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(54) **Vessel and method for removal and/or installation of at least a part of a sea platform**

(57) A vessel (1) for removal and/or installation of at least a part of a sea platform comprising a support structure and a top side, said vessel comprising a hull (6) and two support arms (11,12) located at a distance from each other and attached to the hull (6), wherein the support arms in use extend beyond the hull in a substantially horizontal direction.

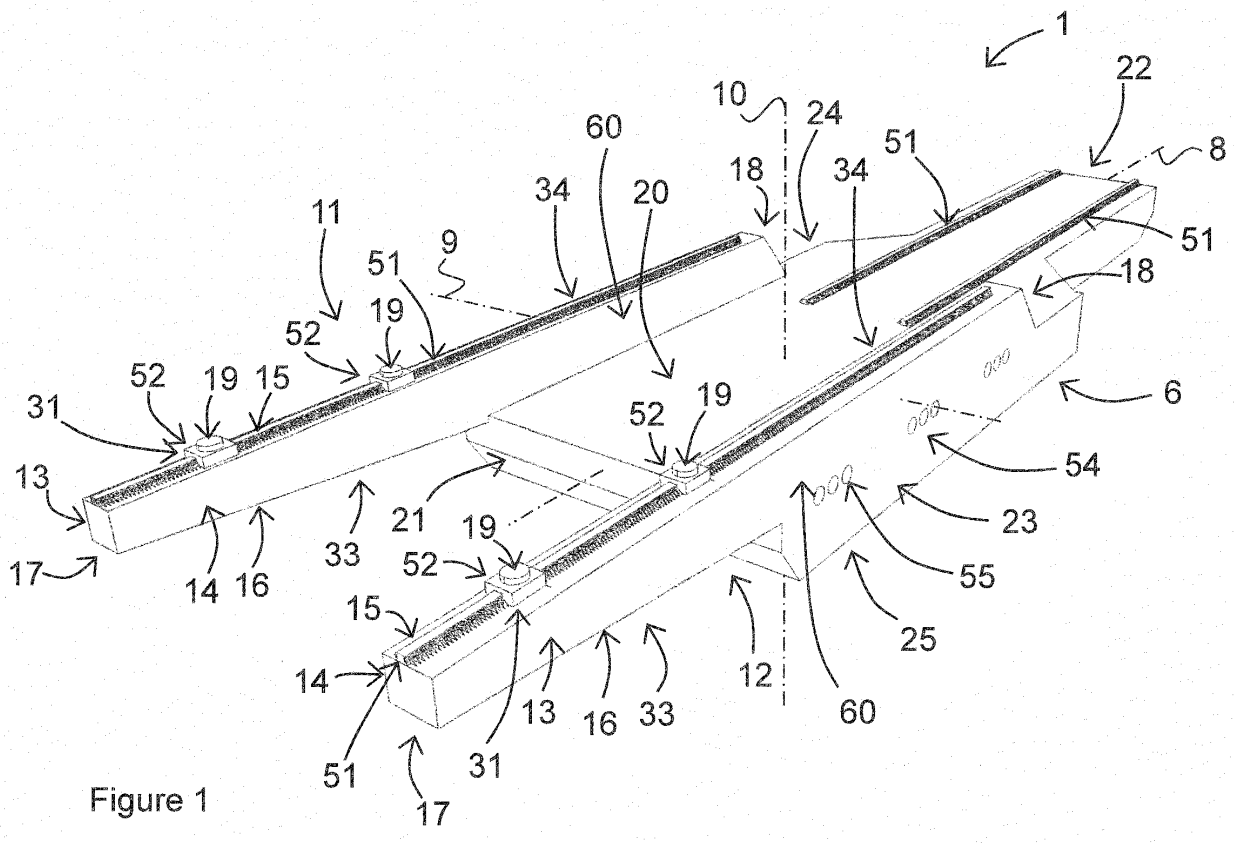

Figure 1

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Description

[0001] The invention relates to a vessel for removal and/or installation of at least a part of a sea platform comprising a support structure and a top side.

[0002] It is an object of the invention to provide an improved or at least alternative vessel for removing and installing at least a part of a sea platform comprising a support structure and a top side.

[0003] This object is achieved by the vessel according the invention. Said vessel for removal and/or installation of at least a part of a sea platform comprising a support structure and a top side comprises a hull and two support arms located at a distance from each other and attached to the hull, wherein the support arms in use extend beyond the hull in a substantially horizontal direction. The support structure may for example comprise a frame work or one or more support legs. The top side may for example comprise equipment for exploitation of oil and/or gas from the seabed or a wind turbine for producing electricity.

[0004] In an embodiment of the vessel according the invention, the support arms are constructed and arranged to in use fully support said at least one part of the sea platform.

[0005] In an embodiment of the vessel according the invention, the support arms extend over a distance between 10 and 100 m beyond the hull. The support arms may extend over a distance of more than 20 m beyond the hull

[0006] In an embodiment of the vessel according the invention, the support arms extend along the hull over a distance between 10 and 100 % of the length of the hull. The support arms may extend along the hull over a distance between 25 - 75% of the length of the hull.

[0007] In an embodiment of the vessel according the invention, the distance between the support arms is between 10 and 100 m.

[0008] In an embodiment of the vessel according the invention, the support arms are located above the water surface when carrying said at least one part of the sea platform. The support arms may extend substantially parallel to each other. The vessel comprises a roll axis and the support arms may extend substantially parallel to the roll axis.

[0009] In an embodiment of the vessel according the invention, the support arms are movable relative to the hull.

[0010] In an embodiment of the vessel according the invention, the support arms are movable relative to each other.

[0011] In an embodiment of the vessel according the invention, the support arms are movable in a direction transverse to the roll axis.

[0012] In an embodiment of the vessel according the invention, the support arms are movable in a direction perpendicular to the roll axis.

[0013] In an embodiment of the vessel according the invention, the support arms are movable along a support trajectory.

[0014] In an embodiment of the vessel according the invention, the support trajectory extends transverse to the roll axis.

[0015] In an embodiment of the vessel according the invention, the support trajectory extends perpendicular to the roll axis.

[0016] In an embodiment of the vessel according the invention, the vessel comprises a support rail and the support arms are moveable along the support rail.

[0017] In an embodiment of the vessel according the invention, the support rail extends transverse to the roll axis.

[0018] In an embodiment of the vessel according the invention, the support rail extends perpendicular to the roll axis.

[0019] In an embodiment of the vessel according the invention, the support rail defines the support trajectory.

[0020] In an embodiment of the vessel according the invention, the vessel comprises an arm driving system constructed and arranged to move the support arms relative to the hull.

[0021] In an embodiment of the vessel according the invention, the arm driving system moves the support arms along the support trajectory.

[0022] In an embodiment of the vessel according the invention, the arm driving system moves the support arms along the support rails.

[0023] In an embodiment of the vessel according the invention, the vessel comprises an arm fixating system constructed and arranged to fixate the support arms relative to the hull.

