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(54) **Filament cooler**

Filamentkühler

Refroidisseur de filaments

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a yarn cooler which cools yarns spun out from a spinning beam which produces yarns from a molten material through spinnerets.

[0002] Japanese Patent No. 3868404 recites a melt spinning device in which a spinning beam produces yarns from a molten material through a plurality of spinnerets. Below the spinning beam is provided a plurality of cooling tubes which opposes the spinnerets. The cooling tubes are disposed in an internal space (cooling tube housing chamber) of a quench box to form one row or two rows in a staggered manner, in accordance with the arrangement of the spinnerets. To the trailing end of the internal space of the quench box is connected a duct. The cooling wind supplied from the duct to the internal space of the quench box is rectified by filters constituting the cooling tubes, and is then blown into spaces (yarn running spaces) which are formed inside the cooling tubes and where the yarns spun out from the spinning beam run. This cooling wind cools the yarns running in the yarn running spaces.

SUMMARY OF THE INVENTION

[0003] The melt spinning device of Japanese Patent No. 3868404, however, is disadvantageous in that, since the cooling wind flows through the duct connected to the trailing end of the cooling tube housing chamber, i.e. since the wind flows into the internal space of the quench box only from the rearward, an amount of the cooling wind which passes the outside of the cooling tube and then flows into the yarn running space from the front of the tube is smaller than an amount of cooling wind flowing into the yarn running space from the rearward without passing the outside of the cooling tube, with the result that the amount of cooling wind flowing into the yarn running space is different in different directions. In particular, when the cooling tubes form two rows in a staggered manner, an amount of cooling wind flowing from the front is small in the front-side cooling tubes which are far from the duct, and hence the amount of cooling wind flowing into the yarn running space is likely to be considerably different in different directions. When the amount of cooling wind flowing into the yarn running space is different in different directions, the yarns running in the yarn running space are not evenly cooled, with the result that the quality of yarns is deteriorated on account of, for example, irregular thickness of yarns.

[0004] An object of the present invention is to provide a yarn cooler which can evenly cool yarns spun out from a spinning beam.

[0005] A yarn cooler according to the first aspect of the invention, which produces yarns from a molten material through spinnerets, the yarn cooler, includes: a plurality

of cooling tubes which are arranged below the spinning beam to oppose the spinnerets, each of the cooling tubes having therein a vertically extending yarn running space in which the yarns run and a wall of the yarn running space functioning as a filter by which cooling wind flown from the outside is rectified; and a quench box which supplies the cooling wind to the yarn running space of each of the cooling tubes, wherein, the quench box includes therein: a cooling tube housing chamber which houses the cooling tubes; and a connection path which connects a duct with the cooling tube housing chamber, the duct supplying the cooling wind and being provided on one side of the cooling tube housing chamber in plan view, the cooling tube housing chamber has a first connection port and a second connection port which are formed at a wall surface on the duct side and at a wall surface on the side opposite to the duct side to be connected to the connection path, and the connection path is constituted by an upper connection path and a lower connection path, the upper connection path connecting the first connection port with the duct whereas the lower connection path being provided below the upper connection path, being connected to the duct, and extending along a lower part of the cooling tube housing chamber to be connected to the second connection port.

[0006] According to the present invention, since the cooling wind supplied from the duct flows into the cooling tube housing chamber from the both sides through the upper connection path and the lower connection path, the cooling wind flows from the cooling tube housing chamber into the yarn running space evenly from all directions, and hence the yarns running in the yarn running space are evenly cooled.

[0007] According to the second aspect of the invention, the yarn cooler of the first aspect of the invention further includes: a first punched plate which is provided at the first connection port and rectifies the cooling wind flowing into the cooling tube housing chamber from the upper connection path; and a second punched plate which is provided at the second connection port and rectifies the cooling wind flowing into the cooling tube housing chamber from the lower connection path, wherein, the aperture ratio of the second punched plate is not lower than the aperture ratio of the first punched plate.

[0008] The lower connection path extends along the lower part of the cooling tube housing chamber and is hence longer than the upper connection path. For this reason, the amount of cooling wind around the second connection port of the lower connection path is smaller than the amount of cooling wind around the first connection port of the upper connection path.

[0009] In this connection, since the present invention is arranged so that the aperture ratio of the second punched plate is not lower than the aperture ratio of the first punched plate, the cooling wind is evenly supplied to the cooling tube housing chamber from both sides.

[0010] According to the third aspect of the invention, the yarn cooler of the first or second aspect of the inven-

tion further includes a tube-shaped third punched plate which encloses therein each cooling tube and rectifies, with the filter, the cooling wind flowing into the yarn running space, wherein, the aperture ratio of the third punched plate increases toward the upper end.

[0011] According to the present invention, since the third punched plate enclosing the cooling tube is arranged to have a higher aperture ratio toward the upper end, the amount of cooling wind flowing into the upper part of the yarn running space is large and hence the yarns immediately after being spun out from the spinning beam are sufficiently cooled.

[0012] According to the fourth aspect of the invention, the yarn cooler of the third aspect of the invention is further arranged so that the first connection port and the second connection port are formed at lower end portions of wall surfaces of the cooling tube housing chamber.

[0013] When the first and second connection ports are provided at the lower end portions of the wall surfaces of the cooling tube housing chamber, the cooling wind does not easily flow into the upper part of the yarn running space. In this regard, since the present invention is arranged so that the aperture ratio of the third punched plate enclosing therein the cooling tube increases toward the upper end, the amount of cooling wind flowing into the upper part of the yarn running space is increased even in the case above, and hence the yarns immediately after being spun out are sufficiently cooled.

[0014] According to the fifth aspect of the invention, the yarn cooler of any one of the first to fourth aspect of the invention is further arranged so that the cooling tubes are provided in a staggered manner.

[0015] When cooling tubes are provided to form plural rows in a staggered manner, provided that the cooling wind flows into the cooling tube housing chamber only from one side, the cooling wind does not easily flow into the yarn running space from the other side, in cooling tubes constituting the row which is far from the duct. For this reason, an amount of cooling wind flowing into the yarn running space may be different in different directions.

[0016] In this regard, since the present invention is arranged so that the cooling wind supplied from the duct flows into the cooling tube housing chamber from the both sides through the first and second connection paths, the cooling wind evenly flows into the yarn running space from all directions, even if the cooling tubes are arranged in a staggered manner.

