

DESCRIPTION

TITLE OF INVENTION

GROOVE FILLING MATERIAL DISPERSAL DEVICE AND SUBMERGED ARC

5 WELDING DEVICE

TECHNICAL FIELD

[0001]

10 The present invention relates to a groove filling material spraying device and a submerged arc welding device.

BACKGROUND ART

[0002]

15 Submerged arc welding is known as follows: In Submerged arc welding known, granular flux is sprayed to a weld portion so that the weld portion is previously covered with the granular flux and a welding wire is inserted into the flux to generate an arc between a member to be welded and the tip of the welding wire, thereby performing welding. Patent Literature 1 discloses a submerged arc welding device including a groove filling material spraying device, a flux spraying device and the like. The groove filling material spraying
20 device supplies a groove filling material to the groove portion in front of the torch in the welding advancing direction. The groove filling material levels off the unevenness in the groove due to a bead by temporary welding, the groove processing accuracy or the like to relieve the influence on the bead.

25 CITATION LIST

PATENT LITERATURE

[0003]

Patent Literature 1: JP-A-2008-238199

30 SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004]

However, in a case where submerged arc welding is performed while the groove

filling material is being sprayed, there is a problem in that the groove filling material is sprayed in an outside of a predetermined target position by the influence of a magnetic field formed by a welding current in welding. When the groove filling material is sprayed in the outside of the predetermined target position, the groove shape is not uniform, so that it is difficult to form a smooth bead surface.

[0005]

An object of the present invention is to provide a groove filling material spraying device and a submerged arc welding device which are capable of reducing the influence of magnetic field and surely spraying the groove filling material to a target position.

SOLUTION TO PROBLEM

[0006]

The present invention includes the following configurations.

A groove filling material spraying device used for a submerged arc welding device configured to weld a member to be welded while spraying a groove filling material to a groove of the member to be welded, the groove filling material spraying device including:

a communication passage through which the groove filling material is supplied to the groove, the communication passage including a spray port at an end of the communication passage; and

a magnetic shield portion disposed so as to cover the spray port side of the communication passage.

According to the groove filling material spraying device, since the magnetic shield portion is provided so as to cover the spray port side of the communication passage, the magnetic field caused by the welding current in arc welding is prevented from acting on the communication passage in the neighborhood of the spray port. Thereby, the groove filling material is restrained from partly lumping due to the influence of the magnetic field and clogging the communication passage, and is smoothly discharged from the spray port. As a result, the groove filling material can be supplied to the groove always at a constant rate, and the height thereof can be made uniform in the groove.

[0007]

Moreover, the magnetic shield portion of the groove filling material spraying device may be disposed so as to cover the spray port.

According to the groove filling material spraying device, since the magnetic shield

portion is disposed so as to cover the spray port, the groove filling material can be prevented from being influenced by the magnetic field during falling from the spray port to the groove. Thereby, the falling direction of the groove filling material can be prevented from being changed by the magnetic force, so that the groove filling material can be stably supplied to a target position.

[0008]

Moreover, the spray port of the groove filling material spraying device may be disposed so as to protrude from an end of the magnetic shield portion.

According to the groove filling material spraying device, since the spray port protrudes from the end of the magnetic shield portion, the spray port can be disposed close to the groove. Thereby, the groove filling material can be stably supplied to a target position.

[0009]

Moreover, the groove filling material spraying device may include a filling material supply adjustment portion configured to increase or decrease a spray amount of the groove filling material, the filling material supply adjustment portion being disposed in the middle of the communication passage.

According to the groove filling material spraying device, insufficiency of the supply amount of the groove filling material and spray of wasteful groove filling material in more than necessary amount are prevented, so that an appropriate amount of groove filling material can be always supplied.

[0010]

Moreover, the groove filling material spraying device may be provided as follows. The communication passage of the groove filling material spraying device has an upstream side passage and a downstream side passage, the filling material supply adjustment portion has a rotor interposed between the upstream side passage and the downstream side passage and a motor to drive a rotor rotation shaft of the rotor, and a plurality of filling material pockets are formed on a rotor outer peripheral surface exposed to the communication passage in a circumferential direction of the rotor, and the groove filling material which is supplied from the upstream side passage and with which the filling material pockets are filled is supplied to the downstream side passage in response to rotation of the rotor.