[0024] In an embodiment of the vessel according the invention, the support arms are movable from a distance of 10 m between the support arms to a distance of 100 m between the support arms, and vice versa.

[0025] In an embodiment of the vessel according the invention, the vessel comprises at least one docking unit.

[0026] In an embodiment of the vessel according the invention, at least one docking unit is attached to the support arms.

[0027] In an embodiment of the vessel according the invention, at least one docking unit is attached to the inner arm surfaces of the support arms.

[0028] In an embodiment of the vessel according the invention, at least one docking unit is attached to the hull.

[0029] In an embodiment of the vessel according the invention, at least one docking unit is attached to the first hull side.

[0030] The vessel according the invention may comprise any feature or combination of features as defined in the claims.

[0031] The invention further relates to a method for removing at least a part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to the invention,
- positioning the support arms under the top side such that the support structure is located between the support arms,
- raising the support arms relative to the water surface to fully support the top side with the support arms,
- continuing the raising of the support arms to move the top side at a distance from the support structure, and
- moving the vessel away from the support structure in a substantially horizontal direction while fully supporting the top side with the support arms.

[0032] The invention further relates to a method for removing at least part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to the invention,
- connecting the hoisting system to the support structure, and
- raising the support structure with the hoisting system in a substantially vertical direction while fully supporting the support structure with the support arms.

[0033] The invention further relates to a method for installing at least a part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to the invention, wherein the top side of the sea platform is fully supported by the support arms,
- positioning the top side above the support structure such that the support structure is located between the support arms,
- lowering the support arms relative to the water surface to place the top side on the support structure,
- continuing the lowering of the support arms to fully transfer the weight of the top side to the support structure and to move the support arms at a distance from the top side and
- moving the vessel away from the support structure in a substantially horizontal direction.

[0034] The invention further relates to a method for installing at least a part of a sea platform comprising a support structure and top side, which method comprises;

- providing a vessel according to the invention, wherein the support structure is connected to the hoisting system and fully supported by the support arms,
- lowering the support structure with the hoisting system in a substantially vertical direction such that the support structure is placed on the seabed or a foundation provided on the seabed, and
- disconnecting the hoisting system from the support structure.

[0035] In an embodiment of the method according the invention, the method comprises moving the support arms relative to the hull.

[0036] In an embodiment of the method according the invention, the method comprises moving the support arms relative to each other.

[0037] In an embodiment of the method according the invention, the method comprises moving the support arms towards each other.

[0038] In an embodiment of the method according the invention, the method comprises moving the support arms away from each other.

[0039] In an embodiment of the method according the invention, the method comprises moving the support arms in a direction transverse to the roll axis.

[0040] In an embodiment of the method according the invention, the method comprises moving the support arms in a direction perpendicular to the roll axis.

[0041] In an embodiment of the method according the invention, the method comprises moving the support arms along the support trajectory.

[0042] In an embodiment of the method according the invention, the method comprises moving the support arms along the support rail.

[0043] In an embodiment of the method according the invention, the method comprises moving the support arms to match the dimensions of the top side which in use will be supported.

[0044] In an embodiment of the method according the invention, the method comprises moving the support arms to match the dimensions of the support structure which in use will be supported.

[0045] In an embodiment of the method according the invention, the method comprises fixating the support arms relative to the hull in a support position.

[0046] In an embodiment of the method according the invention, the method comprises docking the vessel at the support structure via the at least one docking unit.

[0047] In an embodiment of the method according the invention, the method comprises moving the support arms relative to the hull after the docking of the vessel.

[0048] In an embodiment of the method according the invention, the method comprises fixating the support arms relative to the hull after the docking of the vessel.

[0049] In an embodiment of the method according the invention, the method comprises moving said at least one part supported by the support arms along said support arms.

[0050] In an embodiment of the method according the invention, the method comprises moving said at least one part supported by the support arms along the deck of the vessel.

[0051] In an embodiment of the method according the invention, the method comprises moving said at least one part supported by the support arms in the direction of the roll axis of the vessel.

[0052] In an embodiment of the method according the invention, the method comprises moving said at least

one part carried by the hoisting system along said support arms with the driving system.

[0053] In an embodiment of the method according the invention, the method comprises moving said at least one part carried by the hoisting system along the rails.

[0054] In an embodiment of the method according the invention, the method comprises moving the hoist members along the support arms with the driving system while carrying the said at least one part.

[0055] In an embodiment of the method according the invention, the method comprises placing said at least one part carried by the hoisting system on the deck of the vessel.

[0056] In an embodiment of the method according the invention, the method comprises transferring said at least one part from the vessel onto a quay by positioning the second hull side adjacent to the quay and moving said at least one part from the vessel to the quay while moving over the second hull side.

[0057] In an embodiment of the method according the invention, the method comprises transferring said at least one part from a quay onto the vessel by positioning the second hull side adjacent to the quay and moving said at least one part from the quay to the vessel while moving over the second hull side.

[0058] The method according the invention may comprise any feature or combination of features as defined in the claims.

[0059] Embodiments of the vessel and method according the invention will be described by way of example only, with reference to the accompanying schematic drawings in which corresponding reference symbols indicate corresponding parts, and in which:

Figure 1 schematically shows a view in perspective of an embodiment of the vessel,

Figure 2 schematically shows a side view of the vessel of fig. 1,

Figure 3 schematically shows a top view of the vessel of fig. 1,

the Figures 4-11 schematically show a further embodiment of the vessel,

the Figures 12-14 schematically show a further embodiment of the vessel,

the Figures 15 and 16 schematically show an alternative embodiment of the vessel of the fig. 12-14,

Figure 17 schematically shows a view in perspective of a further embodiment of the vessel,

Figure 18 schematically shows a view in perspective of a further embodiment of the vessel,

the Figures 19-22 schematically show a further embodiment of the vessel,

the Figures 23-26 schematically show a further embodiment of the vessel,

Figure 27 schematically shows a further embodiment of the vessel, and

Figure 28 schematically shows a further embodiment of the vessel.

[0060] The figures 1-3 show an embodiment of the vessel which is used for removal and/or installation of at least one part of a sea platform 2 comprising a support structure 4 and a top side 5. The vessel 1 comprises a hull 6 and two support arms 11, 12. The support arms 11, 12 are located at a distance from each other and attached to the hull 6. The support arms 11, 12 in use extend beyond the hull 6 in a substantially horizontal direction. The support arm 11, 12 are constructed and arranged to in use fully support said at least one part 4, 5 of the sea platform 2. Arrow 26 indicates a horizontal direction and arrow 27 indicates a vertical direction.

[0061] The support arms 11, 12 extend over a distance L2 of around 50 meters beyond the hull 6. In other examples, the support arms 11, 12 can extend between 10 and 100 m beyond the hull 6.

[0062] The support arms 11, 12 extend along the hull 6 over a distance L3 of around 40% of the length of the hull 6. In an alternative embodiment, the support arms 11, 12 can extend between 10 and 100 % of the length of the hull 6.

