

WELDING WIRE CONTAINER

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a welding wire container that houses a coil of a welding wire therein, and an in-container welding wire. More particularly, the present invention relates to a welding wire container that is applicable to a welding wire that is large in the rigidity of
10 a solid wire.

2. Description of the Related Art

As a container that houses a welding wire such as a solid wire or a flux cored wire, a welding wire container that is shaped in a bottomed cylinder has been generally employed (For
15 example, refer to JP 59-8474B and JP 3-34424B). Fig. 34 is a perspective view schematically showing the conventional welding wire container. Fig. 35 is a cross-sectional view of the conventional welding wire container shown in Fig. 34, and Fig. 36 is a perspective view showing only a retainer plate.
20 As shown in Figs. 34 and 35, the conventional in-container welding wire is winded and housed within the container in such a manner that a welding wire 100a moves its central axis along a circular locus. The container has a bottom plate 105 that forms a bottom portion held in an interior of an outer cylinder

101. In the conventional welding wire container, an inner cylinder 106 that is smaller in the diameter than the outer diameter 101 may be disposed coaxially with the outer cylinder 101.

5 Normally, the in-container welding wire is unwound in a state where the welding wire is housed in the container. For that reason, the welding wire 100a may intertwine or get tangled when being unwound. Under the circumstances, in the conventional in-container welding wire, an annular retainer
10 plate 102 shown in Fig. 36 is mounted on the welding wire coil 100. The welding wire coil 100 is pressed downward by means of the retainer plate 102, to thereby prevent the unwound wire from being protruded and intertwining.

The retainer plate 102 in the conventional welding wire
15 container has an outer diameter that is slightly smaller than an inner diameter of the outer cylinder 101. In the case of the container having an inner cylinder therein, an inner diameter of the retainer plate 102 is slightly larger than an outer diameter of the inner cylinder 106. The welding wire
20 100a is unwound from a gap defined between the inner cylinder 106 and the retainer plate 102. Because the retainer plate 102 can move vertically, even if the height of the welding wire coil 100 changes as the welding wire 100a is unwound, the retainer plate 102 is always mounted on the welding wire coil

100.

Conventionally, in order to prevent the welding wire from intertwining during unwinding, there has been proposed a retainer plate having a plurality of introverted elastic pieces
5 disposed on a vertical wall portion that is shaped in a band plate (refer to JP 10-218493A). The retainer plate is annularly rounded. The retainer plate is mounted on the welding wire coil in such a manner that the vertical wall portion is in contact with an inner surface of the outer
10 cylinder, and the introverted elastic pieces are in contact with an upper surface of the welding wire, respectively. The welding wire is pulled upward while being in contact with edge portions of the introverted elastic pieces of the retainer plate.

15 In the conventional welding wire container, it is necessary to prevent the welding wire from being protruded from a gap defined between the retainer plate 102 and the outer cylinder 101 in Figs. 34 and 35. To achieve this, a plurality of strings 108 that extend in the height direction of the outer
20 cylinder 101 are disposed between each of the retainer plate 102 and the welding wire coil 100, and the outer cylinder 101. In addition, a ring 103 that is circular in the vertical cross section is disposed above the retainer plate 102. The ring 103 is disposed between the strings 108 and the outer cylinder

101 so as to be coaxial with the outer cylinder 101. The ring
103 is held on the retainer plate 102 through the strings 108,
and travels while following the retainer plate 102. In
addition, in the case where the welding wire is uninterruptedly
5 unwound, in order to smoothly shift from the current container
to a succeeding container, a winding leading edge of the welding
wire 100a, that is, an unwound trailing edge of the welding
wire 100a is locked by means of a plurality of clamps 107
disposed on an upper portion of an inner surface of the outer
10 cylinder 101. With this structure, the unwound trailing edge
(winding leading edge) is connected to the unwound leading edge
of the welding wire 100a to be subsequently unwound which is
housed in the container. As a result, a plurality of in-
container welding wires can be consecutively unwound (refer
15 to JP 1-15353B).

However, in the conventional container for housing the
welding wire, as shown in Fig. 35, a lower end portion of the
outer cylinder 101 is so caulked as to fit the bottom plate
105 to the lower end portion of the outer cylinder 101. The
20 caulked portion facilitates the positioning of the bottom plate
105 when the bottom plate is inserted into the outer cylinder
101, and aids a curling process for fixing the bottom plate
105 by applying a guide. However, when the welding wire coil
100a is unwound, the retainer plate 102 is unavoidably held

by the caulked portion that is smaller in the inner diameter than other portions of the outer cylinder 101. For that reason, the welding wire coil 100 that is located below the caulked portion cannot be held down by the retainer plate 102. As a
5 result, there arises such a problem that the wire situated between the caulked portion and the bottom plate 105 is protruded, thereby intertwining and scattering the welding wire.

Under the above circumstances, a method in which a plate
10 or the like is stacked on the bottom plate 105 so as to raise the bottom of the container has been studied. Fig. 37 is a cross-sectional view showing a welding wire container whose bottom is raised. In the welding wire container shown in the figure, a disk 109 is joined to an upper surface of the bottom
15 plate 105 with an adhesive or the like. The disk 109 has an outer diameter as that can be inserted into the caulked portion and a thickness that is equal in the dimension to the height of the caulked portion. With the above structure, the bottom of the container is raised, and the upper surface of the welding
20 wire at the lowermost layer thereof is above the caulked portion. As a result, the welding wire can be held down to the lowermost layer by the retainer plate 102.

Also, there has been studied a welding wire container having a retainer plate in which a plurality of rectangular

blade members are attached to an annular plate 121 so as to project from an inner side and an outer side of the annular plate 121. The annular plate 121 has an inner diameter which is smaller than an outer diameter of the inner cylinder and an outer diameter which is smaller than the smallest inner diameter of the outer cylinder (refer to JP 2-147566A). Fig. 38 is a plan view showing a retainer plate of the welding wire container. A retainer plate 120 is so designed as to press down a welding wire coil by means of the annular plate 121 and to prevent the welding wire at the outer cylinder side and the inner cylinder side from being protruded by means of the retainer plate 122. The retainer plate 120 has the outer diameter which is smaller than the inner diameter of the caulked portion so as to enter the caulked portion. As a result, the retainer plate 120 can hold the welding wire down to the lowermost layer thereof.

However, the above-mentioned conventional welding wire container suffers from the following problems. The conventional welding wire container having the bottom raised as shown in Fig. 37 can hold the welding wire coil 100 down to the lowermost layer thereof by means of the retainer plate 102. However, the conventional welding wire container suffers from such a problem that a gap is defined between the disk 109 and the outer cylinder 101, and the wire gets stuck in the gap,

to thereby stop the feed of the wire. In this manner, there is a case in which the residual amount of welding wire coil is reduced, and such a trouble that the supply of the welding wire stops transpires in the vicinity of the bottom portion of the container. In this case, when a plurality of in-
5 container welding wires are consecutively employed, all of the welding wire that is housed in the container cannot smoothly be pulled out, and it gets impossible to shift from the present container to a subsequent container. Also, it is possible that
10 the bottom of the container is set above the caulked portion by increasing the thickness of the disk 109, to thereby eliminate the gap between the disk 109 and the inner surface of the outer cylinder 1. However, when the raised amount of bottom increases, the amount of wire that can be housed in the
15 container is reduced. As a result, the workability in use is deteriorated, and the manufacturing costs increase. Thus, the above conventional welding wire container is not preferred.

In addition, in the welding wire container having the retainer plate 120 shown in Fig. 38, a portion between the
20 retainer plate 120 of the welding wire coil and the outer cylinder is merely held at several positions by means of the blade members 122. For that reason, there is a risk that the welding wire at the outer cylinder side is protruded. Moreover, the retainer plate 120 travels downward while the blade members

122 that are projected toward the inner side are in contact with the outer surface of the inner cylinder, and the blade members 122 that are projected toward the outer side are in contact with the inner surface of the outer cylinder. For that
5 reason, there arises such a problem that the retainer plate 120 is liable to be obliquely inclined, and the wire is liable to intertwine and get tangled.

SUMMARY OF THE INVENTION

10 The present invention has been made in view of the problems with the conventional container, and therefore an object of the present invention is to provide a welding wire container which makes it possible to smoothly unwind a welding wire down to a lowermost layer of the welding wire without any
15 occurrence of intertwining or tangling.

In order to achieve the above object, according to a first aspect of the present invention, there is provided a welding wire container in which a welding wire coil is housed, comprising: a paper outer cylinder; a bottom plate that is held
20 by an inner portion of the outer cylinder at a caulked portion of a lower portion of the outer cylinder, and forms a bottom portion; a retainer jig that is mounted on the welding wire coil and travels downward with a reduction in the filler coil wire; and an annular member that is mounted on the retainer

jig and has an outer diameter which is smaller than the smallest inner diameter of the outer cylinder. The retainer jig comprises a tube portion that is formed by rolling up a band-like member and has an adjustable diameter, and a
5 plurality of blade portions that extend from an inner edge of a lower portion of the tube portion toward a center of the tube portion. When the welding wire is pulled out of the container, the annular member serves as a plummet to the retainer jig.

In order to achieve the above object, according to a
10 second aspect of the present invention, there is provided a welding wire container in which a welding wire coil is housed, comprising: a paper outer cylinder; a bottom plate that is held by an inner portion of the outer cylinder at a caulked portion of a lower portion of the outer cylinder, and forms a bottom
15 portion; and a retainer jig that is mounted on the welding wire coil and travels downward with a reduction in the filler coil wire. The retainer jig comprises two annular portions on an upper surface side and a lower surface side thereof. An outer diameter of the annular portion at the lower surface side is
20 smaller than the smallest inner diameter of the outer cylinder. An outer diameter of the annular portion at the upper surface side is larger than the smallest inner diameter of the outer cylinder and smaller than the largest inner diameter of the outer cylinder.

In order to achieve the above object, according to a third aspect of the present invention, there is provided a welding wire container in which a welding wire coil is housed, comprising: a paper outer cylinder; a bottom plate that is held
5 by an inner portion of the outer cylinder at a caulked portion of a lower portion of the outer cylinder, and forms a bottom portion; and a retainer jig that is mounted on the welding wire coil and travels downward with a reduction in the filler coil wire. The retainer jig comprises an annular plate having an
10 outer diameter that is smaller than the smallest inner diameter of the outer cylinder. A plurality of blade portions are disposed on the annular plate so as to project upward and extend in a circumferential direction of the annular plate.

In the present invention, the retainer jig travels while
15 being in contact with the inner surface of the outer cylinder. With this structure, the welding wire at the outer cylinder side can be prevented from being protruded. As a result, even if the bottom is not raised as in the conventional welding wire container, the welding wire can be smoothly unwound down to
20 the lowermost layer of the welding wire without intertwining or getting tangled.

