[CLAIMS]

[Claim 1]

An object grasping device configured to grasp an outer peripheral surface of an object, the object grasping device comprising:

an upper frame provided to have an inner peripheral surface shape corresponding to an outer peripheral surface of an upper portion of the object so as to surround the outer peripheral surface of the upper portion of the object in a grasping completion state in which the object grasping device grasps the outer peripheral surface of the object;

a left lower frame provided to have an inner peripheral surface shape corresponding to an outer peripheral surface of a left lower portion of the object so as to surround the outer peripheral surface of the left lower portion of the object in the grasping completion state;

a right lower frame provided to have an inner peripheral surface shape corresponding to an outer peripheral surface of a right lower portion of the object so as to surround the outer peripheral surface of the right lower portion of the object in the grasping completion state;

a left link member configured to link a left portion of the upper frame and a middle portion of the left lower frame by means of hinges each having a rotating axis defined in a forward/backward direction; and

a right link member configured to link a right portion of the upper frame and a middle portion of the right lower frame by means of hinges each having a rotating axis defined in the forward/backward direction~~.~~,

~~[Claim 2]~~

~~The object grasping device of claim 1,~~ wherein a grasping preparation state

before the object is introduced between the left link member and the right link member is a state in which the left lower frame surrounds the outer peripheral surface of the left upper portion of the object and the right lower frame surrounds the outer peripheral surface of the right upper portion of the object,

wherein the grasping completion state is a state in which the left lower frame is rotated counterclockwise based on the grasping preparation state and surrounds the outer peripheral surface of the left lower portion of the object and the right lower frame is rotated clockwise based on the grasping preparation state and surrounds the outer peripheral surface of the right lower portion of the object, ~~and~~

wherein the left link member and the right link member are not directly connected to each other, and the left link member and the right link member are provided so that an interval between the left lower frame and the right lower frame forms a spacing gap through which the object passes in an intermediate grasping state in which the grasping preparation state is switched to the grasping completion state~~.~~,

~~[Claim 3]~~

~~The object grasping device of claim 1,~~ wherein when a pushing pressure is applied to the object grasping device in the grasping preparation state, the left lower frame and the right lower frame rotate and reach the grasping completion state via the intermediate grasping state in which the spacing gap is formed~~.~~,

wherein the left link member and the right link member provide a restoring force to convert to the grasping completion state, when the pushing pressure by the object is applied to the left lower frame and the right lower frame in the grasping preparation state.

[Claim ~~4~~ 2]

The object grasping device of claim 1, wherein the upper frame comprises:

an upper body; and

an upper insert having an inner peripheral surface shape corresponding to the outer peripheral surface of the upper portion of the object and detachably fixed to the upper body,

wherein the left lower frame comprises:

a left lower body; and

a left lower insert having an inner peripheral surface shape corresponding to the outer peripheral surface of the left lower portion of the object and detachably fixed to the left lower body, and

wherein the right lower frame comprises:

a right lower body; and

a right lower insert having an inner peripheral surface shape corresponding to the outer peripheral surface of the right lower portion of the object and detachably fixed to the right lower body.

[Claim ~~5~~ 3]

The object grasping device of claim ~~4~~2, wherein one or more of the upper insert, the left lower insert, and the right lower insert have an open hole opened at one side thereof and having an inner width larger than an opening width, and

wherein a fastening member, which has a first width larger than the opening width and equal to or smaller than the inner width and has a second width which is equal to or smaller than the opening width and is a width in a direction orthogonal to a direction of the first width, is inserted into the open hole and rotated, such that one or more of the upper insert, the left lower insert, and the right lower insert are detachably fixed.

[Claim ~~6~~ 4]

The object grasping device of claim ~~1~~2, wherein in the grasping completion state, an end of the left lower insert and an end of the right lower insert, which face each other, are provided to engage with each other in the form of an interlock structure, and

wherein the interlock structure is provided in a form that restricts individual movements in the forward/backward direction and permits a switch from the grasping

preparation state to the grasping completion state.