[0063] The total length of the support arms 11, 12 is L1. The part of the support arms 11, 12 extending beyond the hull 6 forms the outboard extending part 33. The length of the outboard extending part 33 of the support arms 11, 12 is L2. The part of the support arms 11, 12 extending along the hull 6 forms the inboard extending part 34. The length of the inboard extending part 34 of support arms 11, 12 is length L3.

[0064] The support arms 11, 12 comprise an outer arm surface 13, inner arm surface 14, upper arm surface 15 and lower arm surface 16. The distance D1 between the outer arm surfaces 13 of the support arms 11, 12 is around 80 meters. In an alternative embodiment, the distance D1 can be between 10 and 100 m. The distance D1 may be smaller or equal to 77,5 meter. The distance D2 between the inner surfaces 14 of the support arms 11, 12 is around 75 meters. In an alternative embodiment, the distance D1 can be between 10 and 100 m.

[0065] The support arms 11, 12 extend substantially parallel to each other. The support arms 11, 12 are located above the water surface when carrying said at least one part 4, 5 of the sea platform 2.

[0066] The vessel 1 comprises a roll axis 8, a yaw axis 9 and a pitch axis 10. The support arms 11, 12 extend substantially parallel to the roll axis 9.

[0067] The support arms 11, 12 comprise a first arm end 17 located outboard and a second arm end 18 located inboard. The vessel 1 comprises a deck 20. An inclined surface 28 is located at the second arm end 18 of the support arms 11, 12 . The inclined surface 28 extends from the upper arm surface 15 to the deck 20.

[0068] The hull 6 comprises a first hull side 21, a second hull side 22, a third hull side 23 and a fourth hull side 24. The support arms 11, 12 extend from the first hull side 21.

[0069] Support units 52 are attached to the support arms 11, 12. The support units 52 are coupled to rails 51

provided on the support arms 11, 12. Additional support units 52 can be attached to the hull 6. The support units 52 comprise a support surface 19 on which said at least one part 4, 5 of the sea platform 2 is placed. This means that the support units 52 form the support surface 19 on which said at least one part 4, 5 of the sea platform 2 is placed when carried by the support arms 11, 12. The support units 52 are movable along the rails 51. This allows that the support units 52 are moved in positions that suit the part the be supported. The support units 52 are actively movable. This way a driving system 31 constructed and arranged to in use move said at least one part 4, 5 along the support arms 11, 12 is provided. The support units 52 are moveable in the direction of the roll axis 8. In alternative embodiments, the support units 52 are attached to the support arms 11, 12 in a fixed position.

[0070] The support surface 19 is located at a distance H1 from the bottom 25 of the hull 6. In the embodiment shown, H1 is around 30 m. In alternative embodiments, H1 can be between 10 and 60 m. The support surface 19 is located at a distance H2 from the deck 20. In the embodiment shown, H2 is around 15 m. In alternative embodiments, H2 can be between 5 and 30 m.

[0071] The vessel 1 comprises a ballast system 54 constructed and arranged to lower and raise the vessel 1 relative to the water surface 7. For lowering the vessel 1, sea water is taken in by the ballast system 54 and stored in ballast tanks 60. For raising the vessel 1, the sea water is released from the ballast system 54. Several outflow openings 55 are provided to rapidly discharge the water held in the ballast tanks 60. The ballast tanks 60 are located above the water surface 7. This allows the use of gravity for rapidly discharging the sea water from the ballast system 54. The outflow openings 55 are also located above the water surface 7 in order to facilitate the rapid removal of sea water from the ballast system 54. The support surface 19 is in use located between the water surface 7 and 50 m above the water surface 7. In alternative embodiments, the ballast tanks 60 are located below the water surface 7. The outflow openings 55 may also be located below the water surface 7.

[0072] The hull 6 comprises a first hull side 21 and an opposite second hull side 22. The support arms 11, 12 extend beyond the hull 6 from the first hull side 21 and the width W2 of the hull 6 at the second hull side 22 is smaller than the width W1 of the hull 6 at the first hull side 21. In the direction of the roll axis 8 the hull 6 comprises said smaller width W2 over a distance of around 40 % of the length of the hull 6. In an alternative embodiment, the said width W2 extends over a distance of between 20 and 60 % of the length of the hull 6. The width W2 of the second hull side 22 can be between 20 and 70 m. The width W1 of the first hull side 21 can be between 40 and 100 m.

[0073] The vessel 1 comprises a propulsion system 53. More specifically, the embodiment shown comprises a dynamic positioning system which is used for propulsion. In alternative embodiments, the vessel 1 can comprise any other type of propulsion system, but can also rely on other vessels such as tugs in order to move.

[0074] The figure 4-11 show a further embodiment of the vessel. A sea platform 2 comprising a support structure 4 and a top side 5 is shown. The at least one part which will be removed and/or installed may relate to the top side and/or the support structure. Said top side and said support structure may be partly or fully removed and/or installed.

[0075] The sea platform 2 is supported on the seabed by the support structure 4. It will be clear that the invention is not only directed to this type of sea platforms 2. The invention also applies to different types of sea platforms 2, such as sea platforms 2 with a floating support structure 4.

[0076] The vessel 1 comprises support units 52 which are attached to the support arms 11, 12. The support units 52 are attached to the inner arm surface 14 of the support arms 11, 12. The support units 52 are shown in detail in fig. 6. The support units 52 form the support surface 19 on which said at least one part of the sea platform 2 is placed. In the fig. 4-11 the top side 5 is the part that will be supported by the support arms 11, 12. The support units 52 comprise a first coupling member 29. The first coupling members 29 are constructed and arranged to couple with cooperating second coupling members 30 attached on the sea platform 2. The first coupling members 29 and the second coupling members 30 are mating coupling members. In alternative embodiments, the first coupling members 29 and the second coupling members 30 can of a different type. The support units 52 comprise dampers 56 forming the support surface 19. The dampers 56 comprise an elastic material, such as rubber. In other examples, a different type of damper 56 can be used, such as fluid dampers and the like.

[0077] The figures 4-11 show an embodiment of the method for removing at least a part of a sea platform comprising a support structure and a top side. In fig. 4, the vessel 1 is located near the sea platform 2. Second coupling members 30 are attached to the sea platform 2. The second coupling members 30 are located below the top side 5. The support structure 4 is cut below the second coupling members 30 to allow a removal of the top side 5 from the support structure 4. Part of the support structure 4 is removed together with the top side 5.

[0078] In fig. 5, the vessel 1 is lowered to a position wherein the first coupling members 29 of the vessel 1 are located below the second coupling members 30.

[0079] In fig. 7, the support arms 11, 12 are positioned under the top side 5 such that the support structure 4 is located between the support arms 11, 12. The first coupling members 29 are located directly under the second coupling members 30.