[0017] According to the present invention, cooling wind supplied from a duct flows into a cooling tube housing chamber from both sides through an upper connection path and a lower connection path. For this reason, the cooling wind evenly flows from the cooling tube housing chamber into the yarn running space from all directions, and hence yarns running in the yarn running space are evenly cooled.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

5 Fig. 1 schematically shows a melt spinning device according to an embodiment of the present invention.

Fig. 2 is a plan view of the yarn cooler of Fig. 1.

10 Fig. 3A is a cross section taken along the IIIA-III A line in Fig. 2.

Fig. 3B is a cross section taken along the IIIB-IIIB line in Fig. 2.

Fig. 4 is a cross section taken along the IV-IV line in Fig. 3A and Fig. 3B.

15 Fig. 5 is a cross section taken along the V-V line in Fig. 3A and Fig. 3B.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 **[0019]** The following will describe a preferred embodiment of the present invention.

[0020] As shown in Fig. 1, a melt spinning device 1 includes components such as a spinning beam 2, a yarn cooler 3, and an oiling device 4. The spinning beam 2 is provided with a plurality of pack housings 11. On each pack housing 11 is mounted a spinning pack 12. The spinning pack 12 stores a molten material such as molten polyester, from which a yarn Y is formed. At the lower end portion of the spinning pack 12 is provided spinnerets 13. From the molten material stored in the spinning packs 12, the spinning beam 2 spins yarns Y downward through unillustrated through holes of the respective spinnerets 13. The spinnerets 13 are, in the same manner as later-described cooling tubes 21, arranged to form two rows along the crosswise direction in a staggered manner.

35 **[0021]** The yarn cooler 3 is provided below the spinning beam 2 and, as described below, cools the yarns Y spun out from the spinning beam 2. The oiling device 4 is provided below the yarn cooler 3 and lubricates the yarns Y cooled by the yarn cooler 3. The yarns Y lubricated by the oiling device 4 are wound onto bobbins by an unillustrated winding device provided below the oiling device 4.

40 **[0022]** Now, the structure of the yarn cooler 3 will be described. The yarn cooler 3 includes components such as a plurality of cooling tubes 21 and a quench box 22.

[0023] The cooling tubes 21 are disposed to oppose the spinnerets 13 of the spinning packs 12, and forms two rows in the crosswise direction in a staggered manner. The spinnerets 13 and the cooling tubes 21 are arranged in staggered manners for the purpose of densely arranging the components.

45 **[0024]** Inside each cooling tube 21 is formed a substantially circular yarn running space 31 which vertically extends. The yarns Y spun out from the spinneret 13 run downward through the yarn running space 31. The side wall of the yarn running space 31 functions as a filter 32. The filter 32 rectifies the cooling wind when the cooling wind flows from a later-described cooling tube housing

chamber 41 into the yarn running space 31.

[0025] The quench box 22 supplies the cooling wind to the yarn running space 31 of the cooling tube 21. This box 22 is substantially rectangular parallelepiped and in which the cooling tube housing chamber 41, an upper connection path 42 and a lower connection path 43 are formed.

[0026] The cooling tube housing chamber 41 houses therein the cooling tubes 21. Each cooling tube 21 penetrates the cooling tube housing chamber 41. In the cooling tube housing chamber 41, furthermore, a substantially tubular third punched plate 44 is provided to enclose each cooling tube 21. The third punched plate 44 has a plurality of through holes. As described later, the third punched plate 44 performs, with the filter 32, the rectification of the cooling wind when the cooling wind flows from the cooling tube housing chamber 41 into the yarn running space 31. In the third punched plate 44, the aperture ratio of a portion 44a substantially at the upper half of the cooling tube housing chamber 41 is higher than the aperture ratio of a portion 44b substantially at the lower half of the cooling tube housing chamber 41. More specifically, for example, while the aperture ratio of the portion 44a is about 10 to 20%, the aperture ratio of the portion 44b is about 1 to 3%.

[0027] The cooling tube housing chamber 41 further includes a first connection port 45 at the lower end portion of the backside (duct 60 side) wall surface 41a and a second connection port 46 at the lower end portion of the front-side (the side opposite to the duct 60 side) wall surface 41b. At the first connection port 45 and the second connection port 46, a first punched plate 47 and a second punched plate 48 are provided, respectively. Each of the first punched plate 47 and the second punched plate 48 is a plate having a plurality of through holes. As described later, these plates perform the rectification of the cooling wind when the cooling wind flows from the upper connection path 42 and the lower connection path 43 into the cooling tube housing chamber 41. The aperture ratio of the second punched plate 48 is arranged to be not lower than the aperture ratio of the first punched plate 47. More specifically, for example, while the aperture ratio of the first punched plate 47 is about 5 to 10%, the aperture ratio of the second punched plate 48 is about one to three times as large as the aperture ratio of the first punched plate 47.

[0028] The upper connection path 42 extends in the front-back directions and the leading end thereof is connected to the first connection port 45, whereas the trailing end thereof is connected to the substantially upper half of the leading end of the duct 60 provided behind the quench box 22.

[0029] The lower connection path 43 is provided below the upper connection path 42. The trailing end of the path 43 is connected to the substantially lower half of the leading end of the duct 60. The path 43 extends forward below the cooling tube housing chamber 41 beyond the second connection port 46 from the junction with the duct 60, and

the leading end of the path 43 is bended for about 180 degrees and connected to the second connection port 46. In other words, the lower connection path 43 extends along the lower part of the cooling tube housing chamber 41 and is connected to the second connection port 46.

[0030] The yarn running space 31 in the above-described cooling tube 21 extends downward from the cooling tube housing chamber 41 and vertically penetrates the lower connection path 43. However, a part of the yarn running space 31, which part is in the lower connection path 43, is defined by a partition tube 49 which is different from the third punched plate 44 and does not have any through holes. This prevents the cooling wind from directly entering the yarn running space 31 from the lower connection path 43.

[0031] In addition to the above, at the junction of the upper connection path 42, the lower connection path 43, and the duct 60, a punched plate 51 is provided. This punched plate 51 is a plate having a plurality of through holes. As described later, this plate 51 performs the rectification of the cooling wind when the cooling wind flows from the duct 60 into the upper connection path 42 and the lower connection path 43.

[0032] Now, the flow of the cooling wind from the duct 60 to the yarn running space 31 will be described. It is noted that the arrows shown in Fig. 3A to Fig. 5 indicate the flow of the cooling wind. The cooling wind flowing in the duct 60 is divided into upper and lower wind components at the junction between the upper connection path 42 and the lower connection path 43. The wind components after the division are rectified by the punched plate 51 and then flow into the upper connection path 42 and the lower connection path 43, respectively.