Also, in the first aspect of the present invention, the outer diameter of the annular member is smaller than the inner diameter of the caulked portion of the outer cylinder. For

that reason, even in the case where the tube portion cannot travel downward from the caulked portion when the welding wire is unwound, the blade portions and the annular member can enter a portion below the caulked portion, and can hold the welding wire coil down to a position lower than the caulked portion. As a result, it is possible to smoothly unwind a welding wire down to the lowermost layer of the welding wire without any occurrence of intertwining or tangling.

In addition, in the above second aspect of the present invention, the outer diameter of the annular portion at the lower surface side is smaller than the smallest inner diameter of the outer cylinder. For that reason, even in the case where the tube portion cannot travel downward from the caulked portion when the welding wire is unwound, the annular portion at the lower surface side can enter the caulked portion and can hold down the welding wire coil at a position of or lower than the caulked portion. As a result, it is possible to smoothly unwind the welding wire down to the lowermost layer of the welding wire without intertwining or getting tangled even if the bottom is not raised as in the conventional welding wire container.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of this invention

will become more fully apparent from the following detailed description taken with the accompanying drawings in which:

Fig. 1A is a cross-sectional view showing a welding wire container in accordance with an embodiment of a first aspect
5 of the present invention, and Fig. 1B is a plan view thereof;

Fig. 2 is a perspective view showing the configurations of a retainer jig and an annular plate shown in Figs. 1A and 1B;

Fig. 3 is an enlarged perspective view showing the
10 configuration of blade portions of the retainer jig;

Figs. 4A and 4B are enlarged perspective views showing other configurations of the blade portions of the retainer jig, respectively;

Fig. 5 is a perspective view showing a main portion of
15 one example of a length adjusting means of the retainer jig;

Fig. 6 is a perspective view showing a main portion of another example of a length adjusting means of the retainer jig;

Fig. 7 is a perspective view showing a main portion of
20 still another example of a length adjusting means of the retainer jig;

Fig. 8 is a perspective view showing the configurations of a retainer jig and a ring in a welding wire container in accordance with a modified embodiment of the present invention;

Fig. 9 is a cross-sectional view showing a welding wire container in accordance with an embodiment of a second aspect of the present invention;

Fig. 10A is a perspective view showing the configuration of a retainer jig in Fig. 9, and Fig. 10B is a side view thereof;

Fig. 11 is a cross-sectional view showing a state where the retainer jig travels down to a lower layer portion of the welding wire in Fig. 9;

Fig. 12 is a cross-sectional view showing a welding wire container having no inner cylinder in accordance with the second aspect of the present invention;

Fig. 13 is a perspective view showing another configuration of the retainer jig in Fig. 9;

Fig. 14 is a perspective view showing still another configuration of the retainer jig in Fig. 9;

Fig. 15 is a perspective view showing still another configuration of the retainer jig in Fig. 9;

Fig. 16 is a perspective view showing still another configuration of the retainer jig in Fig. 9;

Fig. 17 is a perspective view showing another configuration of the retainer jig;

Fig. 18 is a perspective view showing still another configuration of the retainer jig;

Fig. 19 is a diagram showing a welding wire within a

welding wire container in accordance with an embodiment of the present invention;

Fig. 20 is a cross-sectional view showing a surface fastener portion of Fig. 19;

5 Fig. 21 is a perspective view showing the surface fastener portion of Fig. 19;

Fig. 22 is a vertical cross-sectional view of Fig. 19;

Fig. 23 is a view showing another modified example of a projection of the surface fastener in the present invention;

10 Fig. 24 is a cross-sectional view showing a welding wire container in accordance with the present invention;

Fig. 25 is a cross-sectional view showing a main portion of Fig. 24;

15 Fig. 26 is a plan view showing a cover of the welding wire container in accordance with the present invention;

Fig. 27 is a perspective view showing the cover of the welding wire container in accordance with the present invention with a partial cross-section of the cover;

20 Fig. 28 is a cross-sectional view showing an upper caulked portion of the welding wire container in accordance with the present invention;

Fig. 29 is a cross-sectional view showing a lower caulked portion of the welding wire container in accordance with the present invention;

Fig. 30 is a front view showing a lifting sling of the welding wire container in accordance with the present invention;

Fig. 31 is a side view of Fig. 30;

5 Fig. 32 is a cross-sectional view showing a welding wire container in accordance with the present invention;

Fig. 33 is an enlarged plan view showing a surface fastener portion of Fig. 32;

10 Fig. 34 is a perspective view schematically showing a conventional welding wire container;

Fig. 35 is a cross-sectional view of Fig. 34;

Fig. 36 is a perspective view showing only a conventional retainer plate;

15 Fig. 37 is a cross-sectional view showing a part of a conventional welding wire container whose bottom is raised; and

Fig. 38 is a perspective view showing only a conventional retainer plate.

20 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

(First Aspect of the Invention)

Now, a description will be given in more detail of a welding wire container in accordance with an embodiment of a first aspect of the present invention with reference to the

accompanying drawings.

(Basic Structure of Welding wire Container)

Fig. 1A is a cross-sectional view showing a welding wire container in accordance with an embodiment of a first aspect of the present invention, and Fig. 1B is a plan view thereof. In the welding wire container according to this embodiment, a portion slightly upper than a lower end portion of a circular outer cylinder 1 is caulked. A bottom plate 5 that forms a bottom portion of the container is fitted into a lower portion nearest to the caulked portion so as to be held in the interior of the outer cylinder 1. The bottom plate 5 is fixed to the outer cylinder 1 by means of a metal reinforcement band that surrounds the caulked portion of the outer cylinder 1 and the bottom surface of the bottom plate 5 as will be described below. In general, because a welding wire of 250 to 500 Kg is housed in the welding wire container, there is required a structure that is secure and rigid for a transportation time and a hanging-up and transfer time. For that reason, the outer cylinder 1 of the welding wire container according to this embodiment is made of multi-layered papers or the like from the viewpoints of weight saving and electric insulation as will be described below.

In the welding wire container according to this embodiment, a circular inner cylinder 6 that is smaller in the

diameter than the outer cylinder 1 is disposed in the interior of the outer cylinder 1 so as to be coaxial with the outer cylinder 1. A lower end portion of the inner cylinder 6 is fixed onto the bottom plate 5. The inner cylinder 6 serves
5 as a guide at the time of pulling out a welding wire 10a. A bottom surface of the inner cylinder 6 is fixed to the bottom plate 5 by screwing or an adhesive. Otherwise, it is possible to detachably locate the inner cylinder 6 such that a guide
10 having an outer diameter corresponding to the inner diameter of the inner cylinder 6 is disposed on the bottom plate 5 in advance, and the bottom surface of the inner cylinder 6 is fitted onto the guide.

(The Number of Laminated Layers of a Paper Sheet of the Outer Cylinder)

15 In this example, in order to improve a pressure capacity, it is preferable that the outer cylinder 1 is formed of, for example, a laminated body having a thickness of 4 to 6 mm in which eight or more paper sheets are laminated. The pressure capacity of the outer cylinder is about 1500 kgf/m², taking
20 a case in which three containers are laminated, transported and stored into consideration. With reference to this, on the standard scale, in the case where the inner diameter of the container is 500 ϕ and the loading welding wire is 300 kg, the number of lamination of paper sheets is set to 10 sheets or

more. Likewise, in the case where the inner diameter of the container is 600 ϕ and the loading welding wire is 400 kg, the number of lamination of paper sheets is set to 11 sheets or more. Likewise, in the case where the inner diameter of the
5 container is 660 ϕ and the loading welding wire is 500 kg, the number of lamination of paper sheets is set to 12 sheets or more. Also, the basic weight of the paper sheet to be used is, for example, about 200 to 300 g/m².

In the welding wire container having the above basic
10 structure according to the present invention, the welding wire 10a is winded in such a manner that a central axis of the welding wire 10a is moved and displaced along a circular locus on the bottom plate 5 at the outer peripheral side of the inner cylinder 6. Thus, the welding wire 10a is housed in the
15 interior of the outer cylinder 1.

The welding wire container according to this embodiment includes a retainer jig 2 that is mounted on the winded welding wire coil 10 and prevents the welding wire from being protruded, and an annular plate 3 which is an annular member that is mounted
20 on the retainer jig 2 and presses down the welding wire coil 10.

(Retainer Jig)

Fig. 2 is a perspective view showing the configurations of the retainer jig 2 and the annular plate 3. Figs. 3 and

4A, 4B are enlarged perspective views showing the configurations of blade portions of the retainer jig 2, respectively. As shown in Figs. 2 and 3, the retainer jig 2 includes a tube portion 2a and a plurality of blade portions 5 2b. The tube portion 2a is formed by rolling up a band-like member and has an adjustable diameter. The plurality of blade portions 2b extend from an inner edge of a lower portion of the tube portion 2a toward a center of the container. When the welding wire 10a is pulled out of the container, the annular 10 member 3 serves as a plummet to the retainer jig 2.

More specifically, the tube portion 2a of the retainer jig 2 is, for example, formed by rolling up a paper band. Because end portions of the paper band are divided, respectively, and are not joined with each other as will be 15 described later, a diameter (length) of the retainer jig 2 can be adjusted according to the inner diameter of the outer cylinder 1. It is preferable that the tube portion 2a is rolled up in such a manner that both end portions of the paper band overlap each other.

20 The configuration of the blade portions 2b in the retainer jig 2 is shaped in substantially a triangle in a plan view where a width of the blade portion 2b is narrowed toward a leading edge of the blade portion 2b. Also, the blade portions 2b are made of a resin material having flexibility

or elasticity such as PET (polyethylene terephthalate).

The blade portions 2b are required to prevent the welding wire from being protruded by coming in contact with the welding wire and to move forward and backward without obstructing the movement for pulling out or receiving the welding wire. In this situation, the blade portions 2b are required not to scratch the surface of the welding wire. To meet the above requirements, it is preferable that the blade portions 2b are shaped in substantially a triangle.

Also, it is preferable that the blade portions 2b are made of a resin material having flexibility or elasticity such as the above PET resin in order to exhibit the above function. In addition, since the PET resin is transparent, a state of the welding wire coil 10 that has been received downward can be visually observed even in a state where the retainer jig 2 is located. Therefore, it is preferable that the blade portions 2b are made of a transparent resin material even in the case of using a resin other than PET. With the above structure, the residual amount of filler coil can be readily recognized even if an opening portion or the like dare not be formed in the retainer jig.

In the welding wire container according to this embodiment, the length of the blade portions 2b is set to the degree that the leading edges of the blade portions 2b are out

of contact with the inner cylinder 6. That is, a diameter of a circle that is formed by a line connecting the leading edges of the blade portions 2b is larger than the outer diameter of the inner cylinder 6.