[0080] In fig. 8, the support arms 11, 12 are raised relative to the water surface 7 to fully support the top side 5 with the support arms 11, 12. The first coupling members 29 and the second coupling members 30 are cou-

pled to each other. The top side 5 is positioned on the support surface 19 formed by the support units 52. In an alternative embodiment, the above indicated cut of the support structure 4 is made when the top side is fully supported by the support arms 11, 12.

[0081] In fig. 9, the raising of the support arms 11, 12 is continued to move the top side 5 at a distance from the support structure 4 .

[0082] In fig. 10, the vessel 1 is moved away from the support structure 4 in a substantially horizontal direction while fully supporting the top side 5 with the support arms 11, 12.

[0083] In fig. 11, the top side 5 is transported by the vessel 1 to a quay 49. The vessel 1 is positioned such that the support arms support arms 11, 12 supporting the top side are positioned above the quay 49. The top side 5 is subsequently transferred onto the quay 49 by lowering the vessel 1 relative to the water surface 7 with the ballast system 54.

[0084] With reference to the figures 4-11, the invention furthermore relates to a method for installing at least a part of a sea platform comprising a support structure and top side. Said method comprises;

- providing a vessel 1 according the invention, such as shown in fig. 4-11, wherein the top side 5 of the sea platform 2 is fully supported by the support arms 11, 12,
- positioning the top side 5 above the support structure 4 such that the support structure 4 is located between the support arms 11, 12,
- lowering the support arms 11, 12 relative to the water surface 7 to place the top side 5 on the support structure 4,
- continuing the lowering of the support arms 11, 12 to fully transfer the weight of the top side 5 to the support structure 4 and to move the support arms 11, 12 at a distance from the top side 5, and
- moving the vessel 1 away from the support structure 4 in a substantially horizontal direction.

[0085] Said method may comprise fully supporting the top side 5 with the support arms 11, 12 while the top side 5 is positioned on the support surface 19.

[0086] Said method may comprise fully supporting the top side 5 with the support arms 11, 12 via the support units 52.

[0087] Said method may comprise attaching cooperating second coupling members 30 to the top side 5 and lowering the support arms 11, 12 relative to the water surface 7 to decouple the first coupling members 29 from the second coupling members 30 when the top side 5 is carried by the support structure 4.

[0088] Said method may comprise connecting the top side 5 to the rest of the sea platform 2, such as the support structure 4, while the support arm fully support the top side 5.

[0089] Said method may comprise positioning the vessel 1 such that the support arms 11, 12 supporting the top side 5 are positioned above a quay 49, and transferring the top side 5 from the quay 49 onto the support arms 11, 12. The top side 5 may be transferred onto the support arms 11, 12 by moving the top side 5 along the support arms 11, 12. The top side 5 may be transferred onto the support arms 11, 12 by hoisting the top side 5 from the support arms 11, 12 and placing the top side on the quay 49. The top side 5 may be transferred onto the support arms 11, 12 by raising the vessel 1 relative to the water surface 7 with the ballast system 54.

[0090] The figures 12-14 show a further embodiment of the vessel. A hoisting system 32 is attached to the support arms 11, 12. The hoisting system 32 is attached to the outboard extending part 33 of the support arms 11, 12. The hoisting system 32 comprises a first hoisting member 35, a second hoisting member 36, a flexible first hoisting line 37 connecting the first hoisting member 35 with the first support arm 11, a flexible second hoisting line 38 connecting the second hoisting member 36 with the second support arm 12. The flexible hoisting lines 37, 38 may be of any suitable type known to the skilled person, such as cables, chains, wires etc. A first line driver 39 is connected to the vessel 1 and constructed and arranged to take in and pay out the first hoisting line 37 in order to move the first hoisting member 35 relative the first support arm 11. A second line driver 40 is connected to the vessel 1 and constructed and arranged to take in and pay out the second hoisting line 38 in order to move the second hoisting member 36 relative the second support arm 12. The first line driver 39 is attached to the first support arm 11 and the second line driver 40 is attached to the second support arm 12. The first line driver 39 and second line driver 40 comprise a reeling device, such as a traction winch. In alternative embodiments, the line driver 39, 40 may be of a different type, such as a strand jack lifting system or a chain jack lifting system.

[0091] The first hoisting member 35 and second hoisting member 36 are provided with first connectors 57 constructed and arranged to in use connect said hoisting members 35, 36 to cooperating second connectors 58 provided on said at least one part of the sea platform 2, more specifically on the support structure 4 of the sea platform 2.

[0092] The first hoisting member 35 and the second hoisting member 36 comprise an in use substantially horizontal extending hoisting beam 42.

[0093] The vessel 1 comprises a further hoisting system 46 which is supported by the support arms 11, 12. The further hoisting system 46 comprises a hoist driving device 47 constructed and arranged to drive the further hoisting device 46 along the support arms 11, 12. Rails 51 are provided on the support arms 11, 12 and the further hoisting system 46 is coupled and movable along said rails 51 via the hoist driving device 47. The further hoisting system 46 comprises a cross beam 48 extending over the distance between the support arms 11, 12.

[0094] The figures 15 and 16 show an alternative em-

bodiment of the vessel of the fig. 12-14. The first hoisting line 37 is attached to the first support arm 11 via a first lifting device 44 constructed and arranged to in use lift the first hoisting line 37 above the first support arm 11 l in a substantially vertical direction. The second hoisting line 38 is attached to the second support arm 12 via a second lifting device 45 constructed and arranged to in use lift the second hoisting line 38 above the second support arm 12 in a substantially vertical direction. Said movement is indicated by arrow 59.

[0095] The first lifting device 44 and the second lifting device 45 are constructed and arranged to lift the first hoisting line 37 and the second hoisting line 38 up to a distance of around 30 m above the first support arm 11 and the second support arm 12, respectively. In alternative embodiments, the first hoisting line 37 and the second hoisting line 38 are lifted up to a distance between 10 and 50 m above the first support arm 11 and the second support arm 12, respectively.

[0096] The figures 12-14 show an embodiment of the method for removing at least a part of a sea platform comprising a support structure and a top side. In said method the hoisting system 32 is connected to the support structure 4 and the support structure 4 is raised with the hoisting system 32 in a substantially vertical direction while fully supporting the support structure 4 with the support arms 11, 12.

[0097] In fig. 12, the vessel 1 and the support structure 4 of the platform 2 are shown. The top side 5 has already been removed. In fig. 13, the first hoist member 35 and second hoist member 36 are lowered towards the seabed on which the support structure 4 is positioned. The first hoist member 35 and second hoist member 36 are connected to the support structure 4 at a position below the water surface 7. The first hoist member 35 and second hoist member 36 may for example be connected to the support structure 4 at a position between 10 and several hundreds of meters below the water surface 7. The first connectors 57 and the second connectors 58 are interconnected.

[0098] In fig. 14, the first hoist member 35 and second hoist member 36 holding the support structure 4 are raised towards the water surface 7. The first hoist member 35 and second hoist member 36 may be raised to a position above the water surface 7.