[0033] The cooling wind component flowing into the upper connection path 42 is further rectified by the first punched plate 47 and then flows from the first connection port 45 into the cooling tube housing chamber 41. This wind component reaching the cooling tube housing chamber 41 is further rectified by the third punched plate 44 and the filter 32, and then flows into the yarn running space 31.

[0034] On the other hand, the cooling wind component flowing into the lower connection path 43 passes below the cooling tube housing chamber 41 and reaches the front of the second connection port 46, and then is rectified by the second punched plate 48 and flows into the cooling tube housing chamber 41 through the second connection port 46. Thereafter, the wind component reaching the cooling tube housing chamber 41 is further rectified by the third punched plate 44 and the filter 32 and flows into the yarn running space 31.

[0035] As the cooling wind flows into the yarn running space 31 in this way, the yarns Y spun out from the spinning beam 2 and running in the yarn running space 31 are cooled.

[0036] At this moment, the cooling wind flows into the cooling tube 21 in all directions. In this regard, provided that the cooling wind flows into the cooling tube housing

chamber 41 only from the back side where the duct 60 is provided, e.g. provided that the cooling wind flows into the cooling tube housing chamber 41 only through the first connection port 45, the amount of cooling wind passing the outside of the cooling tube 21 and flowing into the yarn running space 31 from the front is smaller than the amount of cooling wind flowing into the yarn running space 31 from the rearward without passing through the outside of the cooling tube 21. In particular, when cooling tubes are provided to form two rows in a staggered manner as in the present embodiment, an amount of cooling wind flowing from the front of a cooling tube 21, which is at the front side and far from the first connection port 45 (duct 60), into the yarn running space 31 is particularly small. That is to say, an amount of cooling wind flowing into the yarn running space 31 may be different in different directions. As a result, the yarns Y running in the yarn running space 31 are not evenly cooled, with the result that the quality of yarns may be deteriorated on account of, for example, irregular thickness of yarns.

[0037] A conceivable arrangement to solve the problem above is such that another duct is provided in front of the quench box 22 to cause the wind components to flow into the cooling tube housing chamber 41 from both the front and rear sides. However, because it is necessary to secure a space in front of the quench box 22 to allow an operator to perform operations, it is difficult to provide a duct in front of the quench box 22.

[0038] In regard to the problem above, the present embodiment described above is arranged so that, in addition to the upper connection path 42 connected to the first connection port 45 formed at the lower end portion of the wall surface 41a of the cooling tube housing chamber 41, the lower connection path 43 is provided to extend along the lower part the cooling tube housing chamber 41 and to be connected to the second connection port 46 formed on the wall surface 41b of the cooling tube housing chamber 41, in order to allow the wind components to flow into the cooling tube housing chamber 41 from the both front and rear sides. This reduces the difference between the amount of cooling wind flowing into the yarn running space 31 from the front and the amount of cooling wind flowing into the yarn running space 31 from the rearward, and hence the cooling wind flows into the yarn running space 31 evenly from all directions. Therefore the yarns Y running in the yarn running space 31 are evenly cooled.

[0039] However, since the lower connection path 43 is longer than the upper connection path 42 and the wind component flowing in the lower connection path 43 is different from the wind component flowing in the upper connection path 42 in that the former wind component collides the partition tube 49 in the lower connection path 43, the amount of the wind component at around the second connection port 46 of the lower connection path 43 is smaller than the amount of the wind component at around the first connection port 45 of the upper connection path 42.

[0040] In this regard, the present embodiment is arranged so that the aperture ratio of the second punched plate 48 is not lower than the aperture ratio of the first punched plate 47, and hence the cooling wind easily flows into the lower connection path 43 from the cooling tube housing chamber 41, with the result that the cooling wind flows into the cooling tube housing chamber 41 evenly from the front and rear sides.

[0041] In the meanwhile, to keep the yarns Y spun out from the spinning beam 2 (spinnerets 13) to be high-quality yarns with no thickness irregularities, it is preferable to cool the yarns Y as soon as possible after being spun out. In other words, the amount of cooling wind flowing into the upper part of the yarn running space 31 is preferably large. However, when as in the present embodiment the first connection port 45 and the second connection port 46 are formed at the lower end portions of the wall surfaces 41a and 41b of the cooling tube housing chamber 41, provided that the aperture ratio of the third punched plate is constant at all portions thereof, the cooling wind does not easily flows into the upper part of the yarn running space 31, and hence the yarns Y immediately after being spun out from the spinning beam 2 may not be sufficiently cooled. It is noted that, in the present embodiment, the first connection port 45 and the second connection port 46 are formed at the lower end portions of the wall surfaces 41a and 41b of the cooling tube housing chamber 41 for the purpose of, for example, shortening the distance of the lower connection path 43 below the cooling tube housing chamber 41 as much as possible, or preventing the duct 60 from interfering with the other parts of the melt spinning device 1.

[0042] In connection with the above, the present embodiment is arranged so that the aperture ratio of the portion 44a is larger than the aperture ratio of the portion 44b in the third punched plate 44. With this arrangement, even if the first connection port 45 and the second connection port 46 are connected to the lower end portions of the cooling tube housing chamber 41, the cooling wind sufficiently flows into the upper part of the yarn running space 31 and the yarns Y immediately after being spun out from the spinning beam 2 are sufficiently cooled.

[0043] Now, various modifications of the embodiment will be described. It is noted that the descriptions of the same components as in the embodiment will be suitably omitted.

[0044] While the cooling tubes 21 are arranged to form two rows in the crosswise direction in a staggered manner in the embodiment, the cooling tubes 21 may be differently arranged. For example, a plurality of cooling tubes 21 may be arranged to form a single row in the crosswise direction. Alternatively, cooling tubes 21 may be arranged to form two rows in the crosswise direction such that the cooling tubes 21 of the respective rows are not staggered but are at the same positions in the crosswise direction.

[0045] When the cooling wind flows into the cooling tube housing chamber 41 only from the rearward where

the duct 60 is disposed, the amount of cooling wind passing the outside of the cooling tube 21 and flowing into the yarn running space 31 from the front is more or less smaller than the amount of cooling wind flowing into the yarn running space 31 from the rearward without passing through the outside of the cooling tube 21, regardless of the arrangement of the cooling tubes 21. In this regard, when it is arranged in the same manner as the embodiment above so that cooling wind flows into the cooling tube housing chamber 41 from both the front and rear sides, the cooling wind evenly flows into the yarn running space 31 from all directions, regardless of the arrangement of the cooling tubes 21.