5 However, the present invention is not limited to the above structure, but the blade portions 2b may be in contact with the inner cylinder 6. When the blade portions 2b are brought in contact with the inner cylinder 6, the wire can be more stably pulled out of the container. When the blade
10 portions 2b are brought in contact with the inner cylinder 6, a resistance of the retainer jig 2 against the inner cylinder 6 increases when the retainer jig 2 travels down. For that reason, it is desirable that the length of the blade portions 2b is set to the degree that the retainer jig 2 can smoothly
15 travel down.

 On the other hand, in the case where the leading edges of the blade portions 2b are out of contact with the inner cylinder 6 as in the welding wire container according to this embodiment, the retainer jig 2 can smoothly travel down.
20 However, the pulling out of the wire may be slightly unstable. Accordingly, it is desirable that the length of the blade portions 2b is appropriately selected in accordance with a tensile strength of the wire that is pulled out, a variation of the tensile strength, or a wire property such as the wire

diameter. A mass of the retainer jig 2 is, for example, 300 to 400 g, and a total mass of the mass of the retainer jig 2 and a mass of the annular plate 3 is, for example, about 800 to 1500 g.

5 (Annular Member)

The annular member 3 is mounted on the blade portions 2b of the retainer jig 2, presses the welding wire coil 10 downward, and supplements the execution of the above functions of the blade portions 2b (retainer jig 2). The retaining pressure to be exerted on the wire is required more as the tensile strength of the wire is higher. Because the retaining pressure of only the blade portions 2b is insufficient to retain the wire, the provision of the annular member 3 is required. For that reason, the annular member 3 is an annular plate (ring) 15 in this embodiment, and made of, for example, paper, plastic, metal or laminated wood. The inner diameter of the annular plate 3 is larger than the outer diameter of the inner cylinder 6. Also, the outer diameter of the annular plate 3 is smaller than the smallest inner diameter of the outer cylinder 1, that 20 is, the inner diameter of the caulked portion.

Specifically, for example, the outer diameter of the inner cylinder 6 is 310 mm regardless of the inner diameter of the outer cylinder 1. In the case where the nominal inner diameter of the outer cylinder 1 is 500 mm, the smallest inner

diameter of the outer cylinder 1 is 480 mm, the inner diameter of the annular plate 3 is 325 to 335 mm, and the outer diameter of the annular plate 3 is 460 to 470 mm. Also, the thickness of the annular plate 3 is, for example, about 3 mm. In the case where the nominal inner diameter of the outer cylinder 1 is 600 mm and 660 mm, the outer diameter of the annular plate 3 may be set to be larger according to the nominal inner diameter of the outer cylinder 1.

In addition, it is preferable to adjust the mass of the annular plate 3 so as to adjust the above retaining pressure that supplements the execution of the above functions of the blade portions 2b. For that reason, in this embodiment, plummets 4 each of which is formed of a steel panel are arranged at substantially regular intervals on the annular plate 3 in order to adjust the mass of the annular plate 3. The total mass of the annular plate 3 and the plummets 4 can be appropriately selected in accordance with the kind of the housed welding wire, how to wind the welding wire, or the like. For example, in the case where the above structure is applied to a solid wire that is 1.2 mm or 1.4 mm in diameter, it is preferable to adjust the total mass of the annular plate 3 and the plummets 4 to 800 to 1500 g.

(Operation of Welding wire Container)

Subsequently, a description will be given in more detail

of the operation of the welding wire container structured according to this embodiment as described above, that is, a method of housing the welding wire in the container and a method of unwinding the in-container welding wire. Referring to Fig. 1, when the welding wire is first housed in the container, the welding wire is stacked on the bottom plate 5 upward from the bottom while the central axis is moved and displaced along the circular locus. Then, the retainer jig 2 is mounted on the stacked welding wire coil 10. In addition, the annular plate 3 having the plummets 4 attached thereto is mounted on the blade portions 2a of the retainer jig 2 so as to be coaxial with the welding wire coil 10, thus providing the in-container welding wire.

When the in-container welding wire is transported and stored, an upper end portion of the outer cylinder 1 is covered with a cover (a cover 50 in Fig. 24 which will be described later). In this situation, a paper spacer (not shown) is arranged between the retainer jig 2 and the cover. The spacer for use in the welding wire container according to this embodiment is structured, for example, such that a rectangular cylinder smaller in diameter is inserted into a rectangular cylinder larger in diameter, and the rectangular cylinder of the smaller diameter is projected from the rectangular cylinder of the larger diameter. One or plural strings or band-like

elastic members are stretched on the interior of the rectangular cylinder of the larger diameter. In the spacer, a lower end portion of the rectangular cylinder smaller in the diameter is held by the elastic members that are stretched
5 within the rectangular cylinder of the larger diameter. Therefore, the height by which the rectangular cylinder of the smaller diameter is projected from the rectangular cylinder of the larger diameter can be changed in accordance with a distance between the cover and the retainer plate 2. For that
10 reason, even if the winding of the wire is fastened due to vibrations or the like during the transportation, and the height of the welding wire coil is lowered, the welding wire coil can be pressed downward. As a result, the welding wire coil is prevented from unfastening due to the vibrations during
15 the transportation, with the result that the welding wire is prevented from intertwining and getting tangled when the welding wire is unwound.

On the other hand, when the welding wire 10a is unwound, the cover and the spacer are removed, and the wire trailing
20 edge at the time of winding is pulled out of a gap defined between the inner cylinder 6 and the annular plate 3. With the wire trailing edge as an unwinding leading edge, the welding wire is unwound from the upper layer of the welding wire coil 10 toward the lower layer thereof. In this situation, the

retainer jig 2 and the annular plate 3 travel downward along with a reduction in the height of the welding wire coil 10.

In the welding wire container according to this embodiment, the outer diameter of the annular plate 3 is smaller
5 than the inner diameter of the caulked portion of the outer cylinder 1, and the blade portions 2b are made of a flexible resin material such as PET. Therefore, even in the case where the tube portion 2a is held by the caulked portion and cannot travel downward from the caulked portion, the welding wire coil
10 10 located below the caulked portion can be held down. This is because the blade portions 2a and the annular plates 3 enter a portion lower than the caulked portion. As a result, even if the bottom is not raised as in the conventional welding wire container, the welding wire can be smoothly unwound down to
15 the lowermost layer of the welding wire without intertwining and getting tangled. In this manner, the welding wire container according to this embodiment is particularly effective to a case in which a plurality of welding wires that are housed in the respective containers are consecutively used
20 since the supply of the welding wire does not stop during use.

Also, in the welding wire container according to this embodiment, the tube portion 2a of the retainer jig 2 travels while being in contact with the inner surface of the outer cylinder 1. For that reason, because no gap occurs between

the retainer jig 2 and the outer cylinder 1, the wire can be prevented from being protruded from the outer cylinder 1 side of the welding wire coil. Accordingly, the string and the ring which are disposed in the conventional welding wire container shown in Fig. 2 become unnecessary. In addition, the retainer jig 2 of the welding wire container according to this embodiment can be applied to a container having no inner cylinder 6 in the interior of the outer cylinder 1 because the tube portion 2a made of paper or the like travels along the inner surface of the outer cylinder 1.

Further, the retainer jig 2 of the wire container according to this embodiment has the higher effect of preventing from intertwining and getting tangled than that of the conventional retaining plate. This is because the retainer jig 2 is difficult to obliquely incline since the leading edges of the blade portions 2b travel while being out of contact with the outer side surface of the inner cylinder 6. In addition, in the welding wire container according to this embodiment, because the blade portions 2b of the retainer jig 2 are made of a transparent resin material such as PET, the residual amount of welding wire coil 10 can be readily visually recognized. For that reason, it is unnecessary to provide an opening portion for recognizing the residual amount of welding wire coil 10 in the annular plate 3 as in the

conventional retainer plate.

(Examples of Retainer Jig)

Hereinafter, other examples and more specific examples of the retainer jig 2 will be described. In the retainer jig 2 according to the embodiment described with reference to Figs. 1A, 1B, 2 and 3, the blade portions 2b that are substantially triangular in the plan view are fitted to the tube portion 2a at a substantially right angle (90°) with respect to the tube portion 2a. An angle θ defined between the blade portions 2b and the tube portion 2a as shown in Fig. 3 can be appropriately selected in a range of from 75° to 100° . The range is selected in order to obtain the effects of preventing the welding wire from intertwining and getting tangled at the caulked portion by making it easy that the blade portions 2b enter the caulked portion.

However, the present invention is not limited to the above structure. For example, a part of the blade portions may be folded inward. Also, the thickness of the blade portions 2 is, for example, about 0.4 to 0.6 mm. Figs. 4A and 4B are enlarged perspective views showing other configurations of the blade portions of the retainer jig, respectively. In the retainer jig shown in Fig. 4A, an end portion of each the blade portion 2b at the tube portion 2a side is folded inward and inclined. The angle of gradient α at the inclined portion,

the height a and the width b can be appropriately set in accordance with the configuration of the caulked portion. In this embodiment, for example, the angle of gradient α is about 46 to 50°, the height a is about 17 to 21 mm, and the width b is about 15 mm. In this manner, the end portion of the blade portions 12b at the tube portion 12a side is folded inward and inclined, thereby making it possible that the blade portions 12b are liable to enter the caulked portion. As a result, the effects of preventing the welding wire from intertwining and getting tangled at the caulked portion are improved.

In addition, as shown in Fig. 4B, an inclined portion may be formed on the end portion of the blade portions 2b at the tube portion 2a side, and the leading portion of the blade portions 2b may be folded inward. As a result, positioning of the annular plate 3 at the time of mounting the annular plate 3 on the blade portions is facilitated, and the inner edges of the annular plate 3 are held by the folded portions of the blade portions 2b. With the above structure, the annular plate 3 can be prevented from moving laterally at the time of unwinding.

(Adjustment of the Length of Retainer Jig)

Subsequently, a specific example for adjustment of the length (outer diameter) of the retainer jig 2 will be described. It is necessary that the tube portion 2a of the retainer jig

2 (a paper of which the tube portion 2a is made is the same material as that of the outer cylinder, for example, the thickness of the paper is about 4 to 6 mm when the basic weight is 200 to 300 g/m²) travels while being in contact with the inner surface of the outer cylinder 1. For that reason, there is the necessity that the length (outer diameter) of the tube portion 2a is adjusted according to the inner diameter of the outer cylinder 1. When the length (outer diameter) of the tube portion 2a is improper, a contact force of the retainer jig 2 with the inner surface of the outer cylinder 1 is weakened, the effect of the retainer jig 2 is lowered, and the wire is liable to be tangled.

