distribution of the fluid is needed to be uniformed directly below the jetting surface. Nevertheless, the fluid colliding against the guide vane is not turned completely upward because of the influence of horizontal inertia of the fluid in the duct. Therefore, it is an actual situation that the flow direction of the fluid is not able to be changed upward at an intended place.

[0007]

ii. Also, according to the jetting apparatus to which the above-mentioned guide vane is mounted, because the influence of horizontal inertia of the fluid in the duct depends on the pump output, the speed distribution of the fluid directly below the jetting surface cannot be uniformed and the jetting height of the fluid is deviated in the direction of the nozzle's width. Thereby, there are problems that the widthwise distribution of the fluid jetting height jetted from the nozzle does not become uniform and the tendency variation becomes large in the widthwise distribution of the fluid from the pump output. Incidentally, this problem can be found in the wave soldering apparatus and the like on which the above-mentioned jetting apparatus is mounted.

[0008]

Then, this invention solves such problems and has an object to provide the guide vane and the jetting apparatus which allows to jet the fluid to the target position and allows to uniformize the widthwise distribution of the fluid jetting height by means of devising the structure of the guide member which changes the flow direction of the fluid.

[MEANS FOR SOLVING THE PROBLEMS]

[0009] To solve the problems, a guide vane of Claim 1 is characterized in that multiple pair structures are provided; each of said structures comprises a first member having a curvature or angular inner surface shape and having a prescribed height and a second member having a curvature or angular inner surface shape and having a prescribed height; said first and second members of constructing said pair structure are arranged under a condition that said first and second members are shifted left or right in a view from a main flow direction of melted fluid; said pair structures are stood on a board in the main flow direction of the fluid; the fluid is flowed into an opening formed by edges of said

first and second members; the flowed fluid is turned in said pair structure to change the fluid flow direction from a horizontal direction to a vertical direction.

[0010]

According to the guide vane described in Claim 1, the first member has the curvature or angular inner surface shape and the prescribed height. The second member also has the curvature or angular inner surface shape and the prescribed height. With acceptance on this point, the multiple pair structures comprising the first members and the second members are provided; each of said structures comprises a first member having a curvature or angular inner surface shape and having a prescribed height and a second member having a curvature or angular inner surface shape and having a prescribed height; said first and second members of constructing said pair structure are arranged under a condition that said first and second members are shifted left or right in a view from a main flow direction of melted fluid; said pair structures are stood on a board in the main flow direction of the fluid; the fluid is flowed into an opening formed by edges of said first and second members; the flowed fluid is turned in said pair structure to change the fluid flow direction from a horizontal direction to a vertical direction.

[0011]

In accordance with this arrangement, since said fluid is flowed into the opening formed by both the edges of the first and second members having the inner surfaces faced each other, the flowed fluid becomes the spiral flow along the inner surfaces of said pair structure and thereby rises.

[0012]

(Deleted)

[0013]

(Deleted)

[0014] The guide vane described in Claim 4 is characterized in that, in the description of Claim 1, each of said first member and said second member comprises any one of a half-cylindrical, L-shape cross section and U-shape cross section screen plate.

[0015] The jetting apparatus described in Claim 5 comprises a nozzle having a prescribed opening for jetting melted fluid; a pump for sending the fluid into said duct; a pump housing receiving said pump and being connected to said duct; and a guide vane described in Claim 1, said guide vane being provided in said duct and turning the flow direction of the fluid sent by said pump and flowed in the longitudinal direction of said duct to change the flow of the fluid to a height direction of said nozzle.

[0016] According to the jetting apparatus of Claim 5, the nozzle has the prescribed opening and jets the melted fluid. The duct is connected to the nozzle. The pump housing receiving the pump is connected to the duct and the pump sends the melted fluid into the duct. The guide vane is placed in the duct. With acceptance on this point, the guide vane according to the present invention is adapted to turn the flow of the melted fluid sent by the pump and flowed from the longitudinal direction of the duct and to change the fluid flow to the height direction of the nozzle.

[0017]

In Claim 6, the jetting apparatus according to Claim 5 is characterized in that an angle between the longitudinal direction of the duct and the longitudinal direction of the guide vane is set and the guide vane is attached to the duct at the angle set here wherein the duct is connected to the pump housing and the fluid is sent by the pump.