[0099] In the method shown in the fig. 15 and 16, the first hoist member 35 and second hoist member 36 are raised above the support arms 11, 12.

[0100] After the support structure has been raised and is supported by the support arms 11, 12, the support structure may be dismantled or the vessel 1 may transport the support structure to a location where it will be dismantled or re-used.

[0101] With reference to the figures 12-16, the invention furthermore relates to a method for installing at least a part of a sea platform comprising a support structure and top side. Said method comprises;

- providing a vessel 1 according the invention, such as shown in the fig. 12-15, wherein the support structure 4 is connected to the hoisting system 32 and fully supported by the support arms 11, 12,
- lowering the support structure 4 with the hoisting system 32 in a substantially vertical direction such that the support structure 4 is placed on the seabed or a foundation provided on the seabed and
- disconnecting the hoisting system 32 from the support structure 4. Said method may comprise;
- providing the vessel 1, wherein the first hoist member 35 and second hoist member 36 are connected to the support structure 4,
- lowering the support structure 4 by lowering the first hoist member 35 and second hoist member 36 towards the seabed,
- disconnecting the first hoist member 35 and second hoist member 36 from the support structure 4 at a positioned below the water surface 7, and
- raising the first hoist member 35 and the second hoist member 36 towards the water surface 7.

[0102] Said method may comprise raising the first hoist member 35 and the second hoist member 36 to a position above the water surface 7.

[0103] Said method may comprise lowering the first hoist member 35 and second hoist member 36 up to a depth of between 10 and several hundreds of meters below the water surface 7.

[0104] Said method may comprise providing a vessel according the invention, such as shown in fig. 15 and 16, wherein the first hoist member 35 and second hoist member 36 are located above the support arms 11, 12 while being connected to support structure 4.

[0105] Figure 17 shows a further embodiment of the vessel. Two heavy lifting cranes 61 are provided on the vessel 1.

[0106] Fig. 18 shows a further embodiment of the method. Two parts of the sea platform are supported by the support arms 11, 12. The top side 5 is supported by the inboard extending part 34 of the support arms 11, 12. The support structure 4 is supported by the outboard extending part 33 of the support arms 11, 12.

[0107] The figures 19-22 show a further embodiment of the vessel. A top side support 62 is provided on the deck 20 of the vessel 1. The top side support 62 is constructed and arranged to support the top side 5 of the sea platform 2. The top side support 62 is located at the second hull side 22. The top side structure 62 may be located at a distance from the second hull side 22. The top side support 62 is located on the deck 20 of the vessel 1. The top side support 62 is located at the part of the hull comprising said smaller width W2.

[0108] In fig. 19, a top side 5 is positioned on the top side support 62. The top side 5 is fully supported by the top side support 62 located on the deck 20. A support structure 4 is fully supported by the support arms 11, 12. The support structure 4 is connected to the hoisting sys-

tem 32 attached to the support arms 11, 12. The support structure 4 comprises several support legs 63.

[0109] In fig. 20, the support structure 4 is being lowered by the hoisting system 32. After the support structure 4 is positioned on the seabed, the hoisting members 35, 36 are subsequently disconnected from the support structure 4 and raised to the support arms 11, 12.

[0110] In fig. 21, the support structure 4 is positioned on the seabed and the vessel 1 is positioned such that the top side 5 is located above the support structure 4. The hull 6 of the vessel 1 is located between the support legs 63. The top side support 62 carrying the top side 5 is lowered relative to the water surface 7 to place the top side 5 on the support structure 4. Said lowering is continued to fully transfer the weight of the top side 5 to the support structure 4 and to move the top side support 62 at a distance from the top side 5.

[0111] In fig. 22, the top side 5 is fully supported by the support structure 4 and the vessel 1 is moving away from the support structure 4 and the top side 5 in a substantially horizontal direction.

[0112] The top side support 62 is lowered by lowering the hull 6 of the vessel 1 relative to the water surface 7.

[0113] With reference to the fig. 19-22, the invention furthermore relates to a method wherein a vessel 1 according the invention, such as shown in fig. 19-22, is used to remove a top side 5 from a sea platform 2 comprising a support structure 4 with several support legs 63 and the top side 5. Said method comprises

- positioning the top side support 62 under the top side 5 such that the hull 6 of the vessel 1 is located between the support legs 63 of the support structure 4,
- raising the top side support 62 relative to the water surface 7 to fully support the top side 5 with the top side support 62,
- continuing the raising of the top side support 62 to move the top side 5 at a distance from the support structure 4, and
- moving the vessel 1 away from the support structure 4 in a substantially horizontal direction while fully supporting the top side 5 with the top side support 62.

[0114] The top side support 62 is raised by raising the hull 6 of the vessel 1 relative to the water surface 7.

[0115] The support structure 4 can subsequently be removed according to the invention, such as shown in the fig. 12-16.

[0116] This allows the vessel 1 to remove or install a sea platform comprising a support structure and top side in one trip.

[0117] It is also possible to remove or install a second top side 5, as for example shown in the fig. 1-11.

[0118] The figures 23-26 show a further embodiment of the vessel. The figures 23-25 show a top view of the vessel 1 and figure 26 shows a cross sectional view along the roll axis 8.

[0119] The support arms 11, 12 are movable relative to the hull 6. The support arms are movable relative to each other. The support arms 11, 12 are movable in a direction transverse to the roll axis 8. More specifically, the support arms 11, 12 are movable in a direction perpendicular to the roll axis 8.

[0120] The support arms 11, 12 are movable along a support trajectory 64. The support trajectory 64 extends transverse to the roll axis 8. More specifically, the support trajectory 64 extends perpendicular to the roll axis 8.

[0121] The vessel 1 comprises two support rails 65 and the support arms 11, 12 are moveable along the support rails 65. The support rails 65 extends transverse to the roll axis 8. More specifically, the support rails 65 extends perpendicular to the roll axis 8. The support rails 65 defines the support trajectory 64.

[0122] The vessel 1 comprises an arm driving system 66 constructed and arranged to move the support arms 11, 12 relative to the hull 6. The arm driving system 66 moves the support arms 11, 12 along the support trajectory 64. The arm driving system 66 moves the support arms 11, 12 along the support rails 65.

[0123] The vessel 1 comprises an arm fixating system 67 constructed and arranged to fixate the support arms 11, 12 relative to the hull 6. The support arms 11, 12 are movable from a distance of 10 m between the support arms 11, 12 to a distance of 100 m between the support arms 11, 12, and vice versa.

[0124] The vessel 1 comprises two docking units 70. The vessel 1 may comprise a different number of docking units 70. The docking units 70 are attached to the hull 6. More specifically, the docking units 70 are attached to the first hull side 21. In other examples of the vessel, at least one docking unit 70 is attached to the support arms 11, 12, for example to the inner arm surfaces 14 of the support arms 11, 12.

[0125] In figure 23, the vessel 1 is positioned near a support structure 4. The support arms 11, 12 are positioned such that the distance between the support arms 11, 12 is larger than the width of the support structure 4.

