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(71) Applicant: **Hoondert Beheer BV**
4453 ZG 's-Heerenhoek (NL)

(72) Inventor: **Hoondert, Joannes Simon Gerardus**
4453 ZG ´s-Heerenhoek (NL)

(74) Representative: **Assendelft, Jacobus H.W.**
Assendelfts Octrooibureau
Keukenhofdreef 20
2161 AZ Lisse (NL)

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(54) **DEMOLISHING AN OFFSHORE JACKET**

(57) A method in which a low-lying piece, for example the lower part, is removed from a structure and the construction is then lowered and the low-lying piece, for example the lower part, is removed. In this way one can demolish a large spatial framework construction of steel pipes as used in the offshore industry, for example a jacket to carry a platform or a windmill.

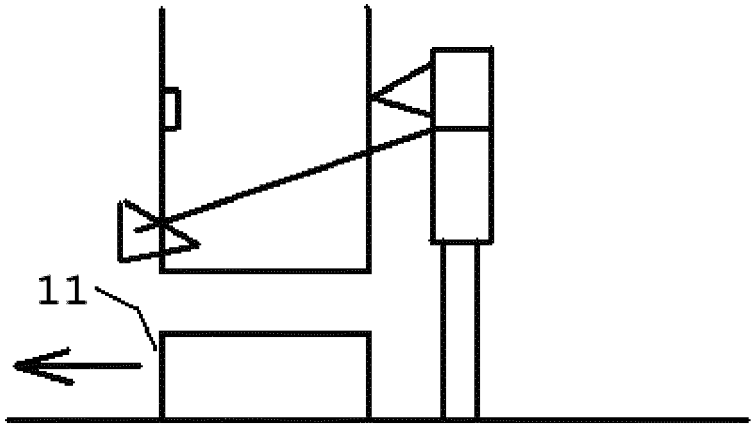

Fig. 4

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Description

[0001] This invention relates to demolishing a large spatial framework construction of steel tubes as used in the offshore industry, for example a jacket for carrying a platform or a windmill. The construction preferably has one or more of: at least three or four upright legs of steel, preferably thin-walled, tube; horizontal and/or diagonal cross braces or braces of steel, preferably thin-walled, tube fixed with the legs for stiffening the legs, in particular the kinking strength thereof and/or increasing the dimensional stability of the entire structure; an open truss construction; a tube construction; the fields bounded by the pipes are open; the loads are carried in the tubes by tensile and compressive forces.

[0002] Traditionally, a jacket is demolished vertically from above, usually on the mainland. For this reason, it is initially necessary to work at great heights, for example 50 or 100 meters. Large equipment such as cranes are needed. Working at a high altitude involves personnel risks.

[0003] The invention proposes to demolish from below, so that work can be carried out on or just above the ground and large equipment can be made superfluous.

[0004] To this end, in each case, it is proposed to remove a lowlying part, for example the lower part, of the structure and then to lower, and then to remove it again low-lying part, for example, bottom piece, construction. Thus, the height decreases stepwise, with a lower part being removed at an earlier time than a higher part. This allows working at a lower level, well below the initial level of the top of the jacket.

[0005] During the demolition, the jacket is usually on a surface above the local water level, for example on shore.

[0006] For example, one or more of the following is used: the structure is held at a level above the piece to be removed; the construction is lifted and then the piece is loosened and/or removed; loosening is, for example, due to severing such as sawing or cutting or milling or burning/melting, for example with cutting torches; after loosening and/or removing the piece the level of holding is moved upwards along the construction, preferably after the construction has an alternative support, for instance is placed on the ground.

[0007] In a presently preferred application, a lifting system is used with an engaging provision for positive engagement with the structure to provide an upward force to the structure in operation opposite to the direction of gravity. Preferably, the engagement device is arranged for cooperating upwardly with a grip edge on the structure. Preferably, the engaging edge of the structure is provided by a recess or hole that is preferably made for demolition, for example in a pipe wall, preferably of a leg. The engagement device comprises, for example, a hook member, for example for gripping in the recess or hole.

[0008] The lifting system preferably comprises one or more of the following: a lifting element, for example hydraulic jack; a transmission means, for example a flexible pulling element such as a cable or chain, which is coupled to transmitting force to the engagement device; a loop means arranged to surround a tube on both radial sides; a control unit for controlling the lifting and lowering; an energy source, such as a hydraulic pump, for lifting; a support means for engaging with the structure, for instance for lateral support.

[0009] In a preferred embodiment, a lifting element is placed on the one side of a tube and the engagement device on the diametrically opposite side and these two are coupled to each other by the transmission means. Optionally, the lifting means is coupled to the support means which engages the construction. In operation, the engagement device and support means are diametrically opposite each other and the tube is enclosed between them.