[Claim ~~7~~ 5]

The object grasping device of claim ~~6~~4, wherein in the grasping completion state, an end of the upper insert and the end of the left lower insert, which face each other, are provided to engage with each other in the form of the interlock structure, and the end of the upper insert and the end of the right lower insert, which face each other, are provided to engage with each other in the form of the interlock structure.

[Claim ~~8~~ 6]

The object grasping device of claim 1, further comprising:

a link angle restriction unit provided to restrict a rotation angle of the left link member and a rotation angle of the right link member within a predetermined angle range.

[Claim ~~9~~ 7]

The object grasping device of claim ~~8~~6, wherein the link angle restriction unit comprises:

a left slot member protruding and extending from the left link member toward the right link member and having a left slot;

a right slot member protruding and extending from the right link member toward the left link member so as to partially intersect the left slot member and having a right slot formed to overlap the left slot in the forward/backward direction;

a restriction member having a link angle restriction hole formed to overlap the portion where the left slot and the right slot overlap each other;

a restriction body connected to the upper frame such that the restriction member is mounted on the restriction body so as to be movable between the left link member and the right link member in an upward/downward direction; and

a restriction pin fastened to traverse, in the forward/backward direction, an overlap region in which all the left slot, the right slot, and the link angle restriction hole overlap one another.

[Claim ~~10~~ 8]

The object grasping device of claim ~~9~~7, wherein a catching groove is formed in an outer surface of the restriction member, and

wherein the link angle restriction unit further comprises:

a catching unit provided to be caught by the catching groove or released from the catching groove in the grasping completion state; and

a locking mechanism configured to selectively provide any one of a locking holding mode that prevents the catching unit from being separated from the catching groove in the grasping completion state and a locking releasing mode that permits the separation of the catching unit from the catching groove in the grasping completion state.

[Claim ~~11~~ 9]

The object grasping device of claim ~~10~~8, wherein the link angle restriction unit further comprises:

an elastic unit configured to elastically press the catching unit toward the catching groove so that the catching unit is caught by the catching groove, and

wherein automatic locking is performed by the elastic unit in the grasping completion state.

[Claim ~~12~~ 10]

The object grasping device of claim ~~10~~8, wherein one or both of an inner upper surface and an inner lower surface of the catching groove are formed as an inclined surface so that the separation of the catching unit is guided when the restriction member

moves in the upward/downward direction in the locking releasing mode.

[Claim ~~13~~ 11]

The object grasping device of claim ~~10~~8, wherein the locking mechanism is provided to have an available space formed outside the catching groove so as to be equal to or larger than a width of the catching unit in the locking releasing mode, and have an available space formed outside the catching groove so as to be smaller than the width of the catching unit in the locking holding mode.

[Claim ~~14~~ 12]

The object grasping device of claim ~~13~~11, wherein the restriction body has a receiving space in which the catching unit is disposed,

wherein the restriction member is disposed to be movable in the upward/downward direction through a through hole formed in the receiving space, and

wherein the locking mechanism is placed in any one of the locking releasing mode and the locking holding mode by being moved in the upward/downward direction.

[Claim ~~15~~ 13]

The object grasping device of claim 1, wherein the hinge connection between the left link member and the middle portion of the left lower frame is implemented by a snap structure comprising a cam part and a cam follower.

[Claim ~~16~~ 14]

A swaging-type tube fitting fastening tool comprising:

an object grasping device according to claim 1 configured to grasp a first object; and

a fastening force providing device configured to adjust a spacing distance between the object grasping device and a neighboring object grasping device disposed adjacent to the object grasping device and configured to grasp a second object.

[Claim ~~17~~ 15]

The swaging-type tube fitting fastening tool of claim ~~16~~14, further comprising:

the neighboring object grasping device.