[0046] In addition to the above, while the embodiment above is arranged so that the first connection port 45 and the second connection port 46 are provided at the lower end portions of the wall surfaces 41a and 41b of the cooling tube housing chamber 41, the first and second connection ports may be provided at parts different from the lower end portions of the wall surfaces 41a and 41b, e.g. at the central portions or the upper end portions of the wall surfaces 41a and 41b of the cooling tube housing chamber 41. Also in these cases, the amount of cooling wind flowing into the upper part of the yarn running space 31 is increased and the yarns Y immediately after being spun out from the spinning beam 2 are sufficiently cooled if the aperture ratio of the upper portion 44a of the third punched plate 44 is larger than the aperture ratio of the lower portion 44b, irrespective of the positions of the first and second connection ports.

[0047] In addition to the above, while the embodiment above is arranged so that the aperture ratio of the portion 44a of the third punched plate 44 is about 10 to 20% whereas the aperture ratio of the portion 44b is about 1 to 3%, the aperture ratio of the third punched plate 44 may be differently set as long as the aperture ratio of the portion 44a is larger than the aperture ratio of the portion 44b. In this connection, the portion 44b may not have any through holes (i.e. the aperture ratio may be 0%).

[0048] In addition to the above, while the embodiment above is arranged so that the third punched plate 44 is divided into two portions, i.e. into the upper and lower portions 44a and 44b and the aperture ratio of the portion 44a is larger than the aperture ratio of the portion 44b, the third punched plate 44 may be divided into three or more vertically-stacked portions and the aperture ratios thereof may be arranged to increase toward the above.

[0049] In addition to the above, the aperture ratio of the third punched plate 44 may be constant at all portions thereof. For example, when the first and second connection ports are provided at the upper end portions of the wall surfaces 41a and 41b of the cooling tube housing chamber 41 as described above, the amount of cooling wind flowing into the upper part of the yarn running space 31 is sufficiently large even if the aperture ratio of the third punched plate 44 is constant at all portions thereof.

[0050] In addition to the above, while the embodiment above is arranged so that the aperture ratio of the second

punched plate 48 is not lower than the aperture ratio of the first punched plate 47, the aperture ratio of the second punched plate 48 may be lower than the aperture ratio of the first punched plate 47. Also in this case, even if the amount of cooling wind flowing into the cooling tube housing chamber 41 from the front is small, since the cooling wind flows into the cooling tube housing chamber 41 from both the front and rear sides, the cooling wind evenly flows into the yarn running space 31 from all directions as compared to the arrangement in which the cooling wind flows into the yarn running space 31 only from the rearward.

Claims

1. A yarn cooler which cools yarns spun out from a spinning beam which produces yarns from a molten material through spinnerets,
the yarn cooler comprising: a plurality of cooling tubes which are arranged below the spinning beam to oppose the spinnerets, each of the cooling tubes having therein a vertically extending yarn running space in which the yarns run and a wall of the yarn running space functioning as a filter by which cooling wind flown from the outside is rectified; and a quench box which supplies the cooling wind to the yarn running space of each of the cooling tubes, wherein, the quench box includes therein: a cooling tube housing chamber which houses the cooling tubes; and a connection path which connects a duct with the cooling tube housing chamber, the duct supplying the cooling wind and being provided on one side of the cooling tube housing chamber in plan view, the cooling tube housing chamber has a first connection port and a second connection port which are formed at a wall surface on the duct side and at a wall surface on the side opposite to the duct side to be connected to the connection path, and the connection path is constituted by an upper connection path and a lower connection path, the upper connection path connecting the first connection port with the duct whereas the lower connection path being provided below the upper connection path, being connected to the duct, and extending along a lower part of the cooling tube housing chamber to be connected to the second connection port.

2. The yarn cooler according to claim 1, further comprising:

- a first punched plate which is provided at the first connection port and rectifies the cooling wind flowing into the cooling tube housing chamber from the upper connection path; and
- a second punched plate which is provided at the second connection port and rectifies the cooling wind flowing into the cooling tube housing cham-

ber from the lower connection path, wherein, the aperture ratio of the second punched plate is not lower than the aperture ratio of the first punched plate.

3. The yarn cooler according to claim 1 or 2, further comprising:

a tube-shaped third punched plate which encloses therein each cooling tube and rectifies, with the filter, the cooling wind flowing into the yarn running space, wherein, the aperture ratio of the third punched plate increases toward the upper end.

4. The yarn cooler according to claim 3, wherein, the first connection port and the second connection port are formed at lower end portions of wall surfaces of the cooling tube housing chamber.

5. The yarn cooler according to any one of claims 1 to 4, wherein, the cooling tubes are provided in a staggered manner.

Patentansprüche

1. Garnkühler, der Garne kühlt, die aus einem Spinnbalken herausgesponnen werden, der Garne aus einem geschmolzenen Material durch Spinn Düsen erzeugt, wobei der Garnkühler aufweist: mehrere Kühlrohre, die unter dem Spinnbalken angeordnet sind, sodass sie den Spinn Düsen gegenüberliegen, wobei jedes der Garnrohre darin einen sich vertikal erstreckenden Garnlaufraum aufweist, in dem die Garne laufen, und eine Wand des Garnlaufraums als Filter dient, durch den Kühlwind, der von außen einfließt, richtig ausgerichtet wird; und eine Abschreckbox, die den Kühlwind dem Garnlaufraum jedes der Kühlrohre zuleitet, wobei die Abschreckbox darin aufweist: eine Kühlrohrgehäusekammer, in der die Kühlrohre untergebracht sind; und einen Verbindungspfad, der einen Kanal mit der Kühlrohrgehäusekammer verbindet, wobei der Kanal den Kühlwind zuleitet und auf einer Seite der Kühlrohrgehäusekammer in einer Draufsicht vorgesehen ist, die Kühlrohrgehäusekammer einen ersten Verbindungsanschluss und einen zweiten Verbindungsanschluss, die an einer Wandoberfläche auf der Kanalseite und an einer Wandoberfläche auf der der Kanalseite gegenüberliegenden Seite ausgebildet sind, zur Verbindung mit dem Verbindungspfad aufweist und der Verbindungspfad aus einem oberen Verbindungspfad und einem unteren Verbindungspfad be-

steht, wobei der obere Verbindungspfad den ersten Verbindungsanschluss mit dem Kanal verbindet, wohingegen der untere Verbindungspfad unterhalb des oberen Verbindungspfads vorgesehen ist, der mit dem Kanal verbunden ist, und sich entlang eines unteren Teils der Kühlrohrgehäusekammer zur Verbindung mit dem zweiten Verbindungsanschluss erstreckt.