According to the groove filling material spraying device, when the rotor is rotated, the filling material pocket situated at the upstream side passage is moved from the exit of the upstream side passage, so that the groove filling material having entered the filling material

pocket falls to the downstream side passage. Thereby, the groove filling material with an amount proportional to the rotational speed (number of rotations) of the rotor can be supplied to the groove, and the spray amount of the groove filling material to the groove can be controlled with a simple structure and with accuracy and ease.

5 [0011]

Moreover, the present invention may be a submerged arc welding device including the above-described groove filling material spraying device.

According to the submerged arc welding device, the groove filling material is hardly influenced by the magnetic field because of the groove filling material spraying device,
10 so that the groove filling material is sufficiently supplied to a target position of the groove. As a result, a uniform and smooth bead surface can be formed.

ADVANTAGEOUS EFFECTS OF INVENTION

[0012]

15 According to the present invention, the influence of the magnetic field can be reduced and the groove filling material can be surely sprayed to a target position. Thereby, a uniform and smooth bead surface can be formed.

BRIEF DESCRIPTION OF DRAWINGS

20 [0013]

[FIG. 1] FIG. 1 is a side view of a submerged arc welding device including a groove filling material spraying device for explaining an embodiment of the present invention.

[FIG. 2] FIG. 2 is a perspective view of the groove filling material spraying device shown in FIG. 1.

25 [FIG. 3] FIG. 3 is an enlarged perspective view of the neighborhood of a magnetic shield portion shown in FIG. 2.

[FIG. 4] FIG. 4 is a longitudinal cross-sectional view of a magnetic shield portion viewed from a direction V in FIG. 3.

[FIG. 5] FIG. 5 is a relevant part enlarged view of a filling material supply
30 adjustment portion shown in FIG. 2.

[FIG. 6] FIG. 6 is a perspective view of a rotor shown in FIG. 5.

DESCRIPTION OF EMBODIMENTS

[0014]

Hereinafter, an embodiment of the present invention will be described in detail with reference to the drawings.

FIG. 1 is a view a side view of a submerged arc welding device including a groove
5 filling material spraying device for describing the embodiment of the present invention.

The submerged arc welding device 100 includes the groove filling material spraying device 200. The groove filling material spraying device 200 supplies a groove filling material to the groove of a steel plate 15 as a member to be welded, in front of torches in the welding advancing direction.

10 [0015]

First, the basic configuration of the submerged arc welding device 100 will be described.

The steel plate 15 is conveyed on a non-illustrated conveyer to a predetermined welding position, and is disposed so that the weld line thereof extends in the horizontal
15 direction of FIG. 1.

[0016]

In the submerged arc welding device 100, a support member 17 is supported on a running carriage (not shown) on a welding machine running beam, and is reciprocated in the horizontal direction of FIG. 1. Therefore, the support member 17 is movable to a
20 predetermined welding position along the weld line of the steel plate 15.

[0017]

On the support member 17, a first torch 27 having a first electrode 19, a second torch 29 having a second electrode 21 and a third torch 31 having a third electrode 23 are disposed in series in the welding direction. The first torch 27, the second torch 29 and the
25 third torch 31 are fixed to a rack 25 with which the support member 17 is provided. To the first electrode 19, the second electrode 21 and the third electrode 23, welding wires are fed toward a groove 11 of the steel plate 15 (see FIG. 2) from the first torch 27, the second torch 29 and the third torch 31, respectively.

[0018]

To the support member 17, a support arm 40 is fixed to a front part of the rack 25 in the welding direction. In front of the support arm 40 in the welding direction, an end detector 33 that detects the end of the steel plate 15 is disposed. The end detector 33 is provided with a rotation shaft 35 fixed to the support arm 40, an arm 37 rotatably supported

by the rotation shaft 35, a sensor 39 attached to the end of the arm 37 and an arm driving actuator 41 that rotates the rotation shaft 35. The driving force of the arm driving actuator 41 is transmitted to the rotation shaft 35 through an appropriate speed reducer, and rotates the arm 37 between a horizontal position (operating mode) and a vertical position (retracting mode). The end position information detected by the sensor 39 is used for the control of the end timing of the welding along the weld line by the first torch 27, the second torch 29 and the third torch 31.