A means for adjusting the length (outer diameter) of the tube portion 2a is shown by a partial perspective view of the tube 2a in Figs. 5 to 7. In Figs. 5 to 7, the tube portion 2a of the retainer jig 2 has an annular gap 8, and two annular plates 2d and 2e are laminated in such a manner that the annular plate 2d is arranged at the inner peripheral side and the annular plate 2e is arranged at the outer peripheral side, respectively. Then, as shown in Figs. 5 to 7, the tube portion 2a is divided at one place, and at a divided portion 13, a pullout piece 2c is disposed at an end portion of the tube portion 2a of one side (a left side of the figure). Then, the pullout piece 2c is inserted into the gap 8 at another end portion of

the tube portion 2a (a right side of the figure), and the length of the pullout piece 2c to be inserted is adjusted, thereby making it possible to adjust the length (outer diameter) of the tube portion 2a.

5 In Fig. 5, in order to engage the inserted pullout piece 2c, a substantially rectangular solid stopper 9a that is made of a lightweight elastic member such as Styrofoam is located above the gap 8 (above the pullout piece 2c) at another end portion (the right side of the figure) of the tube portion 2a
10 in advance. A force that is exerted on the pullout piece 2c when pulling out (unwinding) the welding wire is applied only upward. For that reason, if the stopper 9a exists only above the pullout piece 2c, the pullout piece 2c can be locked.

In Fig. 6, in order to lock the inserted pullout piece
15 2c, the annular plates 2d and 2e are locked together above the gap 8 of the tube portion 2a at the right side of the figure (above the pullout piece 2c) with a stapler 9b or the like.

In Fig. 7, in order to lock the inserted pullout piece 2c, there is provided a hollow rectangular slide guide 9c. The
20 slide guide 9c surrounds the periphery of the tube portion 2a vertically and sticks the pullout piece 2c in the gap 8.

(Example of Annular Member)

Hereinafter, a description will be given of other examples and more specific examples of the annular member. Fig.

8 is a perspective view showing the configuration of the retainer jig and a ring that is the annular member. In Fig. 8, the structure of the retainer jig 2 is identical with that of the above embodiment shown in Figs. 1A, 1B and 2.

5 In the welding wire container according to the above embodiment shown in Figs. 1A, 1B and 2, a paper annular plate 3 is mounted on the retainer jig 2. However, the present invention is not limited to the structure. For example, as shown in Fig. 8, a metal ring 7 that is substantially
10 rectangular in a vertical cross section may be mounted on the retainer jig 2 as the annular member. The ring 7 has an inner diameter larger than the outer diameter of the inner cylinder 6 and an outer diameter smaller than the smallest inner diameter of the outer cylinder 1 as with the above annular plate 3.

15 More specifically, for example, in the case where the outer diameter of the inner cylinder 6 is 310 mm, and the smallest inner diameter of the outer cylinder 1 is 480 mm, the inner diameter of the ring 7 is 350 to 360 mm, and the outer diameter of the ring 7 is 460 to 470 mm. As described above,
20 in the welding wire container according to this modified example, because the ring 7 is made of metal, no plummet is required. The mass of the ring 7 can be appropriately set in accordance with the kind of the housed welding wire, how to wind the welding wire, or the like. For example, in the case

where the above structure is applied to a solid wire that is 1.2 mm or 1.4 mm in the diameter, it is preferable to set the mass of the ring 7 to about 800 to 900 g. Also, it is preferable to set the total mass of the retainer jig 2 and the ring 7 to
5 about 1100 to 1500 g.

The ring 7 can be formed by joining a plurality of ring pieces together by welding. However, the present invention is not limited to this structure. The ring 7 may be integrally molded.

10 In the welding wire container according to the above embodiment shown in Figs. 1A, 1B and 2, even in the case where the ring 7 is disposed on the blade portions 2b of the retainer jig 2 as the annular member instead of the annular plate 3, the welding wire is housed in the container so as to provide
15 an in-container welding wire. Also, the welding wire can be smoothly unwound down to the lowermost layer of the welding wire without intertwining and being tangled.

(Second Aspect of the Invention)

Hereinafter, a description will be given in more detail
20 of a welding wire container according to an embodiment of the second aspect of the present invention with reference to the accompanying drawings.

Fig. 9 is a cross-sectional view showing a welding wire container according to this embodiment. The basic structure

of the welding wire container and a state where the welding wire 10a is housed according to this embodiment are identical with those shown in Figs. 1A and 1B.

(Retainer Jig)

5 In this example, the welding wire container shown in Fig. 9 includes a retainer jig 2 that is mounted on the winded welding wire coil 10. Fig. 10A is a perspective view showing the configuration of the retainer jig 2, and Fig. 10B is a side view thereof.

10 As shown in Figs. 10A and 10B, the retainer jig 2 includes two annular portions 2f and 2g on an upper surface side and a lower surface side thereof, respectively. The outer diameter of the annular portion 2g on the lower surface side is smaller than the smallest inner diameter of the outer
15 cylinder 1. Also, the outer diameter of the annular portion 2f on the upper surface side is larger than the smallest inner diameter of the outer cylinder 1 and smaller than the smallest inner diameter of the outer cylinder 1. That is, the retainer jig 2 is an annular plate in which the annular portion 2f on
20 the upper surface side is larger in outer diameter than the annular portion 2g on the lower surface side.

The retainer jig 2 is formed of, for example, a corrugated fiberboard, a laminated wood, or the like. The retainer jig 2 is formed by, for example, joining or integrally molding the

two annular portions 2f and 2g on the upper surface side and the lower surface side together.

In the case where the inner cylinder 6 is used for the welding wire container, the retainer jig 2 has an inner diameter r_2 larger than the outer diameter of the inner cylinder 6, and a smallest outer diameter r_3 smaller than the smallest inner diameter of the outer cylinder 1, that is, the inner diameter of the caulked portion. The retainer jig 2 has a largest outer diameter r_1 larger than the inner diameter of the caulked portion of the outer cylinder 1 and smaller than the largest inner diameter of the outer cylinder 1. Specifically, it is assumed that the outer diameter of the inner cylinder 6 is set to 310 mm regardless of the largest inner diameter of the outer cylinder 1, and, for example, the largest inner diameter of the outer cylinder 1 is 500 mm. In this case, it is preferable that the smallest inner diameter of the outer cylinder 1 is set to 480 mm, and the inner diameter r_2 of the retainer jig 2 is set to 322 to 328 mm. Also, it is preferable that the smallest outer diameter r_3 is set to 470 to 475 mm, and the largest outer diameter r_1 is set to 489 to 491 mm. Further, the thickness t of the retainer jig 2 can be appropriately set according to the height of the caulked portion of the outer cylinder 1. The thickness t of the retainer jig 2 is set to, for example, 17 to 20 mm. In addition, the mass of the retainer

jig 2 is 400 to 800 g in the case where the welding wire is formed of a flux-cored wire.

The retainer jig 2 is arranged such that the annular portion 2g on the lower surface side which is smaller in the outer diameter forms a lower surface of the retainer jig 2. Also, it is preferable that a resin film such as a laminate film is stuck on the lower surface of the retainer jig 2. This structure makes it possible to smoothly rewind the welding wire, and also makes it difficult to transmit moisture adsorbed by the corrugated fiberboard or the like to the welding wire. As a result, the welding wire can be prevented from rusting. Further, because the slippage of the wire on a contact surface of the welding wire coil 10 with the retainer jig 2 gets excellent, the wire can be prevented from being tangled.

(Strings)

In addition, a plurality of strings 12 may be attached onto the inner surface of the outer cylinder 1 in the welding wire container according to this embodiment. The plurality of strings 12 extend in the longitudinal direction of the outer cylinder 1, that is, in the height direction of the welding wire coil 10. The plurality of strings 12 are provided in order to prevent a gap from occurring between the retainer jig 2 and the outer cylinder 1, and to prevent the welding wire from being protruded from the outer peripheral side of the welding wire

coil 10 at the time of unwinding. In this example, the strings 12 are arranged between the welding wire coil 12 as well as the retainer jig 2 and the outer cylinder 1 so as to extend in the height direction of the outer cylinder 1. Also, a plurality of sponge plates are disposed on the outer peripheral portion of the retainer jig 2 at substantially regular intervals instead of the strings 12. Likewise, this structure can prevent the wire from being protruded.

Furthermore, in the case where the plurality of strings 12 are attached onto the inner surface of the outer cylinder 1 as described above, the ring 11 that is circular in the vertical cross section is disposed on the retainer jig 2 so as to be coaxial with the outer cylinder 1. The ring 11 is disposed between the strings 12 and the outer cylinder 1 so as to be coaxial with the outer cylinder 1. The ring 11 is held on the upper surface of the retainer jig 2 in an annular shape, and travels while following the retainer jig 2.

Subsequently, a description will be given of the operation of the welding wire container structured as described above, that is, a method of housing the welding wire in the container, and a method of unwinding the in-container welding wire with reference to Fig. 9. When the welding wire 10a is first housed in the container, the welding wire 10a is stacked on the bottom plate 5 upward from the bottom while the central

axis is moved and displaced along the circular locus. Then, the retainer jig 2 is mounted on the stacked welding wire coil 10 so as to be coaxial with the inner cylinder 6. In addition, the ring 11 is disposed between the strings 12 and the outer cylinder 1 which are above the retainer jig 2, thus providing the in-container welding wire.

When the in-container welding wire that has been wound and housed in the above method is transported and stored, an upper end portion of the outer cylinder 1 is covered with a cover (not shown). In this situation, a paper spacer (not shown) is arranged between the retainer jig 2 and the cover. The welding wire coil 10 is pressed downward by means of the retainer jig 2, the ring 11 and the spacer. In this situation, the spacer to be used is identical with that in Fig. 1.

On the other hand, when the welding wire 10a is unwound, after the cover and the spacer have been removed, the wire trailing edge at the time of winding is pulled out of a gap defined between the inner cylinder 6 and the retainer jig 2. With the wire trailing edge as an unwinding leading edge, the welding wire is unwound from the upper layer of the welding wire coil 10 toward the lower layer thereof. In this situation, the retainer jig 2 and the ring 11 travel downward along with a reduction in the height of the welding wire coil 10.

In the welding wire container according to this

embodiment, the outer diameter of a lower surface side portion of the retainer jig 2 is smaller than the inner diameter (the smallest inner diameter) of the caulked portion of the outer cylinder 1. Therefore, the annular portion whose outer diameter is smaller enters the caulked portion, and the caulked portion and the welding wire coil 10 located below the caulked portion can be also held down.

As a result, even if the bottom is not raised as in the conventional welding wire container, the welding wire can be smoothly unwound down to the lowermost layer of the welding wire without intertwining and getting tangled. This is shown in the cross-sectional view of Fig. 11 showing a state where the retainer jig 2 is lowered down to the lower layer portion of the welding wire. As a result, the welding wire container according to this embodiment is effective to a case in which a plurality of in-container welding wires are consecutively used since the supply of the welding wire does not stop during use.