[0126] In figure 24, the vessel 1 is docked at the support structure 4 via the docking units 70. The docking units 70 are placed in contact with the support structure 4. The vessel 1 is positioned such that the support structure 4 is located between the support arms 11, 12.

[0127] The support units 52 can be moved along the support arms 11, 12 by the driving system 31. The support units 52 comprise first coupling members 29 and are positioned near second coupling members (not shown) provided on the support structure 4. The support arms 11, 12 are movable in the directions shown by the arrows 69.

[0128] In figure 25, the support arms 11, 12 are moved toward each other by the arm driving system 66. The support arms 11, 12 are moved toward the support structure 4. The support arms 11, 12 are subsequently fixed in a support position 68 by the arm fixating system 67. By raising the support arms 11, 12 relative to the water surface, the first coupling members 29 of the support

units 52 couple with the second coupling members of the support structure 4. By further raising the support arms 11, 12 relative to the water surface, the support structure 4 will be lifted which allows the transportation of the support structure 4 by the vessel 1.

[0129] In a similar way, the moving support arm 11, 12 can be used to remove and/or install a top side 5. A removal of a top side 5, may for example be performed by moving the coupling members 29 and/or the support arms 11, 12 relative to the hull 6 such that the first coupling members 29 are positioned below second coupling members 30 provided at the underside of the top side 5. The support arms 11, 12 are subsequently raised relative to the water surface to couple the first coupling members 29 with the second coupling members 30. The raising of support arms 11, 12 relative to the water surface is continued to lift the top side 5 from the support structure 4. The vessel 1 is moved away from the support structure 4 while fully supporting the top side 5.

[0130] An installation of the top side 5, may for example be performed by positioning the top side 5 above a support structure 4 while the top side 5 is fully supported by the support arms 11, 12. The support arms 11, 12 are subsequently lowered relative to the water surface to place the top side 5 on the support structure 4. The lowering of the support arms 11, 12 is continued to fully transfer the weight of the top side 5 to the support structure 4. The lowering of the support arms 11, 12 relative to the water surface may be continued to create a distance between the support arms 11, 12 and the top side 5. The support arms 11, 12 are moved relative to the hull 6 before the vessel 1 is moved away from the support structure 4.

[0131] With reference to the fig. 23-26, the invention furthermore relates to a method for removing and/or installing at least one part of a sea platform 2 comprising a support structure 4 and a top side 5, wherein the method comprises the feature of moving the support arms 11, 12 relative to the hull 6. The method may comprise the feature of moving the support arms 11, 12 relative to each other. The method may comprise the feature of moving the support arms 11, 12 towards each other. The method may comprise the feature of moving the support arms 11, 12 away from each other. The method may comprise the feature of moving the support arms 11, 12 in a direction transverse to the roll axis 8. The method may comprise the feature of moving the support arms 11, 12 in a direction perpendicular to the roll axis 8. The method may comprise the feature of moving the support arms 11, 12 along the support trajectory 64. The method may comprise the feature of moving the support arms 11, 12 along the support rail 65. The method may comprise the feature of moving the support arms 11, 12 to match the dimensions of the top side 5 which in use will be supported by the support arms 11, 12. The method may comprise the feature of moving the support arms 11, 12 to match the dimensions of the support structure 4 which in use will be supported by the support arms 11, 12. The method may comprise the feature of fixating the support arms 11, 12 relative to the hull 6 in a support position 68. The method may comprise the feature of docking the vessel 1 at the support structure 4 via the at least one docking unit 70. The method may comprise the feature of moving the support arms 11, 12 relative to the hull after the docking of the vessel 1. The method may comprise the feature of fixating the support arms 11, 12 relative to the hull 6 after the docking of the vessel 1.

[0132] Figure 27 shows a further embodiment of the vessel. The hoisting system 32 is constructed and arranged to move said at least one part along the support arms 11, 12. The hoisting system 32 is constructed and arranged to move said at least one part along the deck 20 of the vessel 11. The driving system 31 is constructed and arranged to move the hoisting system 32 along the support arms 11, 12. The driving system 31 is constructed and arranged to move the hoist members 35, 36 along the support arms 11, 12.

[0133] The support arms 11, 12 comprise rails 51 and the driving system 31 moves the hoisting system 31 along said rails 51. The rails 51 extend substantially parallel to the roll axis 8 of the vessel 1.

[0134] With reference to the fig. 27, the invention furthermore relates to a method for removing and/or installing at least one part of a sea platform comprising a support structure and a top side, wherein the method comprises the feature of moving said at least one part supported by the support arms 11, 12 along the deck 20 of the vessel 1. The method may comprise the feature of moving said at least one part supported by the support arms 11, 12 in the direction of the roll axis 8 of the vessel 1. The method may comprise the feature of moving said at least one part carried by the hoisting system 32 along said support arms 11, 12 with the driving system 31. The method may comprise the feature of moving said at least one part carried by the hoisting system 21 along the rails 51. The method may comprise the feature of moving the hoist members 35, 36 along the support arms 11, 12 with the driving system 31 while carrying the said at least one part. The method may comprise the feature of placing said at least one part carried by the hoisting system 32 on the deck 20 of the vessel 1.

[0135] The method may comprise the feature of transferring said at least one part from the vessel 1 onto a quay 49 by positioning the second hull side 22 adjacent to the quay 49 and moving said at least one part from the vessel 1 to the quay 49 while moving over the second hull side 22.

[0136] The method may comprise the feature of transferring said at least one part from a quay 49 onto the vessel 1 by positioning the second hull 22 side adjacent to the quay 49 and moving said at least one part from the quay 49 to the vessel 1 while moving over the second hull side 22.

[0137] Said at least one part may be the support structure 4. Said at least one part may be the top side 5.

[0138] The method may comprise the feature of removing the support structure 4 while the vessel 1 carries

the top side 5. The method may comprise the feature of removing the support structure 4 while the vessel 1 carries a further support structure 4. The method may comprise the feature of removing the top side 5 while the vessel carries a further top side 5.

[0139] The method may comprise the feature of installing the support structure 4 while the vessel carries the top side 5. The method may comprise the feature of installing the support structure 4 while the vessel carries a further support structure 4. The method may comprise the feature of installing the top side 5 while the vessel carries a further top side 5.

[0140] Figures 28 shows a further embodiment of the vessel. The hoisting system 32 comprises a first hoisting member 35, a second hoisting member 36, a third hoisting member 73, and a fourth hoisting member 74. A flexible first hoisting line 37 connects the first hoisting member 35 with the first support arm 11. A flexible second hoisting line 38 connects the second hoisting member 36 with the second support arm 12. A flexible third hoisting line 75 connects the third hoisting member 73 with the first support arm 11. A flexible fourth hoisting line 76 connects the fourth hoisting member 74 with the second support arm 12.