[0018]

In Claim 7, the jetting apparatus according to Claim 6 is characterized in that the duct, to which the fluid is sent by the pump, includes a thin and long case having an inlet port, an outlet port, and an end port that are provided in prescribed places; the inlet port is provided on one side of the case; the pump housing is connected to the inlet port; an inflow regulating plate is provided on the prescribed place of the inlet port for regulating the fluid to flow into the inflow port in one opening width of the guide vane; the outlet port is positioned above the

guide vane, opened at the top plate of the case and connected with the nozzle; and the fluid having the flow direction reversed by the end port is made to flow into the inflow port in the other opening width of the guide vane.

[0019] The jetting apparatus described in Claim 8 is characterized in that, in Claim 7, an inclined portion is provided at the part of connecting said pump housing and said duct, and said pump sends the fluid into said duct through said inclined portion.

[EFFECTS OF THE INVENTION]

[0020] According to the guide vane relating to this invention, the multiple pair structures are provided. Each of the pair structures comprises the first curvature or angular member having the prescribed height and the second curvature or angular member having the prescribed height. The first and second members of constructing the pair structure are arranged under a condition that the first and second members are shifted left or right in a view from the main flow direction of the melted fluid. The pair structures are stood on the board in the main flow direction of the fluid. The melted fluid is flowed into the opening formed by both the edges of said first and second members that face to each other. The molten inflow fluid is turned to change the fluid flow direction from the horizontal direction to the vertical direction.

[0021] In accordance with this structure, when the melted fluid flows into the opening formed by both the edges of the first and second members having inner surfaces faced each other, the melted fluid flowed in comes to turn in the pair structure comprising the first and second members to rise along the inner surfaces thereof. Thereby, the flow of the melted fluid flowed horizontally into the opening can be changed to the vertical direction flow. This guide vane is sufficiently applicable to the jetting apparatus.

[0022]

The jetting apparatus of this invention comprises the guide vane of the present invention and is adapted to change the flow direction

of the melted fluid from the horizontal direction to the vertical direction in the duct. This constitution enables the widthwise distribution of the melted fluid jetting height jetted from the nozzle to be uniformized. Further, the tendency change of the widthwise distribution of the melted fluid from the pump output can be reduced.

[BRIEF DESCRIPTION OF DRAWINGS]

[0023]

FIG. 1 is a perspective view for showing a configuration example of a half-cylindrical guide vane 10 as the first embodiment according to the present invention.

FIG. 2 is a perspective view for showing a formation example of the guide vane 10.

FIG. 3 is a top view for showing an operation example of the guide vane 10.

FIG. 4A is a perspective view for showing a configuration example of a guide vane 20 having an L-shaped cross section according to a second embodiment.

FIG. 4B is a top view for showing an operation example of the guide vane 20 having an L-shaped cross section according to the second embodiment.

FIG. 5A is a perspective view for showing a configuration example of a guide vane 30 having a U-shaped cross section according to the third embodiment.

FIG. 5B is a top view for showing an operation example of the guide vane 30 having the U-shaped cross section according to the third embodiment.

FIG. 6 is a perspective view for showing a configuration example of a wave soldering apparatus 400 according to the fourth embodiment.

FIG. 7 is a perspective view for showing a configuration example of a jetting apparatus 40.

FIG. 8A is a top view for showing an assembling example of the guide vane 10 according to the jetting apparatus 40.

FIG. 8B is a front view for showing the assembling example of the guide vane 10 according to the jetting apparatus 40.

distribution of the fluid is needed to be uniformed directly below the jetting surface. Nevertheless, the fluid colliding against the guide vane is not turned completely upward because of the influence of horizontal inertia of the fluid in the duct. Therefore, it is an actual situation that the flow direction of the fluid is not able to be changed upward at an intended place.

[0007]

ii. Also, according to the jetting apparatus to which the above-mentioned guide vane is mounted, because the influence of horizontal inertia of the fluid in the duct depends on the pump output, the speed distribution of the fluid directly below the jetting surface cannot be uniformed and the jetting height of the fluid is deviated in the direction of the nozzle's width. Thereby, there are problems that the widthwise distribution of the fluid jetting height jetted from the nozzle does not become uniform and the tendency variation becomes large in the widthwise distribution of the fluid from the pump output. Incidentally, this problem can be found in the wave soldering apparatus and the like on which the above-mentioned jetting apparatus is mounted.

[0008]

Embodiments of the invention seek to solve such problems and seek to provide the guide vane and the jetting apparatus which allows to jet the fluid to the target position and allows to uniformize the widthwise distribution of the fluid jetting height by means of devising the structure of the guide member which changes the flow direction of the fluid.