The effect as shown in Fig. 11 is also applied to Fig. 1 as before mentioned.

Also, in the welding wire container according to this embodiment, because the strings 12 are arranged so that no gap occurs between the retainer jig 2 and the outer cylinder 1, the wire can be prevented from being protruded from the outer

cylinder 1 side of the welding wire coil.

In addition, in the welding wire container according to this embodiment, most of the upper surface of the welding wire coil is covered with the retainer jig 2. This makes it
5 difficult that moisture enters the interior of the welding wire coil 10, which is excellent in a rust resistant effect of the welding wire.

In addition, the retainer jig 2 of the welding wire container according to this embodiment can be applied to a
10 welding wire container having no inner cylinder 6 in the interior of the outer cylinder 1. Fig. 12 is a cross-sectional view showing the welding wire container having no inner cylinder. As shown in Fig. 12, in the case where no inner cylinder 6 is disposed in the interior of the outer cylinder
15 1, the welding wire 10a is passed through a pullout hole 2h formed in the retainer jig 2.

Subsequently, modified examples of the retainer jig 2 will be described. Figs. 13 to 16 are perspective views showing the respective configurations of the retainer jig 2 in the
20 welding wire container according to the modified examples. In the retainer jig 2 shown in Fig. 10, there is used a retainer jig formed by stacking a plurality of annular plates that are made of corrugated fiberboards or laminated woods. The present invention is not limited to this structure. For

example, as shown in Figs. 13 to 16, there can be used a retainer
jig 2 that has been injection-molded with a resin. The resin
is exemplified by PP (polypropylene) resin, ABS (acrylonitrile
butadiene styrene) resin, PET (polyethylene terephthalate)
5 resin, ST (styrene) resin, and PE (polyethylene) resin.

The retainer jigs 2 shown in Figs. 13 to 16 are identical
with the retainer jig 2 shown in Fig. 10 in that each of the
retainer jigs 2 has two annular portions 2f and 2g on the upper
surface side and the lower surface side. However, in the
10 retainer jig 2 shown in Fig. 13, the outer diameters of two
annular portions 2f and 2g on the upper surface side and the
lower surface side are not stepwise (gradual) as with the
retainer jig 2 shown in Fig. 10, but smoothly change by a tapered
vertical wall.

15 The retainer jig 2 shown in Fig. 14 is identical in the
configuration with that of Fig 13, but an annular recess portion
13 is defined in an upper surface of a flange of the annular
portion 2f on the upper surface side over a circumferential
direction thereof. The recess portion 13 is a mounting surface
20 of a plummet having a configuration that meets the
configuration of the recess portion.

The retainer jig 2 shown in Fig. 15 is identical in the
configuration with that of Fig. 10, except that an annular plate
plummet (retainer jig) is disposed on the lower surface of the

annular portion 2g at the lower surface side in order to increase the mass.

The retainer jig 2 shown in Fig. 16 is so designed as to add the recess portion 13 shown in Fig. 14 to the retainer
5 jig 2 shown in Fig. 15.

As with the retainer jig 2 shown in Fig. 10, the retainer jig 2 shown in Fig. 16 has an inner diameter r_2 larger than the outer diameter of the inner cylinder 6. The retainer jig 2 also has a largest outer diameter r_1 smaller than the largest
10 inner diameter of the outer cylinder 1, and a smallest outer diameter r_3 smaller than the smallest inner diameter of the outer cylinder 1.

Specifically, it is assumed that the outer diameter of the inner cylinder 6 is set to 310 mm regardless of the largest
15 inner diameter of the outer cylinder 1. For example, in the case where the largest inner diameter of the outer cylinder 1 is 500 mm, it is preferable that the smallest inner diameter of the outer cylinder 1 is set to 480 mm, and the inner diameter r_2 of the annular member 12 is set to 322 to 328 mm. Also,
20 it is preferable that the smallest outer diameter r_3 is set to 470 to 475 mm, and the largest outer diameter r_1 is set to 489 to 491 mm. Further, the thickness t of the retainer jig 2 can be appropriately set according to the height of the caulked portion of the outer cylinder 1. The thickness t of

the retainer jig 2 is set to, for example, 17 to 20 mm.

In addition, the mass of the retainer jig 2 is, for example, 400 to 800 g. For example, in the case where the above structure is applied to a solid wire that is 1.2 mm or 1.4 mm in diameter, it is preferable that a plummet is attached to the retainer jig 2, and a total mass of the retainer jig 2 and the plummet is set to about 1100 to 1500 g. In this manner, when the retainer jig 2 is made of resin, the configuration of the retainer jig 2 is stabilized, and the smoothness of the surface of the retainer jig 2 is excellent. As a result, the welding wire can be stably unwound, and the welding wire container can be inexpensively manufactured.

The structure of the welding wire container according to this modified example is identical with that in the embodiment shown in Fig. 1 except that the retainer jig 2 formed by injection-molding with resin is used. Accordingly, the welding wire is housed in the container to provide the in-container welding wire, and the welding wire can be smoothly unwound down to the lowermost layer of the welding wire without intertwining and being tangled in the same manner as that of the embodiment shown in Fig. 1. In this structure, a plurality of blade portions may be disposed on the flange upper surface of the annular portion 2f at the upper surface side of the retainer jig 2. The plurality of blade portions function so

as to prevent the welding wire from being protruded from a gap formed between the outer cylinder and the retainer jig. The blade portions are L-shaped so as to project upward from the annular portion 2f and to extend in the circumferential direction of the annular portion 2f as will be described later with reference to Figs. 17 and 18.

(Third Aspect of the Invention)

Hereinafter, a description will be given of a welding wire retainer according to an embodiment of the third aspect of the present invention with reference to the accompanying drawings.

Figs. 17 and 18 are perspective views showing retainer jigs according to the third aspect of the invention, respectively. The basic structure of the welding wire container and a state where the welding wire 10a is housed according to this embodiment are identical with those shown in Figs. 1A, 1B and 9, and therefore they will be omitted from the drawings.

(Retainer Jig)

In Figs. 17 and 18, the retainer plate 2 is formed of an annular plate 20 having an outer diameter that is slightly smaller than the smallest inner diameter of the outer cylinder. In the case of using the inner cylinder, an inner diameter of the inner cylinder is set to be slightly larger than an outer

diameter of the inner cylinder. The welding wire is unwound from a gap defined between the inner cylinder and the retainer jig 2.

The welding wire coil is pressed downward by the retainer
5 jig thus structured, thereby preventing the unwound wire from being protruded and intertwining with each other. This is the same effect as that of the embodiments shown in Figs. 1A, 1B and 9.

To obtain the above effect, in this embodiment, a
10 plurality of L-shaped blade portions 21 (four blade portions in the figure) are disposed on the annular plate 20. The plurality of L-shaped blade portions 21 project upward and extend in the circumferential direction of the annular plate 20. The blade portions 21 function so as not to protrude the
15 welding wire from the gap formed between the outer cylinder and the retainer jig. That is, the blade portions 21 have the same function as that of the ring 11 shown in Fig. 9 as described above.

Reference numeral 22 denotes a plurality of opening
20 portions disposed at intervals (four opening portions symmetrically in the figure) for recognizing the residual amount of filler coil. It is preferable that the blade portions 21 are made of soft material such as sponge in order to prevent the welding wire from being hurt. A difference between Fig.

17 and Fig. 18 resides in that in Fig. 18, plummets 4 for adjusting the mass of the retainer jig are mounted on portions of the annular plate 20 where the blade portions 21 exist. (Consecutively Unwinding of Plural Welding wire Coils)

5 Hereinafter, a description will be given of preferred examples in which a plurality of welding wire coils are consecutively unwound while the welding wire is smoothly unwound. The examples are common to the respective aspects of the present invention and based on the structure of the
10 welding wire container according to the above respective aspects of the present invention.

In the case where a plurality of welding wire coils are going to be consecutively unwound, it is necessary to join an unwound trailing edge of the welding wire coil to an unwound
15 leading edge of the welding wire coil housed in another container from which the welding wire is subsequently unwound.

In order to join those welding wires together, as illustrated in Fig. 19 showing the perspective view of the welding wire container, it is necessary to provide a fastener
20 30 that locks the unwound trailing edge (winding leading edge) 10b of the welding wire coil 10 to an upper portion of the inner surface of the outer cylinder 1. The unwound trailing edge 10b of the welding wire coil that is locked by the fastener 30 is joined to the winding leading edge (not shown) of the

welding wire coil that is housed in the container from which the subsequent welding wire is unwound. As a result, a plurality of welding wire coils can be consecutively unwound. The fastener 30 is located on the upper portion of the inner surface of the outer cylinder 1 at one or plural positions as occasion demands.

(Fastener for the Wire Winding Leading edge)

Specific examples of the fastener will be described with reference to Figs. 20 to 23. Fig. 20 shows an example showing a surface fastener as the fastener 30. As shown in Fig 20, plate hook side members 32 that structure the surface fasteners are adhered to the inner surface 1a of the outer cylinder 1 with a cohesive agent (an adhesive) 35 such as rubber material. A drop-down leading edge (winding leading edge) 10b of the welding wire is held between each of the hook side members 32 and each of flat loop side members 31 that are engaged with the corresponding hook side member 32. With this structure, the drop-down leading edge is locked on the inner surface side of the outer cylinder 1. The loop side member and the hook side member may be replaced with each other.

The hook side member 32 of the surface fastener is, for example, 20 to 50 mm in width, and 50 mm to 200 mm in length. In Fig. 19, the hook side members 32 are adhered to the inner surface of the outer cylinder 1 at three or more positions along

the inner circumferential direction of the outer cylinder 1. The loop side member 31 is, for example, 20 to 50 mm in width, and 20 to 200 mm in length. The loop side members 31 are locked with the corresponding hook side members 32. The hook side members 32 can be disposed over the entire circumference of the outer cylinder 1 in the inner circumferential direction thereof. In an example of Fig. 19, the surface fasteners 30 are arranged on the inner surface of the container at three positions while the longitudinal direction of the surface fasteners 30 is kept horizontally. With this structure, the drop-down leading edge of the welding wire is locked at three positions.

Figs. 21 and 22 is perspective views more specifically showing the surface fasteners. As shown in the figures, loop-shaped projections 33 are disposed on the loop side member 31. On the other hand, hook-shaped projections 34 that are engaged with the loop-shaped projections 33 of the loop side member 31 are disposed on the hook side member 32. The loop side member 31 having the loop-shaped projections 33 thus structured is put on the hook side member 32 having the hook-shaped projections 34. As a result, the loop-shaped projections 33 of the loop side member 31 intertwine with the hook-shaped projections 34 of the hook side member 32, to thereby fix the winding leading edge 10b of the wire between both the surfaces.