[0141] The hoisting system 32 comprises a first line driver 39 connected to the first hoisting line 37, a second line driver 40 connected to the second hoisting line 38, a third line driver 77 connected to the third hoisting line 75 and a fourth line driver 78 connected to the fourth hoisting line 76. The first line driver 39 is attached to the first support arm 11, the second line driver 40 is attached to the second support arm 12, the third line driver 77 is attached to the first support arm 11 and the fourth line driver 78 is attached to the second support arm 12.

[0142] The support structure 4 is of the type on which a top side comprising a wind turbine is placed. Two further support structures 4 are located on the deck 20 of the vessel 1.

[0143] The following clauses present a further description of the vessel, method and use according to the invention.

1. Vessel for removal and/or installation of at least one part of a sea platform comprising a support structure and a top side, said vessel comprising a hull and two support arms located at a distance from each other and attached to the hull, wherein the support arms in use extend beyond the hull in a substantially horizontal direction.

2. Vessel according to clause 1, wherein the support arms are constructed and arranged to in use fully support said at least one part of the sea platform.

3. Vessel according to clause 1 or 2, wherein the support arms extend over a distance between 10 and 100 m beyond the hull.

4. Vessel according to any of the preceding clauses, wherein the support arms extend along the hull over a distance between 10 and 100 % of the length of the hull.

5. Vessel according to any of the preceding clauses, wherein the distance between the support arms is between 10 and 100 m.

6. Vessel according to any of the preceding clauses, wherein the support arms are located above the water surface when carrying said at least one part of the sea platform.

7. Vessel according to any of the preceding clauses, wherein the support arms extend substantially parallel to each other.

8. Vessel according to any of the preceding clauses, wherein the vessel comprises a roll axis.

9. Vessel according to clause 8, wherein the support arms extend substantially parallel to the roll axis.

10. Vessel according to any of the preceding clauses, wherein the support arms are provided with a driving system constructed and arranged to in use move said at least one part carried by the support arms along said support arms.

11. Vessel according to any of the preceding clauses, wherein the support arms form a support surface on which the said at least one part in use is placed.

12. Vessel according to clause 11, wherein the vessel comprises a deck and the support surface in use is located above the deck.

13. Vessel according to any of the preceding clauses, wherein the support arms comprise an upper arm surface, a second arm end connected to the hull and an inclined surface extending from the upper arm surface to the deck.

14. Vessel according to any of the clauses 11-13, wherein the support surface in use is located between the water surface and 50 m above the water surface.

15. Vessel according to any of the clauses 11-14, wherein the support surface is located at a distance of between 10 and 60 m from the bottom of the hull.

16. Vessel according to any of the clauses 11-15, wherein the support surface is located at a distance of between 5 and 30 m from the deck.

17. Vessel according to any of the preceding claus-

es, wherein the vessel comprises a ballast system constructed and arranged to lower and raise the vessel relative to the water surface.

18. Vessel according to clause 17, wherein the ballast system comprises at least one ballast tank in which water received by the ballast system is held.

19. Vessel according to clause 18, wherein the ballast tanks are located in the support arms.

20. Vessel according to clause 19, wherein the ballast tanks are located in the inboard extending part of the support arms.

21. Vessel according to any of the clauses 18-20, wherein the ballast tanks in use are positioned above the water surface.

22. Vessel according to any of the clauses 18-21, wherein the ballast system comprise outflow openings which are in fluid communication with the ballast tanks to discharge water held by said ballast tanks and the outflow openings are in use located above the water surface.

23. Vessel according to any of the preceding clauses, wherein said at least one part of the sea platform comprises the top side.

24. Vessel according to any of the preceding clauses, wherein support units are attached to the support arms.

25. Vessel according to any of the preceding clauses, wherein support units are attached to the hull.

26. Vessel according to clause 24 or 25, wherein the support units form the support surface.

27. Vessel according to any of the clauses 24-26, wherein the support units comprise a first coupling member.

28. Vessel according to clause 27, wherein the first coupling members are constructed and arranged to couple with cooperating second coupling members attached to said at least one part.

29. Vessel according to any of the clauses 24-28, wherein the support units comprise dampers forming the support surface.

30. Vessel according to clause 29, wherein dampers comprise an elastic material, such as rubber.

31. Vessel according to any of the clauses 10-30, wherein the driving system is constructed and arranged to move at least part of the support units along the support arms.

32. Vessel according to any of the preceding clauses, wherein the hull comprises a first hull side and an opposite second hull side, the support arms extend beyond the hull from the first hull side.

33. Vessel according to clause 32, wherein the width of the hull at the second hull side is smaller than the width of the hull at the first hull side.

34. Vessel according to clause 33, wherein in the direction of the roll axis the hull comprises said smaller width over a distance between 20 and 60 % of the length of the hull.

35. Vessel according to any of the clauses 32-34, wherein the width of the second hull side is between 20 and 70 m.

36. Vessel according to any of the clauses 32-35, wherein the width of the first hull side is between 40 and 100 m.

37. Vessel according to any of the preceding clauses, wherein a top side support is provided on the deck of the vessel.

38. Vessel according to clause 37, wherein the top side support is located at the second hull side.

39. Vessel according to clause 38, wherein the top side support is located at the part of the hull comprising said smaller width.

40. Vessel according to any of the preceding clauses, wherein a hoisting system is attached to the support arms.

41. Vessel according to clause 40, wherein the hoisting system is attached to the outboard extending part of the support arms.

42. Vessel according to any of the preceding clauses, wherein said at least one part of the sea platform comprises the support structure.

43. Vessel according to any of the clauses 40-42, wherein the support arms comprise a first support arm and a second support arm and the hoisting system comprises;

- a first hoisting member,
- a second hoisting member,
- a flexible first hoisting line connecting the first hoisting member with the first support arm,
- a flexible second hoisting line connecting the

second hoisting member with the second support arm, and

- at least one line driver connected to the vessel and constructed and arranged to take in and pay out the first hoisting line and second hoisting line in order to move the first hoisting member and the second hoisting member relative the first support arm and the second support arm, respectively.

44. Vessel according to clause 43, wherein the hoisting system comprises;

- a third hoisting member,
- a fourth hoisting member,
- a flexible third hoisting line connecting the third hoisting member with the first support arm,
- a flexible fourth hoisting line connecting the fourth hoisting member with the second support arm, and

the at least one line driver is constructed and arranged to take in and pay out the third hoisting line and fourth hoisting line in order to move the third hoisting member and the fourth hoisting member relative the first support arm and the second support arm, respectively.

45. Vessel according to clause 43 or 44, wherein the hoisting system comprises a separate line driver connected to each hoisting line.

46. Vessel according to clause 43-45, wherein the hoisting system comprises a first line driver connected to the first hoisting line and a second line driver connected to the second hoisting line.

47. Vessel according to clause 46, wherein the first line driver is attached to the first support arm and the second line driver is attached to the second support arm.

48. Vessel according to any of the clauses 43-47, wherein the first hoisting member and second hoisting member are provided with connectors constructed and arranged to in use connect said hoisting members to the support structure.