2. Garnkühler nach Anspruch 1, ferner mit:

einer ersten durchlochten Platte, die an dem ersten Verbindungsanschluss vorgesehen ist und den Kühlwind richtig ausrichtet, der in die Kühlrohrgehäusekammer von dem oberen Verbindungspfad fließt; und einer zweiten durchlochten Platte, die an dem zweiten Verbindungsanschluss vorgesehen ist und den Kühlwind richtig ausrichtet, der in die Kühlrohrgehäusekammer von dem unteren Verbindungspfad fließt, wobei ein Öffnungsverhältnis der zweiten durchlochten Platte nicht geringer als das Öffnungsverhältnis der ersten durchlochten Platte ist.

3. Garnkühler nach Anspruch 1 oder 2, ferner mit:

einer rohrförmigen dritten durchlochten Platte, die darin jedes Kühlrohr umschließt und mit dem Filter den Kühlwind richtig ausrichtet, der in den Garnlaufraum fließt, wobei das Öffnungsverhältnis der dritten durchlochten Platte zu dem oberen Ende hin zunimmt.

4. Garnkühler nach Anspruch 3, bei dem der erste Verbindungsanschluss und der zweite Verbindungsanschluss an unteren Endabschnitten von Wandoberflächen der Kühlrohrgehäusekammer ausgebildet sind.
5. Garnkühler nach einem der Ansprüche 1 bis 4, bei dem die Kühlrohre auf eine versetzte Weise vorgesehen sind.

Revendications

1. Refroidisseur de fils qui refroidit des fils filés à partir d'une rampe de filage qui produit des fils à partir d'un matériau fondu à travers des filières, le refroidisseur de fils comprenant : une pluralité de tubes de refroidissement qui sont disposés sous la rampe de filage pour faire face aux filières, chacun des tubes de refroidissement renfermant un espace de défilement de fils s'étendant verticalement où les fils défilent et une paroi de l'espace de défilement de fils fonctionnant comme un filtre par lequel un air

de refroidissement qui s'est écoulé depuis l'extérieur est rectifié ; et un étouffoir qui fournit de l'air de refroidissement à l'espace de défilement de fils de chacun des tubes de refroidissement, où, l'étouffoir comporte dedans : une chambre de logement de tubes de refroidissement qui loge les tubes de refroidissement ; et un chemin de liaison qui relie un conduit à la chambre de logement de tubes de refroidissement, le conduit fournissant l'air de refroidissement et étant prévu sur un côté de la chambre de logement de tubes de refroidissement dans une vue en plan, la chambre de logement de tubes de refroidissement présente un premier orifice de liaison et un deuxième orifice de liaison qui sont formés au niveau d'une surface de paroi sur le côté du conduit et au niveau d'une surface de paroi sur le côté opposé au côté du conduit devant être connecté au chemin de liaison, et le chemin de liaison est constitué par un chemin de liaison supérieur et un chemin de liaison inférieur, le chemin de liaison supérieur reliant le premier orifice de liaison au conduit tandis que le chemin de liaison inférieur est prévu sous le chemin de liaison supérieur, est relié au conduit, et s'étend le long d'une partie inférieure de la chambre de logement de tubes de refroidissement devant être connectée au deuxième orifice de liaison.

2. Refroidisseur de fils selon la revendication 1, comprenant en outre :

une première plaque perforée qui est prévue au niveau du premier orifice de liaison et qui rectifie l'air de refroidissement s'écoulant dans la chambre de logement de tubes de refroidissement à partir du chemin de liaison supérieur ; et une deuxième plaque perforée qui est prévue au niveau du deuxième orifice de liaison et qui rectifie l'air de refroidissement s'écoulant dans la chambre de logement de tubes de refroidissement à partir du chemin de liaison inférieur, où, le rapport d'ouverture de la deuxième plaque perforée n'est pas inférieur au rapport d'ouverture de la première plaque perforée.

3. Refroidisseur de fils selon la revendication 1 ou 2, comprenant en outre :

une troisième plaque perforée en forme de tube qui renferme dedans chaque tube de refroidissement et qui rectifie, avec le filtre, l'air de refroidissement s'écoulant dans l'espace de défilement de fils, où, le rapport d'ouverture de la troisième plaque perforée augmente vers l'extrémité supérieure.

4. Refroidisseur de fils selon la revendication 3, dans lequel, le premier orifice de liaison et le deuxième orifice de liaison sont formés au niveau de parties d'extrémité inférieures de surfaces de paroi de la chambre de logement de tubes de refroidissement.
5. Refroidisseur de fils selon l'une quelconque des revendications 1 à 4, dans lequel, les tubes de refroidissement sont prévus de manière échelonnée.