Since the above surface fastener is made of a flexible material, the surface fastener can be affixed along the inner surface of the welding wire container. Accordingly, the surface fastener does not drop out even if the surface fastener is affixed to the inner surface of the container with a two-sided tape. The projections of the hook side member 32 and the loop side member 31 of the surface fastener are made of, for example, a single material or a combined material of plastic such as nylon, polypropylene or polyester.

In the case where a plurality of welding wire coils are consecutively unwound, as shown in Fig. 19, the drop-down leading edge 10b of the welding wire is pulled upward from the welding wire container and locked to the upper portion of the inner surface of the welding wire container with the surface fastener 30. In other words, when the welding wire drops down within the container in the form of a loop, the drop-down leading edge 10b is pulled upward from the container, and the welding wire coil is housed in the inner side of the container. Then, after the completion of drop-down, the drop-down leading edge 10b is bent toward the inner cylinder 6 side, and the retainer jig 2 is put on the drop-down leading edge 10b. Then, the drop-down leading edge 10b passes through the inner edge of the retainer jig 2 and is locked to the upper portion of the inner surface of the container with the surface fasteners

30.

Accordingly, in the retainer device of the welding wire, the drop-down leading edge 10b of the welding wire is pulled up along the inner surface of the container 1. More specifically, the drop-down leading edge 10b of the welding wire passes through a gap formed between the upper surface of the welding wire coil 10 and the lower surface of the retainer jig 2, and is pulled upward through a gap between the retainer jig 2 and the inner cylinder 6. Then, the leading portion of the drop-down leading edge 10b is locked to the inner surface of the container with the surface fasteners 30. The welding wire coil 10 is housed so as to be stacked between a portion of the drop-down leading edge 10b along the inner surface of the container and the inner cylinder 6 in the form of loops. For that reason, the welding wire coil 10 in the container is sequentially pulled out from the upper side of the interior of the container which is the drop-down end side, and then fed up to a torch. During this process, there is no case in which the pulled-out welding wire 10 is obstructed by the drop-down leading edge 10b to block the feeding of the fire wire, or the welding wire 10a and the drop-down leading edge 10b intertwine with each other.

Subsequently, the operation of the welding wire within the container structured as described above will be described

in association with a welding device. The welding wire 10 in the container is sequentially pulled out of the drop-down trailing edge thereof, and consecutively fed to the welding device so as to be applied for welding. First, two containers
5 each having the welding wire housed are disposed in the vicinity of the welding device. In each of the containers, the drop-down leading edge 10b is fixed to the upper portion of the inner surface of the container with the surface fasteners 30. Therefore, for example, prior to a start of using a first
10 container to be used primarily or during the use of the first container, a drop-down leading edge 10b is welded to a drop-down trailing edge of the welding wire in a second container to be used secondarily. Thus, the former is joined to the latter. When the leading edge and the trailing edge of the welding wire
15 are joined together, a lock state of the surface fasteners is cancelled once. However, the leading edge and the trailing edge can be joined together without canceling the lock state. After joining, the drop-down leading edge 10b may be again locked with the surface fasteners 30 or may not be locked
20 therewith.

The welding wire in the container is pulled out of the drop-down end side, and then fed to a welding torch. The residual amount of welding wire in the first container is reduced, and the current container is shifted to the second

container. In this case, the drop-down leading edge 10b that has been locked to the inner surface of the container with the surface fasteners 30 is free from the lock state. Then, the drop-down star portion 10b is naturally unlocked from the surface fasteners 30. This is because a tension of the wire that is fed toward the torch gets larger than the locking force of the drop-down leading edge 10b due to the surface fasteners 30.

In this situation, the drop-down trailing edge of the wire in the second container to be used subsequently, which is joined to the drop-down leading edge 10b, is continuously pulled up. Then, the welding wire in the second container is fed toward the welding torch. Even after the drop-down leading edge 10b of the wire is unlocked from the surface fasteners 30, the loop side member 31 of the surface fastener 30 is partially engaged with the hook side member 32, and does not drop out.

On the other hand, there is a case in which the drop-down leading edge 10b is not locked with the surface fasteners 30 after the drop-down leading edge 10b in the first container has been joined to the drop-down trailing edge in the second container. In this case, after the drop-down start portion 10b in the first container has been pulled out, the drop-down trailing edge in the second container is sequentially pulled

out and fed. Thereafter, the wire 3 in the second container is pulled out.

Subsequently, the first container 1 having no welding wire therein is exchanged with a fresh third container housing a welding wire therein. Then, the welding wire in the second container is pulled out, or the pulling out of the welding wire is interrupted. In this situation, the drop-down trailing edge of the welding wire in the third container is joined to the drop-down leading edge of the welding wire in the second container in the same manner as described above. In this way, the drop-down leading edge in the prior container is connected to the drop-down trailing edge in the subsequent container. As a result, the welding wires in a plurality of containers are consecutively fed to the welding torch to conduct welding.

According to this embodiment, the drop-down leading edge 10b of the welding wire is locked on the upper portion of the inner surface of the container with the surface fasteners 30, and the drop-out leading edge 10b is joined to the drop-down trailing edge of the welding wire in a container to be used subsequently in advance. As a result, the welding wires in a plurality of containers can be consecutively and stably fed to the welding device without being hurt or deformed. Also, the surface fasteners 30 are employed as the fastener (locking member) of the drop-down leading edge 10b. As a result, a bulge

on the inner surface of the container gets small as compared with the conventional locking jig such as a clamp member. Therefore, the welding wire can be smoothly stacked without being obstructed by the surface fasteners 30 at the time of dropping down the wire. Also, the surface fasteners can be iteratively employed, and is more inexpensive than the integrally molded locking member and clamp member which have been used conventionally, and the running costs are also low.

Also, the drop-down leading edge 10b can be surely locked with the relationship between a locking force of the drop-down leading edge 10b of the welding wire in the surface fastener and a peeling force between the hook side member 32 and the loop side member 31. When the welding wire is pulled by a force larger than the locking force, since the joint of the surface fasteners is readily canceled, the welding wire is not hurt or elastically deformed such as bending.

When the hook side member 32 or the loop side member 31 of the surface fasteners 30 is fixed to the inner surface of the container, for example, a rubber cohesive agent or a resin adhesive are preferably employed. However, the present invention is not limited to this structure, and another adhering means can be applied if the adhering means has the same adhesive force.

In addition, it is possible that the inner cylinder 6

is omitted, and the welding wire is stacked so that the drop-down edge orbits, for example, while rotating in the container while the welding wire is formed into loops each having a diameter smaller than the cross section of the
5 container.

The arrangement of the surface fasteners 30 is not limited to the above example, and the following arrangement is applicable to the present invention. That is, the hook side members 32 are adhered to the inner surface of the container
10 over the entire circumference. The loop side members 31 that are in a vertically arranged state are stuck on the hook side member 32 along the inner circumference of the container at plural regular positions. In this manner, the drop-down leading edge 10b of the welding wire is locked with the surface
15 fasteners 30.

Also, the arrangement direction of the surface fasteners 30 is not limited to the above example. For example, the surface fasteners 30 that are in a horizontally arranged state may be disposed on the inner circumference of the container
20 along an inclined state of the wire. In addition, the surface fasteners 30 that are in the above arranged state and surface fasteners that are arranged vertically at other inner circumferential positions in the container may be appropriately combined together. In the present invention,

any one of the above arrangements of the surface fasteners is applicable to the present invention, and the same effects as those in the above embodiments can be obtained. The same is applied to a case in which the loop side member and the hook side member are replaced with each other.

Also, the projection structure of the surface fasteners 30 is not limited to the example of Fig. 22, but the projections on the loop side member 31 and the projections on the hook side member 32 can be modified such that the loop-shaped projections 33 and the hook-shaped projections 34 are alternately arranged. With the above arrangement, the projections on the loop side member 31 and the projections on the hook side member 32 are liable to intertwine with each other, thereby improving the engagement strength. In this case, it is preferable that the loop-shaped projections 33 and the hook-shaped projections 34 on both of the surfaces are so arranged as to face each other.

In addition, the projections on the loop side member 31 and the projections on the hook side member 32 can be modified into hook-shaped projections. For example, the projections on the loop side member 31 and the projections on the hook side member 32 can be modified into a mushroom type hook-shaped projections whose leading edges are widened in a radial direction. The surface fasteners thus structured also makes it possible to surely lock the drop-down leading edge of the

wire, and the wire is prevented from being hurt or deformed.

The surface fastener type thus structured can be replaced by a clamp-type fastener 30 shown in a perspective view of Fig. 23. The clamp-type fastener 30 has a plate substrate 38, an upper member 36 that is square in the cross section and provided on the substrate 38 so as to project in a horizontal direction, and a lower member 37 that is substantially triangular in the cross section. A gap that is slightly narrower than the diameter (for example, 1.0 to 1.6 mm) of one wire is defined between those upper and lower members. Then, the drop-down leading edge 10b of the wire gets stuck in the gap. The clamp-type fastener 30 thus structured may be formed by, for example, injection molding.

The above clamp-type fastener 30 has, for example, a two-sided tape 35 on a rear surface of the substrate 38. The clamp-type fastener 30 is stuck onto the upper portion of the inner surface of the container with the two-sided tape 35, or in a state where a sponge that intervenes between the two-sided tape 35 and the substrate 38. However, there arises various problems such that the substrate cannot be sufficiently adhered to the inner surface of the container which is a curved surface because the adhesive force of the two-sided tape 35 is weak in the fastener, the adhesive surface of the substrate in the fastener is flat. Accordingly, the surface fastener

type fastener is more preferable.

Now, a description will be given of preferred embodiments that solve other common problems which are required as the welding wire container except for the smoothly unwinding of
5 the welding wire. The preferred embodiments are implemented with the structure of the welding wire container having the above-mentioned aspects of the present invention.

(Rust-Resistant Coating on Welding wire Container)

In the paper welding wire container, because moisture
10 and humidity are liable to enter the container from the external, the welding wire may be oxidized or rusted during a keeping time. Accordingly, in order to prevent the container from being oxidized or rusted, it is necessary to coat a rust resistant layer such as a resin layer on portions moisture and
15 humidity are liable to enter, such as the inner and outer surfaces of the outer cylinder, the inner surface of the bottom plate, the outer surface of the inner cylinder or the cover. Hereinafter, examples of the rust resistant layer coating will be described with reference to Figs. 24 to 27.

20 Fig. 24 is a cross-sectional view showing a paper welding wire container. Fig. 25 is a cross-sectional view showing a main portion of Fig. 24. The basis structure of the welding wire container shown in Fig. 24 is identical with that in Figs. 1A, 1B and 9 described above. Fig. 24 shows a state in which

a rust resistant layer such as a resin layer is coated on the inner and outer surfaces of the outer cylinder, the inner surface of the bottom plate, and the outer surface of the inner cylinder.

