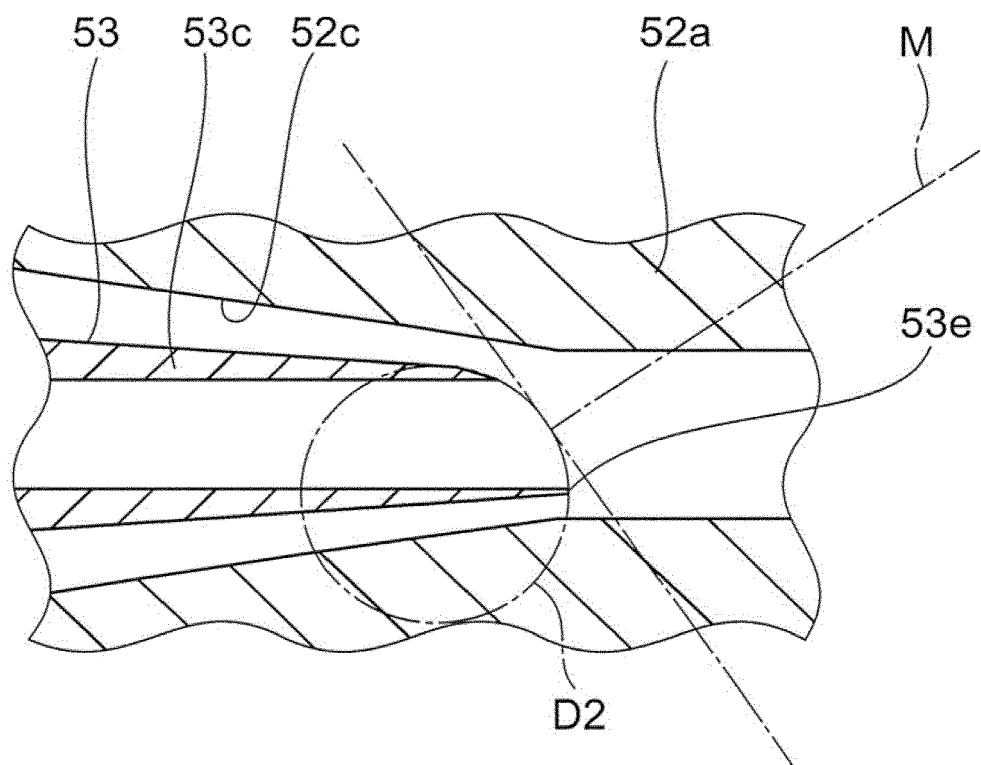


FIG. 14





EUROPEAN SEARCH REPORT

Application Number

EP 22 19 7955

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	EP 1 275 760 A2 (TOYOTA JIDOSHOKKI KK [JP]) 15 January 2003 (2003-01-15) * paragraphs [0018] - [0021]; figures 1-6 * -----	1-3	INV. D03D47/30
			TECHNICAL FIELDS SEARCHED (IPC)
			D03D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 April 2023	Examiner Louter, Petrus
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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 EPO FORM 1503 03.82 (P04C01)

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

EP 22 19 7955

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
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13-04-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1275760 A2	15-01-2003	CN 1396323 A	12-02-2003
		DE 60217443 T2	23-08-2007
		EP 1275760 A2	15-01-2003
		JP 4461650 B2	12-05-2010
		JP 2003020543 A	24-01-2003

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003020543 A [0002]