[0019]

Behind the end detector 33 of the support arm 40, a tracking detector 47 is disposed. The tracking detector 47 moves in the groove along the weld line by being guided by the groove 11, thereby detecting the position of this weld line. By the tracking detector 47, the first torch 27, the second torch 29 and the third torch 31 are controlled so that they can surely move along the weld line. Thereby, the welding wires fed from the first torch 27, the second torch 29 and the third torch 31 are surely supplied into the groove. The tracking detector 47 is also attached to a fixing member 42 so as to be movable up and down by an appropriate driving device.

[0020]

On the first torch 27, a flux spraying nozzle 51 is disposed on the front side in the welding direction, and on the third torch 31, a flux spraying nozzle 53 is disposed on the front side in the welding direction. The flux spraying nozzle 51 sprays flux to the front of the first electrode 19 and the second electrode 21 in the welding direction, and the flux spraying nozzle 53 sprays flux to the front of the third electrode 23 in the welding direction.

[0021]

Behind the rack 25 of the support member 17 in the welding direction, a flux collecting portion 49 is disposed. Of the flux sprayed onto the groove from the flux spraying nozzle 51 and the flux spraying nozzle 53, the flux unmelted in welding and remaining is sucked for collecting by the flux collecting portion 49 after welding. The flux collecting portion 49 is provided with: a flux collecting nozzle 55 to suck flux; a support portion 59 that supports the flux collecting nozzle 55 so as to be swingable within a predetermined range through a swing shaft 57; a guide rail 61 extending in the vertical direction; a slider 63 to which the support portion 59 is fixed and which slides on the guide rail 61; and a cylinder 67 in which an end of a cylinder rod 65 is coupled to the slider 63.

[0022]

When the cylinder rod 65 is retracted by the driving of the cylinder 67, the slider 63 coupled to the cylinder rod 65 moves upward along the guide rail 61. On the other hand, when the cylinder rod 65 is advanced by the driving of the cylinder 67, the slider 63 descends along the guide rail 61, so that the lower end of the flux collecting nozzle 55 is situated on the groove. The flux collecting nozzle 55 is situated on the groove behind the third electrode 23 on the weld line in the welding direction in the operating mode, and ascends along the guide rail 61 together with the slider 63 in the retracting mode.

[0023]

The submerged arc welding device 100 of the above-described configuration is provided with a non-illustrated control unit. The control unit is disposed to control the followings, based on an end detection signal from the sensor 39 of the end detector 33, according to a predetermined sequence: driving of the arm 37 of the end detector 33; ascent of the tracking detector 47; supply of a groove filling material 13 from a hopper 43 described later; the welding conditions of the first electrode 19, the second electrode 21 and the third electrode 23; and ascent of the flux collecting nozzle 55.

[0024]

Next, the configuration of the groove filling material spraying device 200 will be described.

FIG. 2 is a perspective view of the groove filling material spraying device shown in FIG. 1, and FIG. 3 is an enlarged perspective view of the neighborhood of a magnetic shield portion shown in FIG. 2.

The groove filling material spraying device 200 includes: the hopper 43; a communication passage formed of an upstream side passage 75 and a downstream side passage 77; a filling material supply adjustment portion 73; and a filling material spraying portion 45 having a magnetic shield portion 71. The filling material supply adjustment portion 73 has a function of increasing and decreasing the spray amount of the groove filling material 13. The filling material spraying portion 45 has a hollow cylindrical copper nozzle member 91 having one end portion thereof connected to the downstream side passage 77 and the other end portion thereof connected to a spray port 69 (see FIG. 3). The magnetic shield portion 71 is disposed so as to cover the spray port 69 side of the communication passage.

[0025]

Specifically, on the support member 17 shown in FIG. 1, the hopper 43 storing the groove filling material is set on the front surface of the rack 25. To the lower end of the

hopper 43, the upstream side passage 75 as the base end portion of the communication passage is connected. The upstream side passage 75 communicates with the upper part of the filling material supply adjustment portion 73. The filling material supply adjustment portion 73 is fixed to an adjustment portion arm 85 provided in front of the support member 17 in the welding direction. The lower part of the filling material supply adjustment portion 73 communicates with the downstream side passage 77. The downstream side passage 77 is connected to the filling material spraying portion 45 disposed behind the tracking detector 47 in the welding direction, via the fixing member 42 fixed to the support arm 40. The filling material spraying portion 45 is supported by a support pipe 87 fixed to the fixing member 42. The downstream side passage 77 is formed of a flexible resin or a rubber hose.