5 More specifically, reference numeral 41 denotes a water repellent layer such as acrylic resin having an action of repelling a water droplet, which is coated on the outer surface of the outer cylinder 1. Reference numeral 40 denotes a composite lamination of an acrylic/wax resin layer that makes
10 it difficult to transmit moisture and acrylic resin layer which are coated on the inner surface of the outer cylinder 1. Reference numeral 42 denotes a polyethylene film or a rust resistant agent contained film, which is coated on the inner surface (top surface) of the bottom plate.

15 That is, the outer surface of the outer cylinder 1 is coated with the water repellent layer, with the results that because the outer surface of the container repels water, the mechanical property of the container can be prevented from being deteriorated. Also, moisture is transmitted to suppress
20 the paper of the container from being overdried, thereby making it possible to properly keep the mechanical property of the container. In addition, the inner surface of the outer cylinder 1 and the inner surface of the bottom portion 5 are coated with a moisture proof (moisture impermeability or low

moisture permeability) resin. As a result, moisture and humidity can be prevented from entering the interior of the container.

The resin layer that is coated on the inner surface of the outer cylinder 1 and the inner surface of the bottom portion 5 can be formed of a combination or laminate of water resistant thermoplastic resin layers made of polyethylene resin (PE), polyester resin (PET), acrylic resin, polyurethane resin, styrene resin, nylon resin (NY), polypropylene resin (PP), cellophane resin (PT) or polyisocyanate.

At least one layer of the paper sheet laminate that forms the inner surface of the bottom plate 5 is coated with the above resin layers. The number of laminated resin films in one resin layer is not particularly limited, and for example, about 2 to 5. There are various films that are different in the density, oriented one-axially or two-axially, or not oriented. However, when the type of resin is different, the film manufacturing method is unthinkable particularly. The thickness of the resin layer that is coated on the paper sheet is, for example, 10 to 200 μm .

Also, when the above resin layer is further coated with an inorganic oxide layer, the effect of preventing ambient air or humidity from entering the interior of the container is improved. Vacuum evaporation is suitable for a means for

coating the inorganic oxide layer. For example, alumina (Al_2O_3), silica (SiO_2) or titania (TiO_2) may be preferably used as the inorganic oxide.

Even if the above coating is conducted, there may arise
5 such a problem that the filler coil is oxidized or rusted due to the structural material of the container. Particularly, the oxidization or rusting of the filler coil is caused by an oxidizing component contained in the sheet layer on the inner surface of the outer cylinder 1, which is in direct contact
10 with the coil. To solve the above problem, for example, the outer cylinder 1 is formed of a laminate of 8 or more liner papers 1a to 1h, and a liner paper of at least one layer of the outer cylinder 1 at the inner surface side thereof is formed of a low oxidizing component elution sheet. In other words,
15 it is preferable that the inner surface side of the outer cylinder which is in contact with the welding wire is formed of a paper sheet (layer) that is 10 ppm or less in elution chlorine ion density and 80 ppm or less in elution sulfate ion. That is, at least one layer of the liner paper 1a, or two layers
20 or more of the liner papers 1a and 1b are formed of low oxidizing component elution sheets. It is preferable that the paper sheet layer is 15% or less in moisture content. This more improves the effects of preventing the wire from corroding or rusting.

Likewise, the paper inner cylinder 6 suffers from the problem that the filler coil is oxidized or rusted due to the oxidizing component contained in the sheet layer on the inner surface of the outer cylinder 1. Accordingly, it is preferable
5 that the outer surface side of the inner cylinder which is in contact with the welding wire is formed of a paper sheet (layer) that is 10 ppm or less in elution chlorine ion density and 80 ppm or less in elution sulfate ion.

When the amount of elution of the elution chlorine ions
10 from the low oxidizing component elution sheet exceeds 10 ppm, there is a fear that the wire that comes in contact with the elution chlorine ions gets rusted. Also, when the elution chlorine ion density exceeds 80 ppm, there is a fear that the wire that comes in contact with the elution chlorine ion gets
15 rusted. In the present invention, attention is focused on chlorine ions and sulfate ions which particularly greatly act on the corroding and rusting of the wire as the oxidizing component contained in the structural material of the container. As other oxidizing components, there are F^- , NO_2^- , Br^- , NO_3^- ,
20 PO_4^{3-} , or the like. It is considered that an influence of those oxidizing components on the corroding and rusting of the wire is slight.

The elution chlorine ion density or the elution sulfate ion density of the low oxidizing component elution sheet is

measured, for example, as follows: That is, a sampling sheet 5g is soaked in a pure water of 100 ml, and heated at 70 °C for 30 minutes. Then, after the sampling sheet is extracted from the solution, obtained chlorine ions or sulfate ions in the solution are quantitated through the ion chromatography spectrometry method. According to this measuring method, in most cases, the chlorine ions or sulfate ions are represented as 1/20 of the total density.

In this embodiment, it would not matter if the oxidizing component is contained in the structural member that is out of direct contact with the wire when the amount of oxidizing component is comparable to that contained in the normal structural material. However, it is more preferable that all of the structural materials that form the container do not elute the oxidizing component.

(Humidity Proof at Cover Portion)

As shown in Fig. 24, when the in-container welding wire is transported and stored, a circular cover 50 shown in a plan view of Fig. 26 is covered on an upper end portion 1y of the outer cylinder 1. In this situation, for the purpose of moisture proof at the cover portion, as shown in Fig. 27, it is preferable that an annular resin layer or rubber layer 45 is disposed on the container inner surface side of an outer edge portion 50a of the cover 50 to seal the upper end portion

ly of the outer cylinder 1 and the container inner surface side of the outer edge portion 50a of the cover 50. It is preferable that the resin layer on the cover 50 is made of rubber, or expandable resin, for example, expandable polyethylene among
5 the resin. This is because elasticity is required for the resin layer on the cover 50 when the cover is opened or closed. In Fig. 27, reference 1x denotes an upper caulked portion of the outer cylinder 1.

In addition, a spacer may be interposed between the cover
10 50 and the welding wire coil 10 in the interior of the container. In this case, it is preferable that the above low oxidizing component elution sheet layer is disposed on a contact surface of the space with the wire. As a result, the wire can be surely prevented from being rusted.

15 (Outer Cylinder Caulked Portion Reinforcement)

Figs. 28 and 29 show an example of reinforcing the caulked portion of the container outer cylinder. Fig. 28 is a cross-sectional view showing the main portion of an upper caulked portion 1x and an upper end portion 1y of the outer
20 cylinder 1. Fig. 29 is a cross-sectional view showing the main portion of a lower caulked portion 1m and a lower end portion 1n of the outer cylinder 1. In Figs. 28 and 29, reference 18a and 18b denote galvanized steel panels provided on the outer surfaces of the upper caulked portion 1x of the outer cylinder

1 and the lower caulked portion 1m of the outer cylinder 1, respectively. Those galvanized steel panels 18a and 18b are disposed in annular configurations corresponding to the outer surface configurations of the respective caulked portions and
5 the respective end portions.

As described above, the container is commonly required to provide a constant pressure capacity for the outer cylinder 1. When the container is used, stored or transported, a large load is exerted on the respective caulked portion or the
10 respective end portions of the outer cylinder. Also, there is the high possibility that the laminated sheets turn brittle from the respective caulked portions and the respective end portions of the outer cylinder under a rainy or wet ambient atmosphere. Accordingly, in order to hold and ensure the
15 pressure capacity of the outer cylinder 1, it is preferable to commonly provide a galvanized steel panel on the outer surfaces of the respective caulked portions and the respective end portions of the outer cylinder, as described above. In this situation, in order to improve a corrosion resistance of
20 the steel panel per se, a galvanized steel panel is provided. A corrosive resistant coated steel panel may be employed instead of the galvanized steel panel, but gets expensive as compared with the galvanized steel panel.

(Lifting Sling)

Figs. 30 and 31 show an example in which a lifting sling is fitted onto a welding wire container taking transportation by a crane or the like into consideration as a problem common to the respective aspects of the above container. Fig. 30 is a front view of a lifting sling, and Fig. 31 is a side view of the lifting sling when the lifting sling is fitted to the container outer cylinder. In Fig. 30, a lifting sling 51 is made up of a gripper (handle) 52 obtained by integrating round bars into a lattice. The gripper 52 is pivotally supported to a bearing 53a of a dolly block 53 disposed on the outer surface of the outer cylinder 1 with an upper horizontal lattice 52a as an axial portion. On the other hand, a corresponding dolly block 55 is also disposed on the inner surface of the outer cylinder 1. The dolly blocks 53 and 55 are firmly fixed to the outer cylinder 1 by rivets 54 so as to sandwich the outer cylinder 1 therebetween. Four rivets 54 are disposed at four corners of the dolly block 53, and the dolly blocks 53 and 55 are firmly fixed to each other through insertion holes defined on the outer cylinder 1 side. The rivets may be replaced by other known fastening means such as bolts.

An example in which the lifting sling 51 is firmly fixed to the upper outer surface of the outer cylinder is described above. However, the lifting sling 51 per se is not limited to this structure, and another known dolly block may be

appropriately applied.

In the case where the above lifting sling is provided, it is always necessary to bore holes into which the rivets 54 are inserted in the outer cylinder 1. Moreover, because an excessive load is exerted on the holes by slinging the welding wire container, a gap occurs between the fastening means and the outer cylinder in the hole. Then, there is the high possibility that moisture and humidity enter the interior of the container from the gap. Also, the lifting sling must be made of iron or steel from the viewpoints of the strength and durability of the lifting sling per se. As a result, the external lifting sling is liable to be rendered electrically conductive to the welding wire in the interior of the container. In the case where the conduction occurs during welding, there is the possibility that an electric shock or spark is developed. Therefore, for the safety against the electric shock or spark, it is preferable that the rear surface side (inner surface side) portion of the outer cylinder is coated with an electric insulator to form an insulating layer 44, as shown in Fig. 31.

(Surface Fastener for Locking Strings)

In the welding wire container according to the embodiment of the second aspect of the present invention, it is more preferable to provide surface fasteners for locking strings.

Fig. 32 is a cross-sectional view showing a welding wire

container having the surface fasteners for locking the strings in accordance with an embodiment of the present invention. Fig. 33 is an enlarged plan view showing a surface fastener portion at a string upper end portion in Fig. 32.

5 As shown in Fig. 32, a string 66 has its lower end portion caught up and fixed by the bottom portion 67 of the welding wire container 80. The string 66 extends upward between the coiled stacked body of the welding wire 63 and inner surface of the outer cylinder 61, and passes through a gap between the
10 retainer plate 64 and the inner surface of the outer cylinder 61. Then, the string 66 passes through the inner surface side of the ring 65 and extends up to the upper end.