FIG. 1

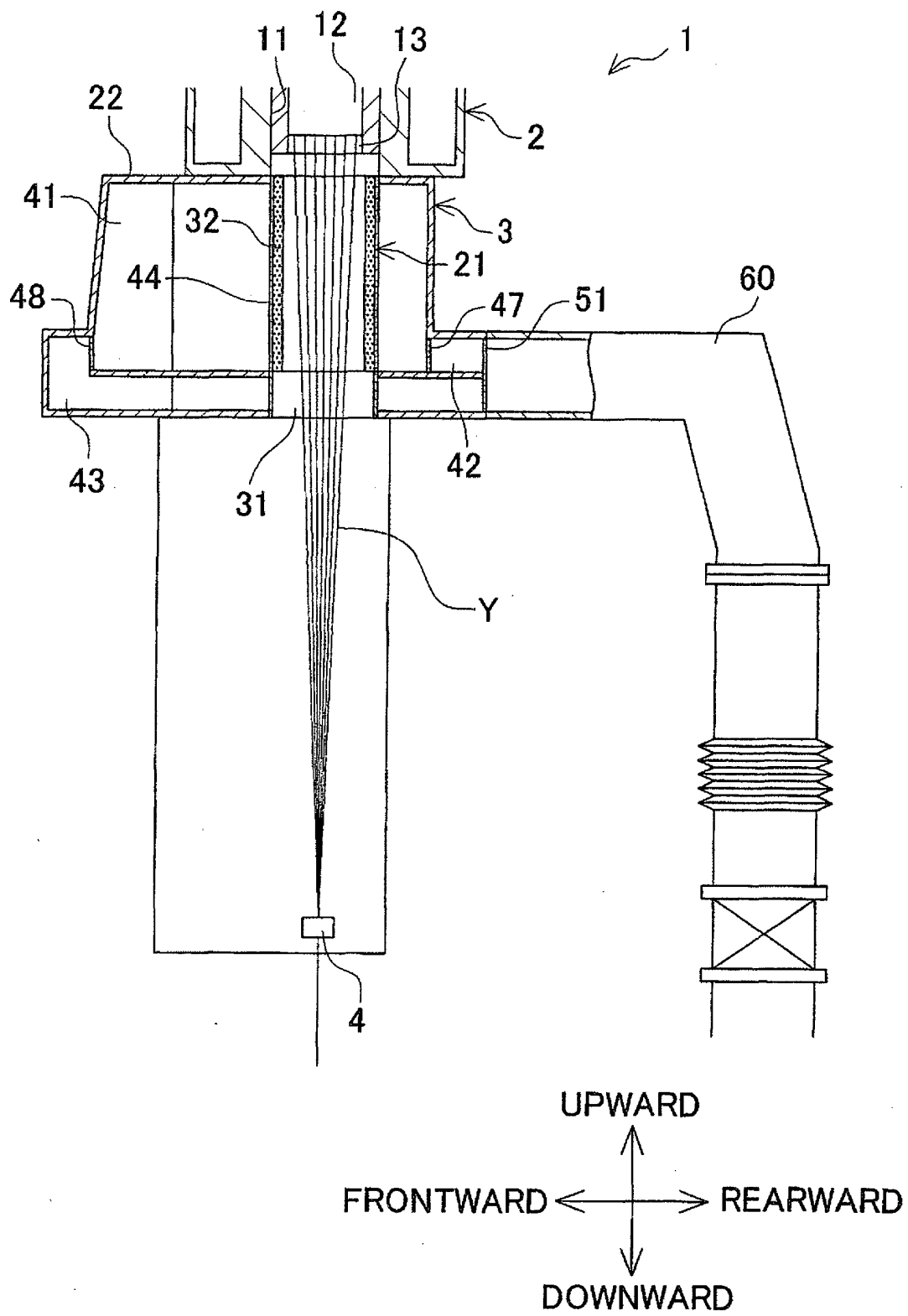


FIG.2

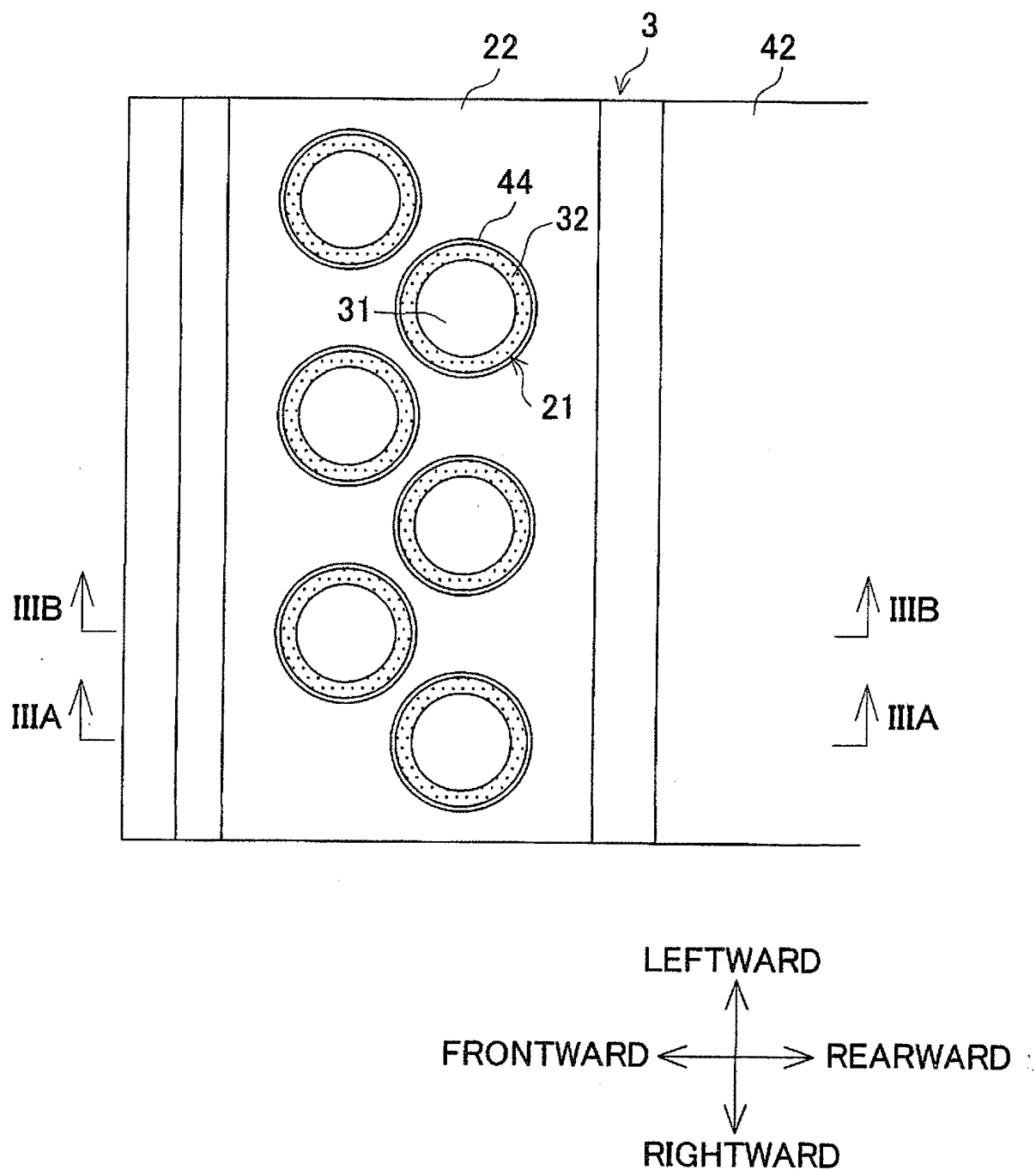


FIG.3A