[MEANS FOR SOLVING THE PROBLEMS]

[0009] According to a first aspect, there is provided a guide vane characterized in that multiple pair structures are provided; each of said structures comprises a first member having a curvature or angular inner surface shape and having a prescribed height and a second member having a curvature or angular inner surface shape and having a prescribed height; said first and second members of constructing said pair structure are arranged under a condition that said first and second members are shifted left or right in a view from a main flow direction of melted fluid; said pair structures are stood on a board in the main flow direction of the fluid; the fluid is flowed into an opening formed by edges of said

first and second members; the flowed fluid is turned in said pair structure to change the fluid flow direction from a horizontal direction to a vertical direction.

[0010]

According to the guide vane described in an embodiment, the first member has the curvature or angular inner surface shape and the prescribed height. The second member also has the curvature or angular inner surface shape and the prescribed height. With acceptance on this point, the multiple pair structures comprising the first members and the second members are provided; each of said structures comprises a first member having a curvature or angular inner surface shape and having a prescribed height and a second member having a curvature or angular inner surface shape and having a prescribed height; said first and second members of constructing said pair structure are arranged under a condition that said first and second members are shifted left or right in a view from a main flow direction of melted fluid; said pair structures are stood on a board in the main flow direction of the fluid; the fluid is flowed into an opening formed by edges of said first and second members; the flowed fluid is turned in said pair structure to change the fluid flow direction from a horizontal direction to a vertical direction.

[0011]

In accordance with this arrangement, since said fluid is flowed into the opening formed by both the edges of the first and second members having the inner surfaces faced each other, the flowed fluid becomes the spiral flow along the inner surfaces of said pair structure and thereby rises.

[0012]

(Deleted)

[0013]

(Deleted)

[0014] According to an embodiment, each of said first member and said second member comprises any one of a half-cylindrical, L-shape cross section and U-shape cross section screen plate.

[0015] According to a second aspect of the present invention, there is provided a jetting apparatus comprising a nozzle having a prescribed opening for jetting melted fluid; a duct connected to said nozzle; a pump for sending the fluid into said duct; a pump housing receiving said pump and being connected to said duct; and a guide vane as defined in the first aspect, said guide vane being provided in said duct and turning the flow direction of the fluid sent by said pump and flowed in the longitudinal direction of said duct to change the flow of the fluid to a height direction of said nozzle.

[0016] According to an embodiment, the nozzle has the prescribed opening and jets the melted fluid. The duct is connected to the nozzle. The pump housing receiving the pump is connected to the duct and the pump sends the melted fluid into the duct. The guide vane is placed in the duct. With acceptance on this point, the guide vane according to embodiments of the present invention is adapted to turn the flow of the melted fluid sent by the pump and flowed from the longitudinal direction of the duct and to change the fluid flow to the height direction of the nozzle.

[0017]

In an embodiment, an angle between the longitudinal direction of the duct and the longitudinal direction of the guide vane is set and the guide vane is attached to the duct at the angle set here wherein the duct is connected to the pump housing and the fluid is sent by the pump.

[0018]

In an embodiment, the duct, to which the fluid is sent by the pump, includes a thin and long case having an inlet port, an outlet port, and an end port that are provided in prescribed places; the inlet port is provided on

one side of the case; the pump housing is connected to the inlet port; an inflow regulating plate is provided on the prescribed place of the inlet port for regulating the fluid to flow into

the inflow port in one opening width of the guide vane; the outlet port is positioned above the guide vane, opened at the top plate of the case and connected with the nozzle; and the fluid having the flow direction reversed by the end port is made to flow into the inflow port in the other opening width of the guide vane.

[0019] In an embodiment, an inclined portion is provided at the part of connecting said pump housing and said duct, and said pump sends the fluid into said duct through said inclined portion.

[EFFECTS OF THE INVENTION]

[0020] According to the guide vane relating to this embodiment of the invention, the multiple pair structures are provided. Each of the pair structures comprises the first curvature or angular member having the prescribed height and the second curvature or angular member having the prescribed height. The first and second members of constructing the pair structure are arranged under a condition that the first and second members are shifted left or right in a view from the main flow direction of the melted fluid. The pair structures are stood on the board in the main flow direction of the fluid. The melted fluid is flowed into the opening formed by both the edges of said first and second members that face to each other. The molten inflow fluid is turned to change the fluid flow direction from the horizontal direction to the vertical direction.

