

DESCRIPTION

TITLE

5

JIG FOR PILE DRIVING

FIELD

[0001]

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The present invention relates to a jig for pile driving placed inside a rotational equipment for casing and used for gripping a pile having a blade sticking out in a direction perpendicular to a pile axis.

BACKGROUND

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[0002]

In the past, for a rotational equipment for casing for gripping a pile (screwed pile) having a blade sticking out in a direction perpendicular to a pile axis, for example, the tubing machine such as shown in PTLs 1 to 5 etc. have been proposed.

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[0003]

PTL 1 discloses a tubing machine with chuck collars formed at their inner circumferential surfaces with spiral shaped recessed grooves through which a spiral shaped blade of a screwed pile is made to pass.

[0004]

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PTL 2 discloses a method of driving in a screwed pile by operating a chuck cylinder to make an inner-diameter of a plurality of chuck collars somewhat larger than a diameter of a body of the screwed pile, hoisting up the screwed pile by a crane to bring a (drilling) blade close to recessed grooves, then making blade pass through collars to a position below the chuck collars, and operating the chuck cylinder to grip the body of the screwed pile with the inner-circumferential surfaces of the plurality of chuck collars and making the casing machine rotate.

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[0005]

PTL 3 discloses a tubing machine providing detachable chuck plates at an inner-circumferential surfaces of chuck collars provided at a casing tube insertion hole of the tubing machine, wherein the chuck plates are attached to the chuck collars through mounting seats, each mounting seat is provided with a pair of end face abutting projections and a pair of side face abutting projections putting in center parts of the two side faces of the chuck plate, and an inner-

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circumferential surface of each chuck collar is formed with a mounting seat engagement groove in a state with open top and bottom ends.

[0006]

PTL 4 discloses a tubing machine attaching a detachment member in an attachment
5 recess of detachment member provided at an inner-circumferential surface of a chuck collar of the tubing machine, attaching a chuck plate at an attachment recess of a chuck plate, screwing a detachment bolt into a female thread hole provided in the detachment member, and detaching the detachment member and chuck plate from the attachment recesses by the reaction of the front
10 end of the detachment bolt abutting against the bottom surface of the attachment recess of the detachment member.

[0007]

PTL 5 discloses rotary press-in pile driving machine which prevents the misalignment from the pile axis of the driving machine while enables the rotary press-in pile to be driven into the ground by a rotational operation when the installation site is the seabed or lakebed and when
15 the ground surface is slanted on the land or seabed or otherwise when the site is unstable, wherein the frame or elevator mechanism is provided with an upper subchuck and a lower subchuck for detachably gripping the rotary press-in pile at an upper side and a lower side of a main chuck.

20 [CITATION LIST]

[PATENT LITERATURE]

[0008]

[PTL 1] Japanese Unexamined Patent Publication No. 2000-248549

[PTL 2] Japanese Unexamined Patent Publication No. 2003-41585

25 [PTL 3] Japanese Unexamined Patent Publication No. 2013-119768

[PTL 4] Japanese Unexamined Patent Publication No. 2014-201878

[PTL 5] Japanese Unexamined Patent Publication No. 2014-129680

SUMMARY

30 [TECHNICAL PROBLEM]

[0009]

Here, the jig for pile driving placed inside the rotational equipment for casing has a function of gripping the pile. For this reason, the size of the jig for pile driving is proportional to
35 the diameter of the pile and/or the blade. As the diameter of the pile or the blade become larger, it becomes necessary to form the jig for pile driving larger. However, if enlarging the jig for pile

driving, the issue arises that the bearing pressure for gripping the pile easily unevenly acts in the pile axial direction or direction perpendicular to the pile axis.

[0010]

That is, depending on the balance of the weight of the jig for pile driving, due to
5 looseness of the machine/jig, sometimes the jig for pile driving tilts. Due to this, sometimes only part of the spiral collar abuts against the pile and the bearing pressure for gripping the pile becomes uneven. Furthermore, as a result, there is the problem that only part of the spiral collar becomes worn. Due to the unsymmetrical pressure, for example, part of the pile becomes dented, the pile becomes damaged, or other issues are liable to arise.

[0011]

On this point, PTLs 1 to 5 do not describe or suggest the problems and countermeasures in the case of enlarging a jig for pile driving explained above. For this reason, with the arts disclosed in PTLs 1 to 5, it is hard to make the bearing pressure for gripping a pile act evenly.

