[CLAIMS]

[Claim 1]

A pipe connection apparatus comprising:

an outer body having a pipe mount part having a pipe insertion space opened rearward so that a pipe end is inserted into the pipe insertion space; and

a swaging ring configured to come into contact with and press at least a part of the pipe mount part while surrounding at least a part of the pipe mount part,

wherein the pipe mount part comprises:

a first swaged portion having a first inner protruding portion;

a second swaged portion having a second inner protruding portion and positioned to be spaced apart forward from the first swaged portion at an interval;

a connection portion configured to connect the first swaged portion and the second swaged portion;

a front extension portion extending forward from the second swaged portion; and

a rear extension portion extending rearward from the first swaged portion and having a rear outer protruding portion,

wherein the swaging ring comprises:

a first ring portion having a first ring inner diameter larger than an outer diameter of the pipe end;

a first tapered portion extending forward from a front end of the first ring portion so that an inner diameter thereof increases forward;

a second ring portion positioned forward of the first tapered portion and having a second ring inner diameter larger than the first ring inner diameter; and

a second tapered portion extending forward from a front end of the second ring portion so that an inner diameter thereof increases forward; and

an inner groove portion configured to connect the first tapered portion and the second ring portion and recessed outward further than a front end of the first tapered portion and a rear end of the second ring portion, and

wherein the inner groove portion engages with the rear outer protruding portion to restrict a rearward movement of the swaging ring in a state in which components are completely assembled so that an inner peripheral surface of the second ring portion is in contact with an outer peripheral surface of the first swaged portion and

wherein the components are the second ring portion and the first swaged portion.

[Claim 2]

The pipe connection apparatus of claim 1, wherein the swaging ring is provided so that the second tapered portion is not in contact with the outer body in the state in which the components are completely assembled.

[Claim 3]

The pipe connection apparatus of claim 2, wherein a first groove portion is formed in the connection portion,

wherein the first groove portion is recessed so as not to be in contact with the second tapered portion in the state in which the components are completely assembled, and

wherein the first groove portion is recessed so as not to be in contact with the first tapered portion in a swaging completion state in which an inner peripheral surface of the first ring portion is in contact with the outer peripheral surface of the first swaged

portion and the inner peripheral surface of at least a part of the second ring portion is in contact with an outer peripheral surface of the second swaged portion.

[Claim 4]

The pipe connection apparatus of claim 2, wherein a second groove portion is formed in the front extension portion and recessed so as not to be in contact with the second tapered portion in a swaging completion state in which an inner peripheral surface of the first ring portion is in contact with the outer peripheral surface of the first swaged portion and the inner peripheral surface of at least a part of the second ring portion is in contact with an outer peripheral surface of the second swaged portion.

[Claim 5]

The pipe connection apparatus of claim 2, wherein the rear outer protruding portion is formed at a position that serves as a restriction projection that restricts a rearward movement of the swaging ring in a swaging completion state in which an inner peripheral surface of the first ring portion is in contact with the outer peripheral surface of the first swaged portion and the inner peripheral surface of at least a part of the second ring portion is in contact with an outer peripheral surface of the second swaged portion.

[Claim 6]

The pipe connection apparatus of claim 5, wherein the pipe mount part further comprises a restriction projection portion formed forward of the front extension portion and configured to restrict a forward movement of the swaging ring in the swaging completion state.

[Claim 7]

The pipe connection apparatus of claim 5, wherein the rear extension portion

has an auxiliary inner protruding portion, and

wherein the auxiliary inner protruding portion is provided so that a protruding inner diameter of a protruding end of the auxiliary inner protruding portion is smaller than a protruding inner diameter of a protruding end of the first inner protruding portion in the state in which the components are completely assembled.

[Claim 8]

The pipe connection apparatus of claim 1, wherein an outer peripheral surface of the first ring portion has a predetermined outer diameter in a forward/rearward direction, and an inner peripheral surface of the first swaged portion has a predetermined outer diameter in the forward/rearward direction, such that an inner peripheral surface of the first ring portion and the outer peripheral surface of the first swaged portion are in surface contact with each other in a swaging completion state in which the inner peripheral surface of the first ring portion is in contact with the outer peripheral surface of the first swaged portion and the inner peripheral surface of at least a part of the second ring portion is in contact with an outer peripheral surface of the second swaged portion.

[Claim 9]

The pipe connection apparatus of claim 8, wherein the first inner protruding portion is pressed by a portion of the first ring portion, which has the predetermined outer diameter in the forward/rearward direction, in the swaging completion state.