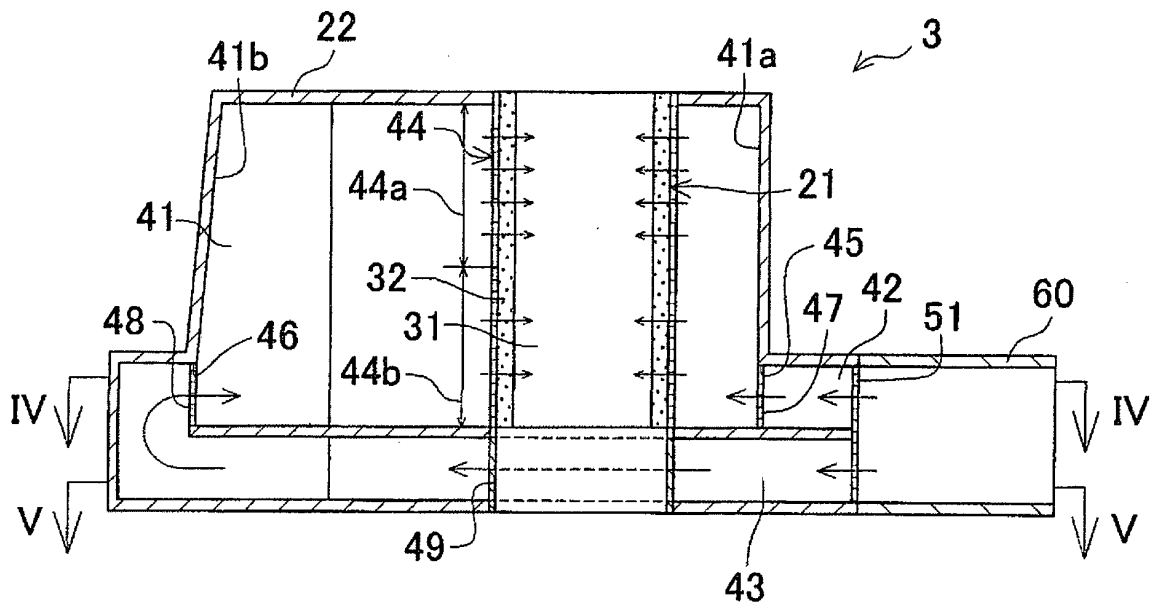


FIG.3B

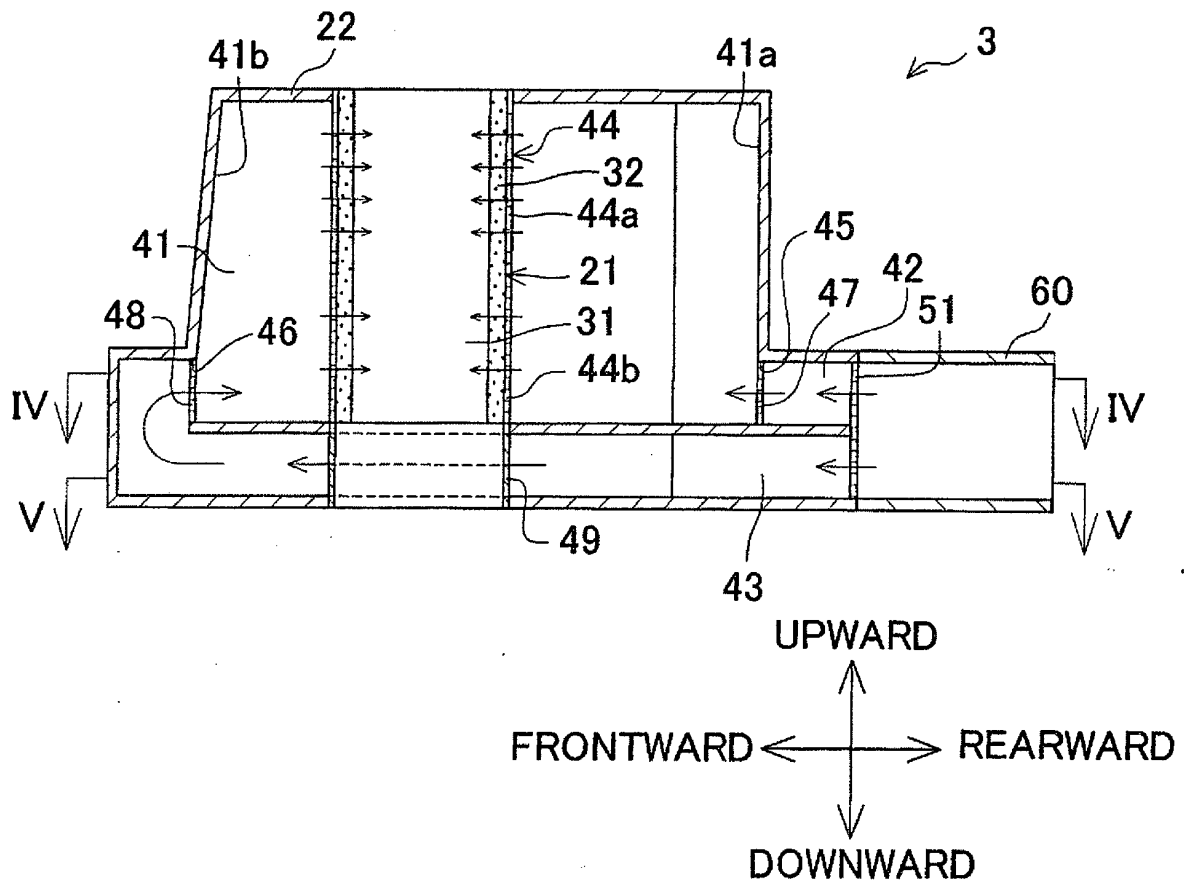


FIG.4

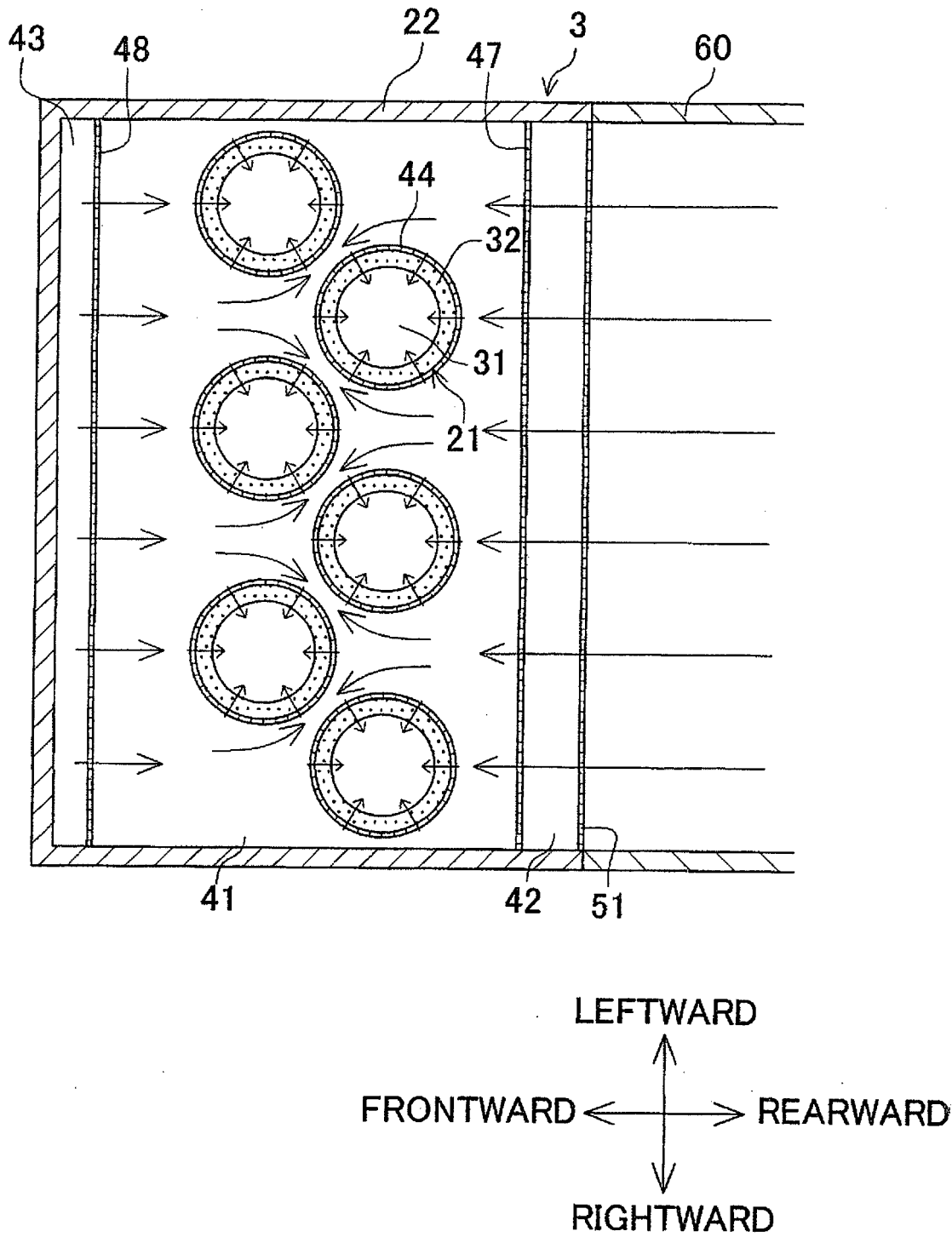