[0026]

The end of the other end portion of the filling material spraying portion 45 is disposed so as to face the groove 11 shown in FIG. 2 in front of the first electrode 19 in the welding direction. Therefore, the groove of the steel plate 15 is filled with the groove filling material that is fed from the hopper 43 from the end of the filling material spraying portion 45. The groove filling material with which the groove is filled uniformly covers the groove 11 to reduce the unevenness of the groove shape.

[0027]

The filling material supply adjustment portion 73 is provided in the middle of the communication passage coupling the hopper 43 and the filling material spraying portion 45. That is, on a motor bracket 79 attached to the adjustment portion arm 85 (see also FIG. 1), a pair of upper and lower flanges 83A and 83B are provided, and to the pair of flanges 83A and 83B, a casing 81 of the filling material supply adjustment portion 73 is fixed. To the casing 81, a speed reducer 110 and a rotor driving motor 111 are attached.

[0028]

On the filling material spraying portion 45, the support pipe 87 fixed to the fixing member 42 (see FIG. 1) is juxtaposed. To the lower end of the downstream side passage 77, the upper end portion of the nozzle member 91 is connected.

[0029]

To the lower end portion of the support pipe 87, a nozzle position adjustment metal fitting 89 is attached so as to be slidable along the longitudinal direction of the support pipe 87. The nozzle position adjustment metal fitting 89 integrally supports the nozzle member 91. The lower end portion of the nozzle member 91 is the spray port 69, and the upper end

portion thereof is an insertion port slidably inserted into the downstream side passage 77. The nozzle member 91 can be positioned with a desired clearance from the steel plate 15 by fixing or unfixing the vertical position of the nozzle member 91 with respect to the support pipe 87 by a nozzle fixing knob 93 of the nozzle position adjustment metal fitting 89.

- 5 Instead of the nozzle member 91, the hose end of the downstream side passage 77 may be extended as it is and disposed.

[0030]

- To the support pipe 87, a magnetic shield position adjustment metal fitting 95 is attached below the nozzle position adjustment metal fitting 89 so as to be slidable in the longitudinal direction of the support pipe 87. The magnetic shield position adjustment fitting 95 supports the cylindrical magnetic shield portion 71. The magnetic shield portion 71 is made of a steel material, and is disposed so as to coaxially cover the outer peripheral surface of the spray port 69 of the nozzle member 91. The magnetic shield portion 71 can be positioned with a desired clearance from the steel plate 15 by fixing or unfixing the vertical position of the magnetic shield portion 71 with respect to the support pipe 87 by a shield fixing knob 97 of the magnetic shield position adjustment fitting 95.

[0031]

- That is, the magnetic shield portion 71 is configured so that the position (the distance L in FIG. 4) relative to the spray port 69 with respect to the steel plate 15 can be easily changed by adjusting the position along the support pipe 87 of the magnetic shield position adjustment metal fitting 95. Therefore, the magnetic shield portion 71 can be extended to the steel plate 15 side of the spray port 69, and the nozzle member 91 can be easily extended from the lower end of the magnetic shield portion 71 by disposing the magnetic shield portion 71 on the side opposite to the steel plate 15 side of the spray port 69.

25 [0032]

- The magnetic shield portion 71 is used for intercepting the magnetic field generated from the first torch 27, the second torch 29 and the third torch 31 (see FIG. 1). In case the magnetic shield portion 71 is provided in the magnetic field, the lines of magnetic force pass in a state of concentrating on the magnetic shield portion 71 itself. For this reason, the magnetic shield portion 71 can prevent the groove filling material 13 such as granular iron existing inside the cylinder from being influenced by the magnetic field. Thereby, inside the cylinder of the magnetic shield portion 71, the magnetic field is intercepted, so that the magnetic force acting on the groove filling material 13 passing through the inside of the

cylinder is reduced.

[0033]

On the outer periphery of the magnetic shield portion 71, a leveling plate fixing metal fitting 101 is attached as required, and a leveling plate 99 is fixed to the leveling plate fixing metal fitting 101. This leveling plate fixing metal fitting 101 also becomes slidable in the vertical direction with respect to the magnetic shield portion 71 by fixing and unfixing a leveling plate fixing knob 103.