[0010] Instead of force fit engagement, friction fit engagement is conceivable, for example by using a loop means which can be laid radially around a smooth-walled tube in a loop and can clamp therewith.

[0011] Lowering step by step for example takes place at least 3 or 5 or 10 steps and/or in steps of minimal or precise 50 or 75 or 100 cm and/or maximum or exactly 2 or 5 or 10 meters where each time, with every step, a piece, as of this named height is separated and removed.

[0012] The construction, for example one or all of its legs, is preferably provided with a row of holes above each other, with a pitch corresponding to the step size. After removing a piece, the lifting system is brought into engagement with the next hole, viewed in the upward direction.

[0013] The combination of hook, flexible pulling element (transmission means) and support ensures the positive engagement between lifting system and construction with simple means.

[0014] The drawing of a non-limiting version shows in:

FIG. 1 a jacket to be demolished;
FIG. 2-5 detail A of fig. 1 during successive phases during demolition.

[0015] FIG. 1 shows a jacket 1 with four upright legs 2.

[0016] FIG. 2 shows a first step. The lifting system comprises a jack 5, support 6, grommer 8 (transmission means) and hook 7. The hook 7 is inserted into the bottom hole 3. The leg 2 is on the floor 4. The grommer 8 surrounds the leg 2 on both sides and is coupled to the hook 7 and the support 6. The support 6 supporting the tube wall gives the lateral reaction force out of the hook 7.

[0017] By extending/expanding the jack 5 further, the leg 2 is lifted off the floor 4, hanging on the hook 7 (fig. 3). Subsequently, the leg 2 is divided along the line 10. The line 10 is below the level of the hook 7.

[0018] The leg part 11 under line 10 falls on the floor 4 and is discharged (represented by the arrow in fig. 4).

[0019] Subsequently, the jack 5 is retracted/shrunk until the underside of the lowered leg 2 abuts on the floor

4 (fig. 5).

[0020] Subsequently, the hook 7 is hooked in the next hole 3, viewed in the upward direction, and the process starts again with the step shown in Fig. 2.

[0021] This procedure is repeated as often as desired, whereby the leg 2 is shortened from below and therefore the height of the jacket decreases stepwise.

[0022] This process could alternatively be carried out at a level above the floor and at a distance below the top of the jacket, for instance so that a lower part of the structure 1 remains standing during the demolition while above that pieces of construction are removed from below, as a result of which the height of the construction decreases.

[0023] Instead of a hole 3, a projection can be used, for example welded to the tube wall for this purpose. Other alternatives also belong to the invention.

Claims

1. Method wherein from an offshore type construction each time a piece at low level, for example the bottom part, is removed and then the construction is lowered and subsequently the then piece at a low level, for instance the lower piece, is removed.

2. Method according to claim 1, the demolition of an offshore-type large spatial, open lattice construction of steel pipes erected on shore, which is applied as a jacket resting on the seabed, with which a platform above the sea level was carried, whereby the jacket is removed from the seabed and landed and which jacket comprises at least four upright legs of thin-walled steel tube and horizontal and diagonal braces of thin-walled steel tube fixed with the legs for stiffening the legs, so that the loads are carried by tensile and compressive forces in the tubes, with the jacket standing upright on the mainland on a dry surface above the local water level and being demolished from below, so that work is done on or just above the ground, whereby the bottom part of the jacket is removed and then the remainder of the jacket is lowered and then the bottom piece of the remainder of the jacket is removed and then the remainder of the jacket is lowered, so that the height of the jacket decreases step by step, the lower part being removed at an earlier point in time than a higher part and the highest part being removed last, and during the entire process of demolishing the jacket, or the remainder thereof is upright.

3. Method according to claim 1 or 2 the jacket is gripped by a holding means of a lifting system at a level above the lower part to be removed, then the jacket is lifted by the retaining means from the ground to the place where it is gripped and lifted by the lifting system, then the bottom jacket part is removed by cutting it loose, then the remainder of the jacket is put back on the ground after which the retaining means is released and then by the retaining means the remainder of the jacket is gripped at a higher level, above the next to be removed lower part, and is then raised, by operation of the lifting system, by the holding means to the place where it is gripped and in this lifted state the next lower part is then removed by cutting it loose and then the remainder of the jacket is put back on the ground after which the retaining means is released.

4. Method according to claim 1, 2 or 3 wherein, at the beginning of the method, holes are made at each level at different levels in all the legs of the jacket and the lifting system comprises for each leg a hook and starting with the holes at the lowest level each hook is inserted into the hole of the associated leg and the jacket is stably lifted by the hooks protruding into the holes and alternately the part under the hooks by which the jacket hangs is removed and the hooks are inserted into the holes at the next higher level.