[0021] In accordance with this structure, when the melted fluid flows into the opening formed by both the edges of the first and second members having inner surfaces faced each other, the melted fluid flowed in comes to turn in the pair structure comprising the first and second members to rise along the inner surfaces thereof. Thereby, the flow of the melted fluid flowed horizontally into the opening can be changed to the vertical direction flow. This guide vane is sufficiently applicable to the jetting apparatus.

[0022]

The jetting apparatus in embodiments of this invention comprises the guide vane in embodiments of the present invention and is adapted to change the flow direction of the melted fluid from the horizontal direction to the vertical direction in the duct. This constitution may enable the widthwise distribution of the melted fluid jetting height jetted

from the nozzle to be uniformized. Further, the tendency change of the widthwise distribution of the melted fluid from the pump output can be reduced.

[BRIEF DESCRIPTION OF DRAWINGS]

[0023]

FIG. 1 is a perspective view for showing a configuration example of a half-cylindrical guide vane 10 as the first embodiment according to the present invention.

FIG. 2 is a perspective view for showing a formation example of the guide vane 10.

FIG. 3 is a top view for showing an operation example of the guide vane 10.

FIG. 4A is a perspective view for showing a configuration example of a guide vane 20 having an L-shaped cross section according to a second embodiment.

FIG. 4B is a top view for showing an operation example of the guide vane 20 having an L-shaped cross section according to the second embodiment.

FIG. 5A is a perspective view for showing a configuration example of a guide vane 30 having a U-shaped cross section according to the third embodiment.

FIG. 5B is a top view for showing an operation example of the guide vane 30 having the U-shaped cross section according to the third embodiment.

FIG. 6 is a perspective view for showing a configuration example of a wave soldering apparatus 400 according to the fourth embodiment.

FIG. 7 is a perspective view for showing a configuration example of a jetting apparatus 40.

FIG. 8A is a top view for showing an assembling example of the guide vane 10 according to the jetting apparatus 40.

FIG. 8B is a front view for showing the assembling example of the guide vane 10 according to the jetting apparatus 40.

CLAIMS

1. A guide vane characterized in that multiple pair structures are provided; each of said structures comprises a first member having a curvature or angular inner surface shape and having a prescribed height and a second member having a curvature or angular inner surface shape and having a prescribed height; said first and second members of constructing said pair structure are arranged under a condition that said first and second members are shifted left or right in a view from a main flow direction of melted fluid; said pair structures are stood on a board in the main flow direction of the fluid; the fluid is flowed into an opening formed by edges of said first and second members; the flowed fluid is turned in said pair structure to change the fluid flow direction from a horizontal direction to a vertical direction.

~~2. (Deleted)~~

~~3. (Deleted)~~

42. The guide vane as recited in Claim 1, wherein each of said first member and said second member comprises any one of a half-cylindrical, L-shape cross section and U-shape cross section screen plate.

~~5~~3. The jetting apparatus, comprising:

a nozzle having a prescribed opening for jetting melted fluid;

a duct connected to said nozzle;

a pump for sending the fluid into said duct;

a pump housing receiving said pump and being connected to said duct; and

a guide vane described in any of Claims 1 or 4, said guide vane being provided in said duct and turning the flow direction of the fluid sent by said pump and flowed in the longitudinal direction of said duct to change the flow of the fluid to a height direction of said nozzle.

64. The jetting apparatus as recited in the Claim ~~53~~, wherein said duct is connected to said pump housing, the fluid is sent by said pump, an angle between the longitudinal direction of said duct and the longitudinal direction of said guide vane is set, and said guide vane is attached to said duct at the set angle.

75. The jetting apparatus as recited in Claim ~~64~~ characterized in that

said duct, to which the fluid is sent by said pump, includes a thin and long case having an inlet port, an outlet port, and an end port that are provided in prescribed places;

said inlet port is provided on one side of said case wherein said pump housing is connected to said inlet port;

an inflow regulating plate is provided on a prescribed place of said inlet port for regulating the fluid to flow into an inflow port in one opening width of said guide vane;

said outlet port is positioned above said guide vane, opened at a top plate of said case and connected with said nozzle; and

the fluid having the flow direction reversed by said end port is made to flow into an inflow port in the other opening width of said guide vane.

86. The jetting apparatus as recited in Claim ~~75~~, wherein an inclined portion is provided at the part of connecting said pump housing and said duct, and said pump sends the fluid into said duct through said inclined portion.