The leveling plate 99 has a tapered shape in which the width gradually decreases toward the lower end, and has a flat portion 105 at the end.

[0034]

FIG. 4 is a longitudinal cross-sectional view of the magnetic shield portion 71 viewed from the direction V in FIG. 3.

The flat portion 105 of the leveling plate 99 becomes insertable into the groove 11 by a slide in the vertical direction. When the leveling plate 99 is attached, the groove filling material 13 put on the groove 11 can be further leveled to a desired height from the bottom portion of the groove 11 by the flat portion 105.

[0035]

It is preferable that the magnetic shield portion 71 is disposed separately (at a distance d) from the outer peripheral surface of the nozzle member 91.

[0036]

Next, the filling material supply adjustment portion 73 will be described.

FIG. 5 is an enlarged view of the main part of the filling material supply adjustment portion 73 shown in FIG. 2.

The filling material supply adjustment portion 73 is provided with a casing 81, a rotor 107, a speed reducer 110, and a rotor driving motor 111. The rotor 107 is received inside the casing 81. The rotor 107 received inside the casing 81 is interposed between the upstream side passage 75 and the downstream side passage 77 of the communication passage. A rotor rotation shaft 109 configured to rotate the rotor 107 is disposed in a direction orthogonal to the extension direction of the upstream side passage 75 and the downstream side passage 77 (the vertical direction in FIG. 5). To the rotor rotation shaft 109, the rotor driving motor 111 is connected via the speed reducer 110 fixed to the motor bracket 79.

[0037]

The motor 111 is driven by a non-illustrated control unit. The filling material

supply adjustment portion 73 is capable of increasing and decreasing the supply amount of the groove filling material 13 from the nozzle member 91 shown in FIG. 3 depending on the rotational speed (number of rotations) of the motor 111. The control unit controls the increase/decrease of the rotational speed (number of rotations) of the motor 111 depending on the spray height of the groove filling material 13 inside the groove 11, the running speed of the submerged arc welding device 100 and the like.

[0038]

FIG. 6 is a perspective view of the rotor 107 shown in FIG. 5.

On the rotor 107, a plurality of filling material pockets 115 are formed on a rotor outer peripheral surface 113 exposed to the communication passage in a circumferential direction of the rotor 107. The rotor 107 is capable of substantially closing the upstream side passage 75 with the rotor outer peripheral surface 113 so that free fall of the groove filling material 13 can be prevented inside the casing 81 shown in FIG. 5. That is, on the rotor outer peripheral surface 113 facing the exit of the upstream side passage 75, the filling material pockets 115 are situated, and the groove filling material 13 falling through the upstream side passage 75 is accommodated in these filling material pockets 115. The groove filling material 13 never falls in an amount larger than the capacity of the filling material pockets 115. By the rotor 107 being rotated, the filling material pockets 115 accommodating the groove filling material 13 move downward, so that the groove filling material 13 accommodated in the filling material pockets 115 is discharged to the downstream side passage 77. Thereby, in a state where the rotor 107 is stationary, the groove filling material 13 is not discharged to the downstream side passage 77, and when the rotor 107 is rotating, the groove filling material 13 of an amount depending on the rotational speed (number of rotations) of the rotor 107 is supplied to the downstream side passage 77.

[0039]

Next, the basic operation of the submerged arc welding device 100 having the above-described configuration will be described.

As shown in FIG. 1, in the submerged arc welding device 100, when welding is started, the first electrode 19, the second electrode 21 and the third electrode 23 are set on the tab plate of the welding start end portion. Thereby, the preceding end detector 33 and tracking detector 47 are set on the steel plate 15. In this state, the flux collecting nozzle 55 is in a state of being retracted upward.