[0012]

15 Therefore, the present invention was devised in consideration of the above-mentioned problems and has as its object to provide a jig for pile driving enabling the bearing pressure for gripping the pile to act evenly and enabling sliding and crushing of the pile to be prevented.

[0013]

Furthermore, in the present invention, another object is to enable prevention of the
20 bearing pressure for gripping the pile from being unable to be made to act evenly due to dirt etc. depositing on the spiral collar at the time of the driving operation.

[SOLUTION TO PROBLEM]

[0014]

25 The present invention was made in consideration of the above problem and has as its gist the following:

[0015]

(1) A jig for pile driving placed inside a rotational equipment for casing and provided with a spiral collar for gripping a pile having a blade sticking out in a direction perpendicular to
30 a pile axis, the spiral collar comprising a connecting part extending in a pile axial direction and connected to the rotational equipment for casing, and a gripping part joined with the connecting part and extending in a direction perpendicular to the pile axis; the spiral collar gripping the pile through the gripping part, a weight of the connecting part being 1.05 times or more a weight of the gripping part, the connecting part and the gripping part being divided into two or more
35 sections along a pile circumferential direction, and the gripping part being divided into two or more sections along the pile axial direction, each of the sections comprising an apical surface

facing an outside surface of the pile and divided into two regions given an angle at a bent part extending in the pile axial direction, and a pair of contact surfaces of planar shapes arranged at the apical surface straddling the bent part.

[0016]

5 (2) The jig for pile driving according to (1), wherein seen from a direction perpendicular to the pile axis, an area of the gripping part getting touch with the pile is 1/30 time to 2/3 time an area of the connecting part getting touch with the pile.

[0017]

10 (3) The jig for pile driving according to (1) or (2) wherein a length of the gripping part in the direction perpendicular to the pile axis is a length of 0.1 time to 1.0 time a pile diameter and is longer than a length of the blade sticking out from the pile in the direction perpendicular to the pile axis, the spiral collar has a plurality of groove parts for allowing the blade to turn between the pair of the sections divided along the pile axial direction, an engaging groove part provided at a topmost part of the plurality of the groove parts in the pile axial
15 direction and formed with a step difference in the pile axial direction with respect to another groove part adjoining it along the pile circumferential direction is for engaging the blade, and a disengaging groove part provided at a bottommost part of the plurality of the groove parts in the pile axial direction and formed with a step difference in the pile axial direction with respect to another groove part adjoining it along the pile circumferential direction is for disengaging the
20 blade turning from the engaging groove part through the plurality of the other groove parts.

[0018]

 (4) The jig for pile driving according to any one of (1) to (3) wherein the contact surfaces comprises convexo-concave parts in the surface.

[0019]

25 (5) A tubing equipment comprising a jig for pile driving according to any one of (1) to (4).

[ADVANTAGEOUS EFFECTS OF INVENTION]

[0020]

30 According to the present invention, it is possible to hold easily the front faces of the gripping part facing the outside surface of the pile parallel to the pile axial direction and possible to make the bearing pressure for gripping the pile evenly act when pushing the gripping part against the pile regardless of the size of the jig for pile driving. Furthermore, it becomes possible to prevent the bearing pressure for gripping the pile becoming unable to act evenly due to the
35 deposition of dirt etc. at the time of the driving operation.

BRIEF DESCRIPTION OF DRAWINGS

[0021]

FIG. 1 is a cross-sectional view showing one example of a jig for pile driving according to the present invention.

FIG. 2 is a plan view showing one example of a jig for pile driving according to the present invention.

FIG. 3A is a cross-sectional view of 3A-3A in FIG. 2, while FIG. 3B is a cross-sectional view of 3B-3B in FIG. 2.

FIG. 4 is a cross-sectional view along a pile circumferential direction showing one example of groove parts formed in a spiral shape.

FIG. 5A is a perspective view showing one example of an apical surface and contact surfaces, FIG. 5B is a front view showing one example of a contact surface, and FIG. 5C is a cross-sectional view showing one example of a contact surface.