 As shown in Fig. 33, the upper end portion of the string 6 is, for example, stitched onto the loop side member 71 of
15 the surface fastener 68. The loop side member 71 of the surface fastener 68 is locked to the hook side member 72 of the surface fastener which is adhered to the upper portion of the inner surface of the outer cylinder 61 of the welding wire container 80 with, for example, a rubber cohesive agent. The width of
20 the loop side member 71 may be smaller than, equal to or larger than the width of the string 66. Also, the upper end portion of the loop member 71 may coincide with or may not coincide with the upper end portion of the string 66. For example, the upper end portion of the loop member 71 may be protruded upward

from the upper end portion of the string 66, or may be shorter than the latter. The joint of the string 66 to the loop member of the surface fastener 68 may be performed by externally stitching or adhering with an adhesive.

5 The ring 65 can travel down together with the retainer plate 64. During the move-down process, the string 66 is held by the ring 65 and envelopes the outer circumstance of the wire 63 and the upper surface of the retainer plate 64. With the above action, the string 66 prevents the wire 63 from being
10 protruded upward from the gap between the outer circumstance of the retainer plate 64 and the inner surface of the outer cylinder 61. The loop side member 71 and the hook side member 72 may be replaced with each other.

 The hook side members 72 of the surface fasteners 68 are,
15 for example, 10 mm to 50 mm in the width and 50 mm to 200 mm in the length. The hook side members 72 are adhered and fixed along the inner circumferential direction of the outer cylinder 61 as many as the number of the strings 66. On the other hand, the loop side members 71 are, for example, 10 mm to 50 mm in
20 the width and 10 mm to 200 mm in the length. The loop side member 71 is fitted to the upper end portion of the string 66. The hook side member 72 can be disposed over the entire circumstance of the outer cylinder 61 along the inner circumferential direction of the outer cylinder 61 of the

welding wire container 80.

The surface fastener 68 has the loop side member and the hook side member as with the surface fastener 30 shown in Fig. 21. The loop-shaped projections of the loop side member and the hook-shaped projections of the hook side member 74 intertwine with each other. As a result, the upper end portion of the string 66 can be locked to the inner surface of the outer cylinder 61.

Since the surface fastener 68 is made of a flexible material, the surface fastener 68 can be stuck along the inner surface of the welding wire container. Accordingly, the surface fastener does not drop out even if the surface fastener is affixed to the inner surface of the container with a two-sided tape. The projections of the hook side member 72 and the loop side member 71 of the surface fastener 68 are made of, for example, a single material or a combined material of plastic such as nylon, polypropylene or polyester.

Subsequently, the operation of the welding wire container structured as described above will be described.

When the welding wire 63 drops down within the welding wire container 80 in the form of a loop, for example, three strings 66 are pulled upward along the inner surface of the outer cylinder 61. Then, the welding wire 63 drops down to the inner side of the outer cylinder 61 in the form of coils in a state

where the strings 66 are locked with the surface fasteners 68. Then, after the completion of drop-down, the retainer jig 64 is put on the welding wire coil. Thereafter, the strings 66 are unlocked from the surface fasteners 68, and the ring 65
5 is put on the retainer plate 64 after the three strings 66 has passed through the inner side of the ring 65. Thereafter, the upper end portion of each of the strings 66 is lifted upward, and the loop member 71 of the surface fastener which is fitted to the upper end portion of the string 66 is abutted against
10 and locked with the hook side member 72 of the surface fastener 68 which is fixed to the upper inner surface of the outer cylinder 61. With the above structure, the ring 65 can move down together with the retainer plate 64. During the move-down process, the string 66 is held by the ring 65 and envelopes
15 the outer circumstance of the wire 63 and the upper surface of the retainer plate 64. With the above action, the string 66 prevents the wire 63 from being protruded upward from the gap between the outer circumstance of the retainer plate 64 and the inner surface of the outer cylinder 61.

20 The welding wire is used, and the ring 65 that is held by the string 66 moves down together with the retainer plate 64 as the height of the welding wire laminate gets lower, thereby preventing the wire 3 from being protruded.

According to this embodiment, since the upper end portion

of the string is locked to the upper portion of the outer cylinder 61 with the surface fastener 68, the locking strength in a shear direction is high, and the string does not drop out halfway. Also, since the surface fastener 68 has flexibility, 5 the adhesion property to the inner surface of the welding wire container is excellent and is not peeled off. Therefore, the upper end portion of the string 66 can be surely locked. Accordingly, there is no disadvantage of a failure to feed the welding wire 63 due to the drop out of the string 66. In 10 addition, since the upper end portion of the string 66 is locked with the surface fastener 68, the removal of the string 66 is easy, and the workability is improved.

Also, the surface fasteners 68 can be iteratively employed, and is inexpensive as compared with the conventional 15 buckle, and the running costs are also low.

In the present invention, when the hook side member 72 or the loop side member 71 of the surface fastener 68 is fixed to the inner surface of the outer cylinder 61, for example, a rubber cohesive agent or a resin adhesive is preferably 20 employed. However, the present invention is not limited to this structure, and another adhering means can be applied if the adhering means has the same adhesive force.

In the present invention, contrary to the above examples, it is possible that the loop side member is adhered to the outer

cylinder, and the string 6 is stitched onto the hook side member.

The foregoing description of the preferred embodiments of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention. The embodiments were chosen and described in order to explain the principles of the invention and its practical application to enable one skilled in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the claims appended hereto, and their equivalents.

WHAT IS CLAIMED IS:

1. A welding wire container in which a welding wire coil is housed, comprising:

a paper outer cylinder;

5 a bottom plate that is held by an inner portion of the outer cylinder at a caulked portion of a lower portion of the outer cylinder, and forms a bottom portion;

a retainer jig that is mounted on the welding wire coil and travels downward with a reduction in the filler coil wire;

10 and

an annular member that is mounted on the retainer jig and has an outer diameter which is smaller than the smallest inner diameter of the outer cylinder,

wherein the retainer jig comprises a tube portion that
15 is formed by rolling up a band-like member and has an adjustable diameter, and a plurality of blade portions that extend from an inner edge of a lower portion of the tube portion toward a center of the tube portion, and

wherein when the welding wire is pulled out of the
20 container, the annular member serves as a plummet to the retainer jig.

2. A welding wire container in which a welding wire coil is housed, comprising:

a paper outer cylinder;

a bottom plate that is held by an inner portion of the outer cylinder at a caulked portion of a lower portion of the outer cylinder, and forms a bottom portion; and

a retainer jig that is mounted on the welding wire coil
5 and travels downward with a reduction in the filler coil wire,

wherein the retainer jig comprises two annular portions on an upper surface side and a lower surface side of the retainer jig, an outer diameter of the annular portion at the lower surface side is smaller than the smallest inner diameter of
10 the outer cylinder, and an outer diameter of the annular portion at the upper surface side is larger than the smallest inner diameter of the outer cylinder and smaller than the largest inner diameter of the outer cylinder.

3. A welding wire container in which a welding wire
15 coil is housed, comprising:

a paper outer cylinder;

a bottom plate that is held by an inner portion of the outer cylinder at a caulked portion of a lower portion of the outer cylinder, and forms a bottom portion; and

20 a retainer jig that is mounted on the welding wire coil and travels downward with a reduction in the filler coil wire,

wherein the retainer jig comprises an annular plate having an outer diameter that is smaller than the smallest inner diameter of the outer cylinder, and a plurality of blade

portions are disposed on the annular plate so as to project upward and extend in a circumferential direction of the annular plate.

4. The welding wire container according to any one
5 of claims 1 to 3, wherein the welding wire is so stacked as to form a cylindrical cavity in the center of a circular locus while moving a central axis of the welding wire along the circular locus, and the retainer jig is located coaxially with the cavity.

10 5. The welding wire container according to any one of claims 1 to 3, further comprising a paper inner cylinder which is fixed on the bottom plate and arranged coaxially with the outer cylinder in the interior of the outer cylinder,
wherein an inner diameter of the retainer jig is larger
15 than an outer diameter of the inner cylinder.

6. The welding wire container according to claim 2, further comprising: a plurality of strings that are arranged between the outer cylinder and the welding wire coil and extend in the height direction of the outer cylinder, and a ring that
20 is arranged between the plurality of strings and the outer cylinder so as to be coaxial with the outer cylinder, and held to the annular portions.

7. The welding wire container according to any one of claims 1 to 3, further comprising a fastener which is

disposed on an upper portion of the inner surface of the outer cylinder and locks an unwound trailing edge of the welding wire coil,

wherein the unwound trailing edge of the welding wire
5 coil which is locked with the fastener is joined to the unwound leading edge of the welding wire coil which is housed in another container from which a welding wire is subsequently unwound so as to consecutively unwind a plurality of welding wire coils.

8. The welding wire container according to any one
10 of claims 1 to 3, wherein the inner surface of the outer cylinder and the outer surface of the inner cylinder are coated with a resin layer made of one of a moisture impermeability resin and a low moisture permeability resin.

9. The welding wire container according to any one
15 of claims 1 to 3, wherein the outer cylinder comprises a laminated body of eight or more paper sheets that are coated with a resin layer having at least one layer made of one of a moisture impermeability resin and a low moisture permeability resin, and a paper sheet layer that is 10 ppm or less in elution
20 chlorine ion density and 80 ppm or less in elution sulfate ion density is formed on an inner surface of the outer cylinder which is in contact with the welding wire.

10. The welding wire container according to claim 9, wherein a gas impermeable film is laminated on the paper sheet

layer on the inner surface of the outer cylinder.

11. The welding wire container according to any one of claims 1 to 3, wherein a repellant agent is coated on the outer surface of the outer cylinder.

5 12. The welding wire container according to any one of claims 1 to 3, wherein a resin layer made of one of a moisture impermeability resin and a low moisture permeability resin is laminated on the inner surface of the bottom plate.

10 13. The welding wire container according to any one of claims 1 to 3, wherein an annular sealing member made of one of resin and rubber is disposed on a contact portion of the cover of the welding wire container with the upper end portion of the outer cylinder.

15 14. The welding wire container according to any one of claims 1 to 3, wherein a pair of lifting slings are fitted on the upper outer surface of the outer cylinder, and an insulator is coated on the respective inner surfaces of portions of the outer cylinder on which the lifting slings are fitted.

20 15. The welding wire container according to any one of claims 1 to 3, wherein caulked portions are provided on an upper end portion and a lower end portion of the outer cylinder, respectively, and galvanized annular steel panels having annular configurations corresponding to the outer surface

configurations of the respective caulked portions are laminated on the outer surfaces of the caulked portions.

16. The welding wire container according to claim 6, wherein the upper end portion of each of the strings is locked
5 to the inner surface of the outer cylinder with a surface fastener.