[0040]

When welding is started, the submerged arc welding device 100 runs in the welding advancing direction while continuing welding with the first electrode 19, the second electrode 21 and the third electrode 23. In this welding, welding wires fed from the first electrode 19, the second electrode 21 and the third electrode 23 are inserted into the groove 11 of the steel plate 15. In a position anterior to the first electrode 19 in the welding direction, flux is sprayed to the groove 11 from the flux spraying nozzle 51, and in a position further anterior to the flux spraying nozzle 51 in the welding direction, the groove filling material 13 is supplied to the groove 11 from the filling material spraying portion 45 of the groove filling material spraying device 200. Therefore, inside the groove 11, the groove filling material 13 and the flux are laminated. When the welding wires fed from the first electrode 19, the second electrode 21 and the third electrode 23 are inserted into the groove 11, the ends of the welding wires are inserted into the flux piled on the groove filling material 13 to perform arc discharge.

[0041]

When the flux collecting nozzle 55 reaches the neighborhood of the formation starting point of a weld bead, the flux collecting nozzle 55 is lowered by a manual switch, and collecting of the flux that is no longer necessary is started.

[0042]

In the groove filling material spraying device 200, the spray port 69 of the groove filling material 13 (see FIG. 3) is disposed in the front of the submerged arc welding device 100 in the welding direction, and prior to welding, the groove filling material 13 is supplied to the groove 11. That is, the groove filling material 13 supplied into the hopper 43 passes through the communication passage to be sprayed from the spray port 69 to the groove 11 of the steel plate 15.

[0043]

Behind the groove filling material spraying device 200 in the welding direction, the flux spraying nozzle 51, the first electrode 19, the second electrode 21, the flux spraying nozzle 53 and the third electrode 23 are disposed in this order. Therefore, flux is heaped on the groove filling material 13 supplied to the bottom portion of the groove 11, and each of the welding wires protruding from the first electrode 19, the second electrode 21 and the third electrode 23 is inserted into the flux.

[0044]

There are cases where as shown in FIG. 4, a temporarily welded weld portion

becomes a convex portion 117 and partially exists at the bottom portion of the groove 11. In those cases, the convex portion 117 is filled in by the sprayed groove filling material 13, so that the surface of the groove filling material 13 becomes flat. Moreover, there are cases where the surface of the groove filling material 13 sprayed on the convex portion 117 is upheaved more than the part where no convex portion 117 exists. Even when this upheaval occurs, it is surely flattened by the leveling plate 99 attached immediately behind the spray port 69 in the welding direction. As a result, unevenness of the groove shape is removed, which enables stable formation of a bead.

[0045]

The groove filling material 13 passing through the communication passage to be sprayed from the spray port 69 is influenced by the magnetic field caused by the welding current supplied to the welding wires by the first electrode 19, the second electrode 21 and the third electrode 23 in the rear in the welding direction. The groove filling material 13 having been influenced by the magnetic field is lumped, for example by the magnetic attractive force, within the communication passage and clogs the communication passage. As a result, the groove filling material 13 is not sprayed, or even if sprayed, it is not sufficiently supplied to a target position of the groove 11. If the groove filling material 13 becomes insufficient because of these causes, the sprayed flux is heaped unevenly. As a result, a smooth bead surface is not formed.

[0046]

Therefore, in the groove filling material spraying device 200 of this configuration, the outer peripheral surface of the spray port 69 of the nozzle member 91 is covered with the magnetic shield portion 71. For this reason, the magnetic shield portion 71 restrains the magnetic field caused by the welding current in welding from acting on the communication passage on the side of the spray port 69. Thereby, the groove filling material 13 is smoothly discharged from the spray port 69 without influenced by the magnetic field, and is supplied to the groove 11 always in a constant supply amount. As a result, the groove filling material 13 can be filled always at a uniform height. The leveling plate 99 is not always necessary, and if the groove filling material 13 can be stably supplied in a desired supply amount, the groove filling material 13 is heaped substantially flatly in the groove 11.

[0047]

In the groove filling material spraying device 200, when the magnetic shield portion 71 is extended from the spray port 69 of the nozzle member 91 toward the steel plate 15, the

groove filling material 13 can be restrained from being influenced by the magnetic field also from when it is at the spray port 69 to when it is inserted into the groove 11. Thereby, the falling direction of the groove filling material 13 can be restrained from being changed by the magnetic force in the middle of falling after the groove filling material 13 exits from the spray port 69 toward the groove 11. As a result, a predetermined target position can be filled with the groove filling material 13 with high accuracy without any waste.

[0048]

Further, in the groove filling material spraying device 200, the increase and decrease of the supply amount of the groove filling material 13 can be appropriately adjusted by providing the filling material supply adjustment portion 73.