5. Method according to claim 4 each leg is associated with its own lifting system which comprises a lifting element embodied by a hydraulic jack, a transmission means coupled to it, embodied by a flexible loop (so-called grommer) through which the leg projects and which is coupled with the hook in a force transmitting manner; and use is made of a control unit for controlling all lifting systems for stably lifting and lowering the jacket, and of an energy source, embodied by a hydraulic pump, which feeds the jacks; and the lifting element is placed on one side of a leg and the hook on the diametrically opposite side and these two are coupled to each other by the transmission means.

6. Method according to claim 4 or 5, in which the step by step demolition takes place in steps of at least 25 cm, such as 100 cm, wherein during each step a piece of this height is separated and removed from the bottom of the jacket, and the holes are provided above each other in the legs at a spacing matching the step size distance, for example 100 cm, and per step, the lifting and lowering takes place with the hooks inserted into the lower holes at that moment.

7. Method according to any of claims 4 - 7 wherein the jacket (1) has four upright legs (2) resting on the floor (4) and the lifting system comprises a jack (5), support (6), grommer (8) and hook (7); the hook (7) is inserted into the lower hole (3), the grommer (8) surrounds the leg (2) on both sides and is coupled to the hook (7) and the support (6) which are present at the front and back, respectively, of the leg; the support (6) resting against the tube wall provides the

lateral reaction force from the hook (7); by extending the jacks (5), all four legs (2) are lifted from the floor (4), hanging on the hooks (7) (fig. 3); then, hanging on the hooks (7), the legs (2) are separated at a level (10), this level (10) is below the level of the hooks (7); the leg parts (11) below the level (10) fall onto the floor (4) and are discharged; the jacks (5) are then retracted until the underside of the legs (2), that are shortened at the bottom, rest on the floor (4) (fig. 5); then the hooks (7) are unhooked and hooked in the next holes (3), viewed in the upward direction, and the process for the next step starts; this procedure is repeated as often as desired, with the legs (2) being shortened further from below and as a result the height of the jacket decreases stepwise.

8. Method according to any of claims 1 - 7, stepwise lowering takes place in at least 3 or 5 or 10 steps where each time, at each step, a piece is separated from the height and removed.

9. Method according to any of claims 1-8, the stepwise lowering takes place in steps of at least 50 or 75 or 75 or 100 cm and/or at most or exactly 2 or 5 or 10 meters, each time, with each step, a piece from this stated height is separated and removed.