FIG. 6A is a plan view showing one example of contact surfaces before wear in a jig for pile driving according to the present invention, FIG. 6B is an enlarged view of a broken line box 6B in FIG. 6A, FIG. 6C is a plan view showing one example of contact surfaces after wear in a jig for pile driving according to the present invention, and FIG. 6D is an enlarged view of a broken line box 6D in FIG. 6C.

FIG. 7A is a plan view showing one example of contact surfaces before wear in a prior art, FIG. 7B is an enlarged view of a broken line box 7B in FIG. 7A, FIG. 7C is a plan view showing one example of contact surfaces after wear in a prior art, and FIG. 7D is an enlarged view of a broken line box 7D in FIG. 7C.

DESCRIPTION OF EMBODIMENTS

[0022]

Below, embodiments of the jig for pile driving according to the present invention will be explained in detail while referring to the drawings.

[0023]

A jig for pile driving 2 according to the present invention, as shown in FIG. 1, is placed inside a rotational equipment for casing 10 provided in a tubing equipment 1. The jig for pile driving 2 according to the present invention is one for gripping a pile 8. The jig for pile driving 2 according to the present invention is formed in a ring shape and enables the pile 8 to be inserted through its center.

[0024]

The jig for pile driving 2 according to the present invention is, for example, used for a pile 8 with a diameter of 400φ to 1600φ or so. It can equally apply bearing pressure for gripping the pile 8 regardless of the diameter of the pile 8. Note that, the jig for pile driving 2 according to the present invention is used for a pile 8 having a blade 81 sticking out in a direction X perpendicular to the pile axis. For example, it may be used for a pile 8 having a blade 81 sticking out from the pile 8 in a direction X perpendicular to the pile axis by a length of 0.1 time to 1.0 time the pile diameter.

[0025]

The tubing equipment 1 is for rotating and driving the pile 8 into the ground 9. The tubing equipment 1 is provided on a base frame 5 fastened to the ground 9. The tubing equipment 1 has the rotational equipment for casing 10, cylinders 30, upper subchuck 32, and lower subchuck 33.

[0026]

The cylinders 30 are attached to support columns 6 provided standing on the base frame 5. The cylinders 30 have base parts 31. Through the base parts 31, they control the elevation of the rotational equipment for casing 10 in the pile axial direction Y and rotation in the pile circumferential direction W.

[0027]

The upper subchuck 32 and lower subchuck 33 are attached to the support columns 6. The upper subchuck 32 is provided above the rotational equipment for casing 10. The lower subchuck 33 is provided below the rotational equipment for casing 10. The upper subchuck 32 and lower subchuck 33 are for gripping the pile 8.

[0028]

The rotational equipment for casing 10 is supported by the base parts 31. The rotational equipment for casing 10 has a horizontal bottom plate 11, horizontal top plate 12, elevator cylinders 13, connecting plate 14, body of rotation 15, and support members 16.

[0029]

The horizontal bottom plate 11 is supported through bearings etc. by the base parts 31. The horizontal top plate 12 is arranged above the horizontal bottom plate 11 and is supported through bearings etc. by the connecting plate 14. The horizontal bottom plate 11 and horizontal top plate 12 are ring shaped.

[0030]

The elevator cylinders 13 are provided on the base parts 31. The elevator cylinders 13 control the elevation of the horizontal top plate 12 in the pile axial direction Y and rotation in the pile circumferential direction W through the connecting plates 14. The connecting plate 14 is provided on the elevator cylinders 13 and supports the horizontal top plate 12.

[0031]

The body of rotation 15 is provided on the horizontal bottom plate 11. The body of rotation 15 is formed in a ring shape. It is formed in a taper shape where the top inside circumference is gradually expanded in diameter the further upward. A plurality of support members 16 are provided and are respectively suspended from the horizontal top plate 12. The plurality of support members 16 are arranged along a pile circumferential direction W. The support members 16 are formed in wedge shapes having slanted parts and are provided so that the slanted parts abut against the inside circumference of the body of rotation 15.

[0032]

The jig for pile driving 2 according to the present invention is attached to the surfaces of the plurality of support members 16 facing the pile 8. The jig for pile driving 2 according to the present invention, for example, uses bolts and nuts to be attached to the plurality of support members 16.