In the filling material supply adjustment portion 73, the movement of the groove filling material 13 is stopped by the rotor 107 disposed at the exit of the upstream side passage 75. When the rotor 107 is rotated, the filling material pocket 115 situated at the upstream side passage 75 is separated from the exit of the upstream side passage 75, so that the groove filling material 13 having entered the filling material pocket 115 falls to the downstream side passage 77. Thereby, the groove filling material 13 proportional to the rotational speed (number of rotations) of the rotor 107 can be supplied to the groove 11, and the spray amount of the groove filling material 13 to the groove 11 can be controlled with a simple structure and with accuracy and ease.

[0049]

In this manner, the filling material supply adjustment portion 73 can prevent undersupply and oversupply of the groove filling material 13 to the groove 11, and can prevent the welding speed from being reduced in order to obtain a required sufficient supply amount and prevent wasteful spraying more than necessary.

[0050]

In the submerged arc welding device 100 according to the present configuration, the groove filling material 13 becomes less likely to be influenced by the magnetic field by the groove filling material spraying device 200, so that a desired amount of the groove filling material 13 is always surely supplied to a target position of the groove 11. For this reason, the groove filling material 13 is uniformly disposed in the welding direction inside the groove 11. As a result, stable arc welding can be performed, and a uniform and smooth bead surface can be formed.

[0051]

The present invention is not limited to the above-described embodiment but combining the configurations of the embodiment with each other, and modifications and applications by one of ordinary skill in the art based on the description of the specification and known art are also what the present invention targets and are embraced in the scope the protection of which is claimed.

[0052]

The present application is based on Japanese Patent Application No. 2017-57808 filed on March 23, 2017, the contents of which are incorporated herein by reference.

10 REFERENCE SIGNS LIST

[0053]

- 11 Groove
- 13 Groove filling material
- 15 Steel plate (member to be welded)
- 15 41 Arm driving actuator
- 45 Filling material spraying portion
- 69 Spray port
- 71 Magnetic shield portion
- 73 Filling material supply adjustment portion
- 20 75 Upstream side passage (communication passage)
- 77 Downstream side passage (communication passage)
- 100 Submerged arc welding device
- 107 Rotor
- 109 Rotor rotation shaft
- 25 113 Rotor outer peripheral surface
- 115 Filling material pocket
- 200 Groove filling material spraying device

CLAIMS

[Claim 1]

A groove filling material spraying device used for a submerged arc welding device configured to weld a member to be welded while spraying a groove filling material to a

5 groove of the member to be welded, the groove filling material spraying device comprising:

a communication passage through which the groove filling material is supplied to the groove, the communication passage comprising a spray port at an end of the communication passage; and

10 a magnetic shield portion disposed so as to cover the spray port side of the communication passage.

[Claim 2]

The groove filling material spraying device according to Claim 1, wherein the magnetic shield portion is disposed so as to cover the spray port.

[Claim 3]

15 The groove filling material spraying device according to Claim 1, wherein the spray port is disposed so as to protrude from an end of the magnetic shield portion.

[Claim 4]

The groove filling material spraying device according to any one of Claims 1 to 3, comprising a filling material supply adjustment portion configured to increase or decrease a
20 spray amount of the groove filling material, the filling material supply adjustment portion being disposed in the middle of the communication passage.

[Claim 5]

The groove filling material spraying device according to Claim 4, wherein:
the communication passage comprises an upstream side passage and a downstream
25 side passage;

the filling material supply adjustment portion comprises a rotor interposed between the upstream side passage and the downstream side passage and a motor to drive a rotor rotation shaft of the rotor; and

a plurality of filling material pockets are formed on a rotor outer peripheral surface
30 exposed to the communication passage in a circumferential direction of the rotor, and the groove filling material which is supplied from the upstream side passage and with which the filling material pockets are filled is supplied to the downstream side passage in response to rotation of the rotor.

[Claim 6]

A submerged arc welding device, comprising the groove filling material spraying device according to any one of Claims 1 to 3.

[Claim 7]

5 A submerged arc welding device, comprising the groove filling material spraying device according to Claim 4.

[Claim 8]

A submerged arc welding device, comprising the groove filling material spraying device according to Claim 5.