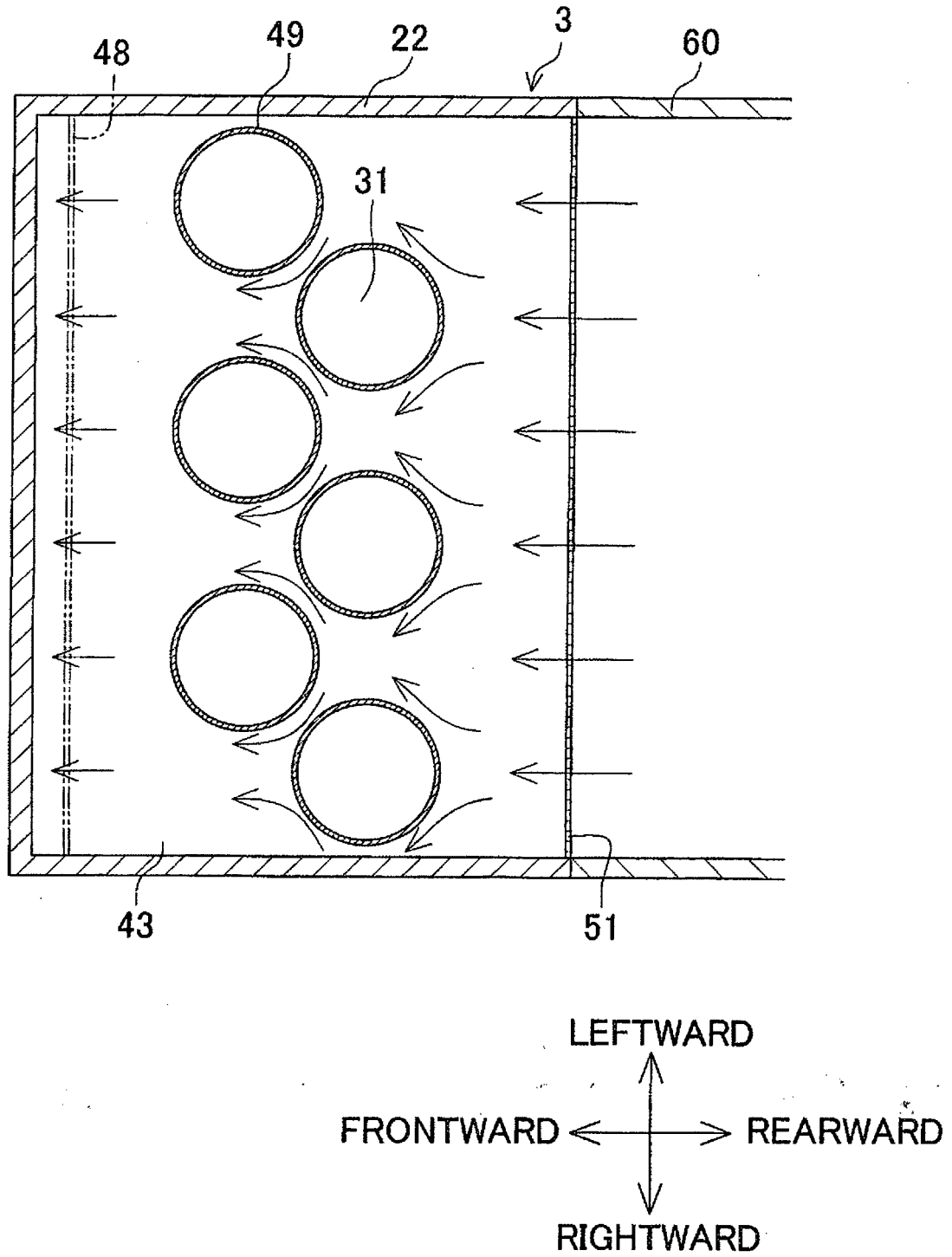


FIG.5



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 3868404 B [0002] [0003]