[0033]

For example, when using the elevator cylinders 13 to make the plurality of support members 16 move to the lower side in the pile axial direction Y, the size of the diameter surrounded by the support members 16 is reduced. At this time, the force acting on the jig for pile driving 2 according to the present invention from the outer circumferential side to the center side becomes greater. For this reason, when the pile 8 is inserted through the tubing equipment 1, the jig for pile driving 2 according to the present invention can grip the pile 8.

[0034]

Further, when using the elevator cylinders 13 to make the plurality of support members 16 move to the upper side in the pile axial direction Y, the size of the diameter surrounded by the support members 16 is increased. At this time, the force acting on the jig for pile driving 2 according to the present invention from the outer circumferential side to the center side becomes weaker. For this reason, when the pile 8 is inserted through the tubing equipment 1, the state of the jig for pile driving 2 according to the present invention gripping the pile 8 can be released.

[0035]

The jig for pile driving 2 according to the present invention is, for example, as shown in FIG. 2, provided with a spiral collar 20 having a connecting part 21 and gripping part 22. The spiral collar 20 is for gripping the pile 8 through the gripping part 22. The spiral collar 20 is formed in a ring shape.

[0036]

The connecting part 21 is arranged along in the pile axial direction Y and is connected to the support members 16. The gripping part 22 is joined with the connecting part 21 and is arranged along in a direction X perpendicular to the pile axis. The weight of the connecting part

21 is 1.05 times or more the weight of the gripping part 22. For example, if the weight of the connecting part 21 is less than 1.05 times the weight of the gripping part 22, the apical surface of the gripping part 22 more easily slants in the center direction of the pile axis and becomes harder to hold parallel to the pile axial direction Y. For this reason, when the gripping part 22 is pushed out to the pile 8, it becomes difficult to make the bearing pressure for gripping the pile 8 be applied equally.

[0037]

The connecting part 21 and gripping part 22 are formed with inside diameters, outside diameters and lengths in the pile axial direction Y in accordance with the diameter of the pile 8 which is gripped. For example, if the diameter of the pile 8 is 800ϕ , the outside diameter of the connecting part 21 is made 1980ϕ or so, the inside diameter of the connecting part 21 and the outside diameter of the gripping part 22 are made 1600ϕ or so, and the length of the connecting part 21 in the pile axial direction Y is made 850 mm or so.

[0038]

The connecting part 21 and gripping part 22 are divided into two or more sections along the pile circumferential direction W. The numbers of the sections into which the connecting part 21 and gripping part 22 are divided are set in accordance with the diameter of the pile 8 gripped. For example, if the diameter of the pile 8 is 800ϕ , they are divided into eight sections such as shown in FIG. 2 (connecting part sections 21a to 21h and gripping part sections 22a to 22h). Note that, the sets of the connecting part sections 21 and gripping part sections 22 are formed in respectively equal sizes and are arranged separated from each other.

[0039]

The gripping part 22, further, as shown in FIG. 3, is divided into two or more sections along the pile axial direction Y. The number of the sections into which the gripping part 22 is divided is set in accordance with the diameter of the pile 8 gripped. For example, if the diameter of the pile 8 is 800ϕ , it is divided into the four sections shown in FIG. 3A (sections 22aa to 22ad) or the three sections shown in FIG. 3B (sections 22ca to 22cc). Note that, the gripping part sections 22 are formed in respectively equal sizes and are arranged separated by the groove parts 25.

[0040]

At this time, seen from the direction X perpendicular to the pile axis, the total area of the gripping part 22 getting touch with the pile 8 is preferably $1/30$ time to $2/3$ time the total area of the connecting part 21 getting touch with the pile 8. For this reason, for example, it is possible to equally disperse the force pushing against the pile 8 to the sections 22aa to 22ad, 22ca to 22cc of the gripping part sections 22a, 22c.

[0041]

If the area of the gripping part 22 getting touch with the pile 8 is 1/30 or more of the areas of the connecting part 21 getting touch with the pile 8, the load acting on the gripping part 22 does not become that large, so this is preferable. Further, for example, if the area of the gripping part 22 getting touch with the pile 8 is 2/3 time or less of the area of the connecting part 21 getting touch with the pile 8, the variation of the force acting on the gripping part 22 will not become that large. Even if the diameter of the pile 8 becomes large, the bearing pressure for gripping the pile 8 can easily be evenly applied, so this is preferable. In addition, due to the bearing pressure acting on the pile 8 becoming harder to become uneven, it is possible to prevent the pile 8 from being damaged. Further, when making the pile 8 turn and driving it into the ground 9, it becomes easier to make blade 81 turn and easily pass around the gripping part 22, so this is preferable.