10. Method according to any of claims 1 - 9, which is carried out on shore or on the mainland or not on the water.

11. System for carrying out the process according to any of claims 1 - 10.

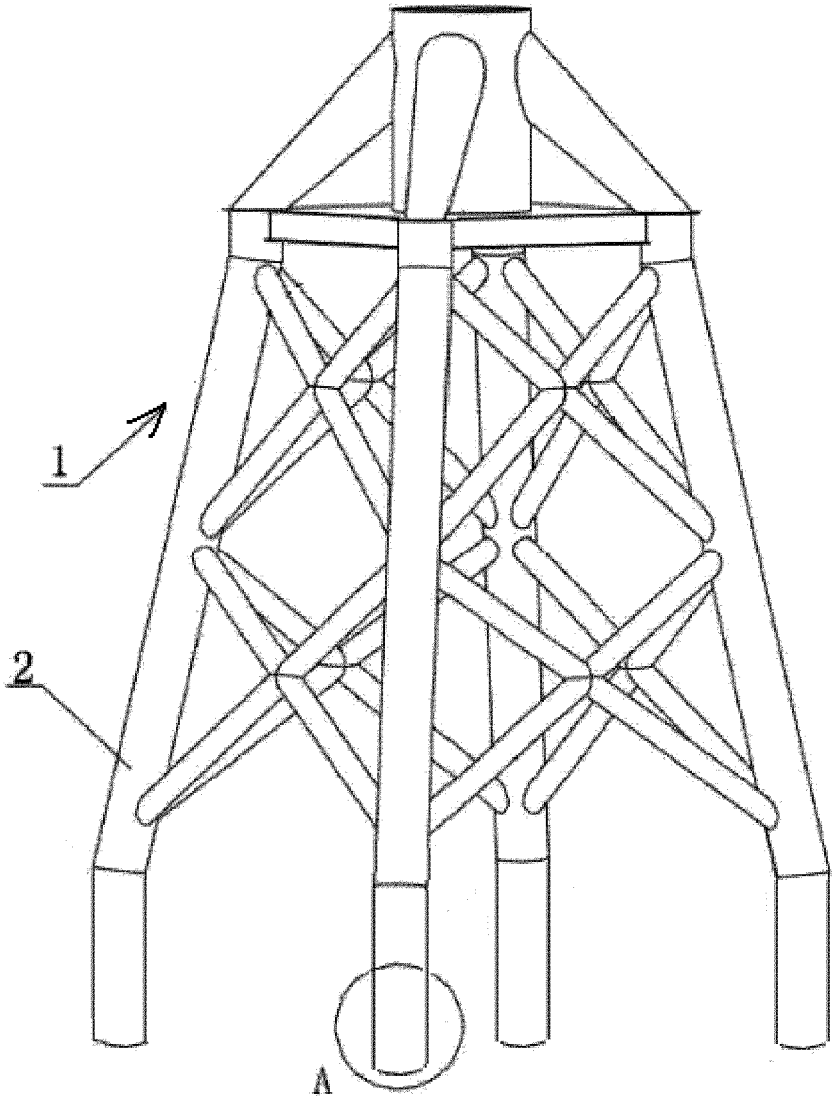

Fig. 1

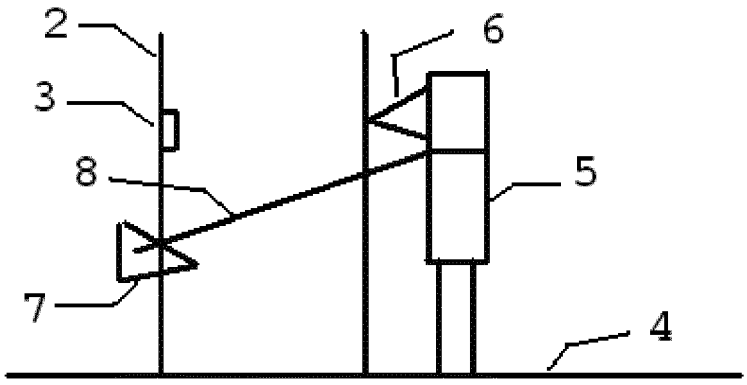

Fig. 2

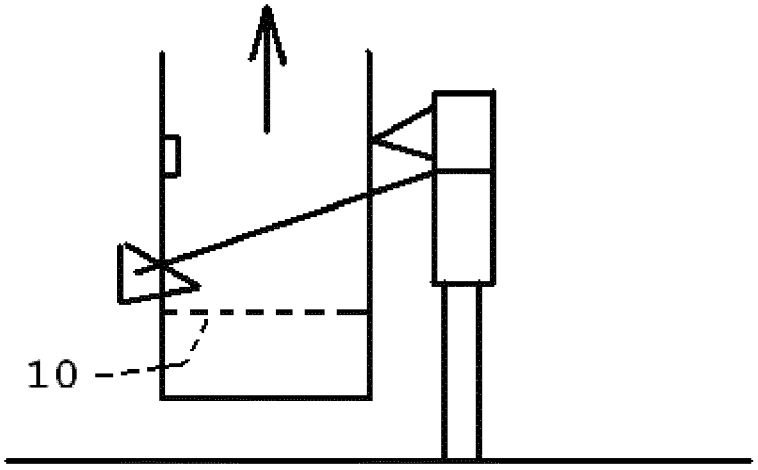

Fig. 3

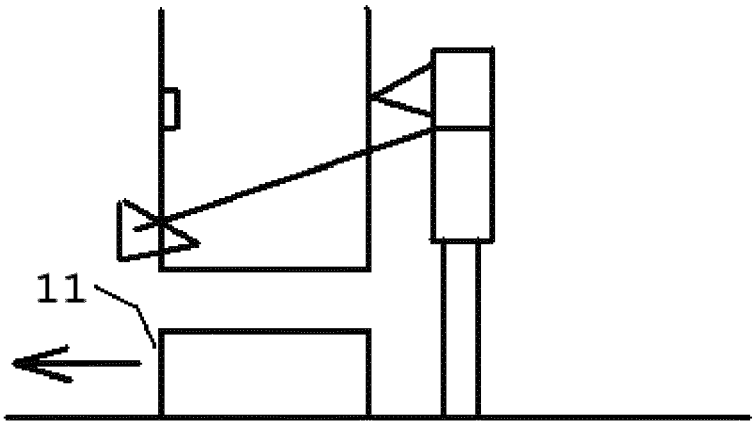

Fig. 4

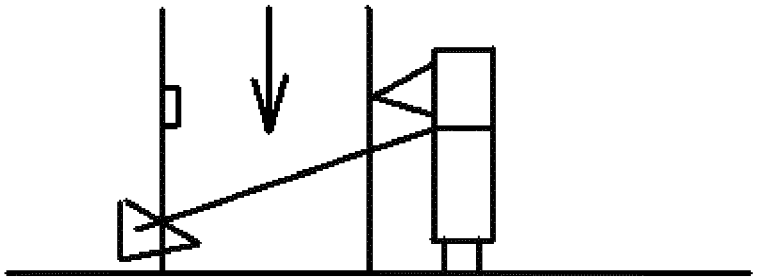

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 22 15 2758

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 May 2022	Zuurveld, Gerben

CATEGORY OF CITED DOCUMENTS

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