[0042]

For example, the area S2a of the gripping part section 22a getting touch with the pile 8 shown in FIG. 3A is a value obtained by multiplying the total of the heights h2aa to h2ad in the pile axial direction Y with the width in the pile circumferential direction W. The area S1a of the connecting part section 21a getting touch with the pile 8 is a value obtained by multiplying the height h1a in the pile axial direction Y with the width in the pile circumferential direction W. Further, for example, the area S2c of the gripping part section 22c getting touch with the pile 8 shown in FIG. 3B is a value obtained by multiplying the total of the heights h2ca to h2cc in the pile axial direction Y with the width in the pile circumferential direction W. The area S1c of the connecting part section 21c getting touch with the pile 8 is a value obtained by multiplying the height h1c in the pile axial direction Y with the width in the pile circumferential direction W. At this time, by making the area S2a 1/30 time to 2/3 time the area S1a and making the area S2c 1/30 time to 2/3 time the area S1c, it is possible to evenly disperse the force pushing against the pile 8.

[0043]

The spiral collar 20, for example, has a plurality of groove parts 25. The groove parts 25 are for allowing the blade 81 to turn. The groove parts 25 are formed between a pair of sections (for example, 22aa, 22ab etc.) divided along the pile axial direction Y. Note that, the length of the gripping part 22 in the direction X perpendicular to the pile axis (for example, the lengths L22a, L22c of FIGS. 3A and 3B) is longer than the blade 81. For this reason, when making the blade 81 turn, it is possible to do this within the groove parts 25, so the blade 81 does not contact the connecting part 21.

[0044]

For example, by making the pile 8 turn in the direction of the arrow mark shown in FIG. 1 and FIG. 2, it is possible to drive the pile 8 into the ground 9. At this time, for example, as

shown by the arrow mark of FIG. 4, it is possible to make the blade 81 pass through the plurality of groove parts 25 and thereby insert the pile 8 without contacting the spiral collar 20.

[0045]

In particular, by forming the plurality of groove parts 25 in a spiral shape along the pile circumferential direction W, it is possible to enable the blade 81 to easily turn. At this time, for example, since the gripping part 22 is divided slanted with respect to the pile circumferential direction W, it is possible to easily form the spiral shaped groove parts 25.

[0046]

Among the plurality of groove parts 25, the engaging groove part 25i provided at the topmost part of the pile axial direction Y is for engaging with the blade 81. The engaging groove part 25i, for example, is formed between the pair of sections 22ga, 22gb obtained by dividing the gripping part 22g. The engaging groove part 25i is formed with a step difference in the pile axial direction Y with respect to another groove part 25 adjoining it along the pile circumferential direction W (in FIG. 4, the groove part 25 provided at the topmost part of the connecting part section 21f in the pile axial direction Y).

[0047]

Among the plurality of groove parts 25, the disengaging groove part 25e provided at the bottommost part of the pile axial direction Y is for disengaging the blade 81 turning from the engaging groove part 25i through the plurality of other groove parts 25. The disengaging groove part 25e, for example, is formed between the pair of sections 22bc, 22bd obtained by dividing the gripping part section 22b. The disengaging groove part 25e is formed with a step difference in the pile axial direction Y with respect to another groove part 25 adjoining it along the pile circumferential direction W (in FIG. 4, the groove part 25 between the section 22cb and the section 22cc). By forming the engaging groove part 25i and disengaging groove part 25e, the turning position when inserting the pile 8 in the spiral collar 20 becomes clearer and it is possible to easily pass the blade 81 through the plurality of groove parts 25.

[0048]

Each section (for example, the sections 22aa to 22ad, 22ca to 22cc shown in FIGS. 3A and 3B) of the gripping part 22, for example, as shown in FIGS. 5A to 5C, has an apical surface 23 and a contact part having a pair of contact surfaces 24a, 24b for contacting the pile 8.

[0049]

The apical surface 23, for example, as shown in FIG. 5A, has a planar shape facing the outer surface of the pile 8 and bent at a bent part 23c extending in the pile axial direction Y. The apical surface 23 is bent in a direction with the bent part 23c at the inside and is divided into two regions having the bent part 23c as a common side. The shapes of the two regions are not particularly limited. For example, they can be made square shapes.

[0050]

By the apical surface 23 having a planar shape, it becomes easy to place the contact surfaces 24. For example, if the apical surface is formed in an arc shape, the contact surfaces have to be formed into arc shapes, it becomes necessary to form a groove in the apical surface, and the contact surfaces cannot be easily placed. As opposed to this, with planar shaped apical surface 23, the contact surfaces 24 do not have to be worked, a groove does not have to be formed at the apical surface 23, and the contact surfaces 24 can be easily placed.

[0051]

Further, by dividing the apical surface 23 into two regions with an angle at the bent part 23c, at the time of installation, it is hard for dirt to deposit. Further, even if dirt deposits, since there is clearance around the bent part 23c, dirt deposited easily drops off starting from there, so it becomes possible to evenly grip the pile without interference from deposited dirt and longer hours of work become possible.

[0052]

The contact surfaces 24 have planar shapes. A pair are arranged at the apical surface 23 straddling the bent part 23c. The pair of contact surfaces 24a, 24b are arranged separated from each other. For example, they are formed into square shapes having equal areas. For this reason, it is possible to make the contact areas at the pair of contact surfaces 24a, 24b contacting the pile 8 equal and possible to make the forces acting on the pile 8 even.

[0053]

The contact surfaces 24, for example, as shown in FIG. 5B and FIG. 5C, may have holes 24h and also, for example, convexo-concave parts 24s on the surfaces of the contact surfaces 24. The holes 24h are for passing bolts and other fastening members when fastening the contact surfaces 24 to the apical surface 23. The number and positions of the holes 24h may be any number and positions. The convexo-concave parts 24s are, for example, for raising the frictional force when gripping the pile 8 and are formed in a plurality of groove shapes or saw tooth shapes.

[0054]

Further, the contact surfaces 24 may be attached movably to the apical surface 23. Here, “attached movably” means, for example, it is attached to be able to rotate about an axis of rotation parallel to the pile axial direction or attaching the contact surfaces to the apical surface by ball joints etc.

[0055]

In the jig for pile driving 2 according to the present invention, for example as shown in FIG. 6A and FIG. 6B, when gripping the pile 8, the plurality of planar shaped contact surfaces 24 (in FIG. 6B, the contact surfaces 24a, 24b) contact the pile 8. For this reason, even if the contact

surfaces 24 become worn, for example, as shown in FIG. 6C and FIG. 6D, it is possible to keep the contact areas of the contact surfaces 24 and pile 8 from changing. Due to this, before and after wear of the contact surfaces 24, it becomes possible to maintain a state where support force for gripping the pile 8 evenly acts.

5 **[0056]**

As opposed to this, for example, as shown in FIG. 7A and FIG. 7B, sometimes contact surfaces 123 formed in arc shapes are used. At this time, in the case where the contact surfaces 123 are worn, for example, as shown in FIG. 7C and FIG. 7D, the contact areas of the contact surfaces 123 and pile 8 greatly change. Due to this, before and after wear of the contact surfaces 123, it becomes difficult to maintain a state where the support force for gripping the pile 8 evenly acts.

10 **[0057]**

According to the jig for pile driving 2 according to the present invention, the weight of the connecting part 21 is 1.05 times or more the weight of the gripping part 22. For this reason, it becomes easy to hold the apical surface 23 of the gripping part 22 facing the outside surface of the pile 8 parallel to the pile axial direction Y. Due to this, regardless of the size of the jig for pile driving 2, when pushing the gripping part 22 against the pile 8, it becomes possible to make the bearing pressure for gripping the pile 8 evenly act.

15 **[0058]**

Further, according to the jig for pile driving 2 according to the present invention, seen from a direction X perpendicular to the pile axis, the area of the gripping part 22 getting touch with the pile 8 is 1/30 time to 2/3 time the area of the connecting part 21 getting touch with the pile 8. For this reason, it becomes possible to evenly disperse the force pushing against the pile 8 to the sections of the gripping part 22. Due to this, when pushing the gripping part 22 against the pile 8, the bearing pressure for gripping the pile 8 is made to evenly act and the frictional force for gripping the pile 8 becomes improved.

20 **[0059]**

Further, according to the jig for pile driving 2 according to the present invention, a pair of contact surfaces 24 is placed at the apical surface 23 straddling the bent part 23c. For this reason, compared with the case where the contact surfaces 24 or apical surface 23 are formed in arc shapes, it is possible to suppress changes in the contact areas of the contact surfaces 24 and pile 8 accompanying wear of the contact surfaces 24. Due to this, even if part of the contact surfaces 24 becomes worn, it becomes possible to maintain a state where the support force for gripping the pile 8 evenly acts.

25 **[0060]**

Further, according to the jig for pile driving 2 according to the present invention, the

length of the gripping part 22 in the direction X perpendicular to the pile axis is longer than the length of the blade 81, and the spiral collar 20 has a plurality of groove parts 25. For this reason, regardless of the size of the blade 81, the pile 8 can be inserted through the spiral collar 20 in a state with the spiral collar 20 placed inside the rotational equipment for casing 10. Due to this, it becomes possible to simplify the work in pile driving.

[0061]

Above, examples of embodiments of the present invention were explained in detail, but the above-mentioned embodiments all only show specific examples of working the present invention. The technical scope of the present invention must not be interpreted limited by these.

REFERENCE SIGNS LIST

[0062]

1: tubing equipment

10: rotational equipment for casing

11: horizontal bottom plate

12: horizontal top plate

13: elevator cylinder

14: connecting plate

15: body of rotation

16: support member

2: jig for pile driving

20: spiral collar

21: connecting part

22: gripping part

23: apical surface

23c: bent part

24: contact surface

24h: hole

24s: convexo-concave part

25: groove part

25e: disengaging groove part

25i: engaging groove part

30: cylinder

31: base part

32: upper subchuck

- 33: lower subchuck
- 5: base frame
- 6: support column
- 8: pile
- 5 81: blade
- 9: ground
- 123: contact surface
- W: pile circumferential direction
- X: direction perpendicular to the pile axis
- 10 Y: pile axial direction

CLAIMS

[Claim 1]

A jig for pile driving placed inside a casing-tube rotating machine and provided with a spiral collar for gripping a pile having a blade sticking out in a direction perpendicular to a pile axis,

the spiral collar comprising

a connecting part extending in a pile axial direction and connected to the casing-tube rotating machine, and

a gripping part joined with the connecting part and extending in a direction perpendicular to the pile axis;

the spiral collar gripping the pile through the gripping part,

a weight of the connecting part being 1.05 times or more a weight of the gripping part,

the connecting part and the gripping part being divided into two or more sections along a pile circumferential direction, and

the gripping part being divided into two or more sections along the pile axial direction,

each of the sections comprising

a front end face facing an outside surface of the pile and divided into two regions given an angle at a bent part extending in the pile axial direction, and

a pair of contact surfaces of planar shapes arranged at the front end face straddling the bent part.

[Claim 2]

The jig for pile driving according to claim 1, wherein seen from a direction perpendicular to the pile axis, an area of the gripping part getting touch with the pile is $1/30$ time to $2/3$ time an area of the connecting part getting touch with the pile.

[Claim 3]

The jig for pile driving according to claim 1 or 2 wherein

a length of the gripping part in the direction perpendicular to the pile axis is a length of 0.1 time to 1.0 time a pile diameter and is longer than a length of the blade sticking out from the pile in the direction perpendicular to the pile axis,

the spiral collar has a plurality of groove parts for allowing the blade to turn between the pair of the sections divided along the pile axial direction,

an engaging groove part provided at a topmost part of the plurality of the groove parts in the pile axial direction and formed with a step difference in the pile axial direction with respect to another groove part adjoining it along the pile circumferential direction is for engaging the blade, and

5 a disengaging groove part provided at a bottommost part of the plurality of the groove parts in the pile axial direction and formed with a step difference in the pile axial direction with respect to another groove part adjoining it along the pile circumferential direction is for disengaging the blade turning from the engaging groove part through the plurality of the other groove parts.

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[Claim 4]

The jig for pile driving according to any one of claims 1 to 3 wherein the contact surfaces comprises convexo-concave parts in the surface.

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[Claim 5]

A tubing equipment comprising a jig for pile driving according to any one of claims 1 to 4.