49. Vessel according to any of the clauses 43-48, wherein the first hoisting member and the second hoisting member comprise an in use substantially horizontal extending hoisting beam.

50. Vessel according to any of the clauses 43-49, wherein the first hoisting line is attached to the first support arm via a first lifting device constructed and arranged to in use lift the first hoisting line above the first support arm in a substantially vertical direction and the second hoisting line is attached to the second support arm via a second lifting device constructed and arranged to in use lift the second hoisting line above the second support arm in a substantially vertical direction.

51. Vessel according to clause 50, wherein the first lifting device and the second lifting device are constructed and arranged to lift the first hoisting line and the second hoisting line up to a distance of between 10 and 50 m above the first support arm and the second support arm, respectively.

52. Vessel according to any of the clauses 44-51, wherein the hoisting system comprises a third line driver connected to the third hoisting line and a fourth line driver connected to the fourth hoisting line.

53. Vessel according to clause 52, wherein the third line driver is attached to the first support arm and the fourth line driver is attached to the second support arm.

54. Vessel according to any of the clauses 44-53, wherein the third hoisting member and fourth hoisting member are provided with connectors constructed and arranged to in use connect said hoisting members to the support structure.

55. Vessel according to any of the clauses 44-54, wherein the third hoisting line is attached to the first support arm via a third lifting device constructed and arranged to in use lift the third hoisting line above the first support arm in a substantially vertical direction and the fourth hoisting line is attached to the second support arm via a fourth lifting device constructed and arranged to in use lift the fourth hoisting line above the second support arm in a substantially vertical direction.

56. Vessel according to clause 55, wherein the third lifting device and the fourth lifting device are constructed and arranged to lift the third hoisting line and the fourth hoisting line up to a distance of between 10 and 50 m above the first support arm and the second support arm, respectively.

57. Vessel according to any of the clauses 40-56, wherein the hoisting system is constructed and arranged to move said at least one part along the support arms.

58. Vessel according to any of the clauses 40-57, wherein the hoisting system is constructed and arranged to move said at least one part along the deck of the vessel.

59. Vessel according to any of the clauses 40-58,

wherein the driving system is constructed and arranged to move the hoisting system along the support arms.

60. Vessel according to any of the clauses 43-59, wherein the driving system is constructed and arranged to move the hoist members along the support arms.

61. Vessel according to any of the clauses 40-60, wherein the support arms comprise rails and the driving system moves the hoisting system along said rails.

62. Vessel according to any of the clauses 40-61, wherein each support arm comprises a rail and the driving system moves the hoisting system along said rails.

63. Vessel according to clause 61 or 62, wherein the rails extend substantially parallel to the roll axis of the vessel.

64. Vessel according to any of the preceding clauses, wherein the vessel comprises a further hoisting system which is supported by the support arms and the further hoisting system comprises a hoist driving device to drive the further hoisting device along the support arms.

65. Vessel according to clause 64, wherein the further hoisting system comprises a cross beam extending over the distance between the support arms.

66. Vessel according to any of the preceding clauses, wherein the vessel comprises a heavy lifting crane positioned on the deck.

67. Vessel according to any of the preceding clauses, wherein the support arms are movable relative to the hull.

68. Vessel according to any of the preceding clauses, wherein the support arms are movable relative to each other.

69. Vessel according to any of the preceding clauses, wherein the support arms are movable in a direction transverse to the roll axis.

70. Vessel according to any of the preceding clauses, wherein the support arms are movable in a direction perpendicular to the roll axis.

71. Vessel according to any of the preceding clauses, wherein the support arms are movable along a support trajectory.

72. Vessel according to clause 71, wherein the support trajectory extends transverse to the roll axis.

73. Vessel according to clause 71, wherein the support trajectory extends perpendicular to the roll axis.

74. Vessel according to any of the preceding clauses, wherein the vessel comprises a support rail and the support arms are moveable along the support rail.

75. Vessel according to clause 74, wherein the support rail extends transverse to the roll axis.

76. Vessel according to clause 74, wherein the support rail extends perpendicular to the roll axis.

77. Vessel according to any of the clauses 74-76, wherein the support rail defines the support trajectory.

78. Vessel according to any of the preceding clauses, wherein the vessel comprises an arm driving system constructed and arranged to move the support arms relative to the hull.

79. Vessel according to clause 78, wherein the arm driving system moves the support arms along the support trajectory.

80. Vessel according to clause 78 or 79, wherein the arm driving system moves the support arms along the support rails.

81. Vessel according to any of the preceding clauses, wherein the vessel comprises an arm fixating system constructed and arranged to fixate the support arms relative to the hull.

82. Vessel according to any of the clauses 67-81, wherein the support arms are movable from a distance of 10 m between the support arms to a distance of 100 m between the support arms, and vice versa.

83. Vessel according to any of the preceding clauses, wherein the vessel comprises at least one docking unit.

84. Vessel according to clause 83, wherein at least one docking unit is attached to the support arms.

85. Vessel according to clause 84, wherein at least one docking unit is attached to the inner arm surfaces of the support arms.

86. Vessel according to any of the clauses 83-85, wherein at least one docking unit is attached to the hull.

87. Vessel according to clause 86, wherein at least one docking unit is attached to the first hull side.

88. Vessel according to any of the preceding clauses, wherein the top side comprises equipment constructed and arranged to exploit oil and/or gas from the seabed.

89. Vessel according to any of the preceding clauses, wherein the top side comprises a drilling system constructed and arranged to drill in the seabed.

90. Vessel according to any of the preceding clauses, wherein the top side comprises a wind turbine.

91. Method for removing at least a part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to any of the preceding clauses,
- positioning the support arms under the top side such that the support structure is located between the support arms,
- raising the support arms relative to the water surface to fully support the top side with the support arms,
- continuing the raising of the support arms to move the top side at a distance from the support structure and
- moving the vessel away from the support structure in a substantially horizontal direction while fully supporting the top side with the support arms.

92. Method according to clause 91, wherein the provided vessel complies with any of the clauses 11-90 and the method comprises fully supporting the top side with the support arms while the top side is positioned on the support surface.

93. Method according to clause 91 or 92, wherein the provided vessel complies with any of the clauses 24-90 and the method comprises fully supporting the top side with the support arms via the support units.

94. Method according to any of the clauses 91-93, wherein the provided vessel complies with any of the clauses 67-90 and wherein the method comprises moving the support arms relative to the hull before the support arms support the top side.

95. Method according to any of the clauses 91-94, wherein the provided vessel complies with any of the clauses 67-90 and wherein the method comprises moving the support arms relative to the hull after the support arms are positioned under the top side.

96. Method according to any of the clauses 91-95, wherein the provided vessel complies with any of the clauses 67-90 and wherein the method comprises fixating the support arms relative to the hull in a support position before the support arms fully support the top side.

97. Method according to any of the clauses 91-96, wherein the provided vessel complies with any of the clauses 67-90 and wherein the method comprises fixating the support arms relative to the hull in a support position after the support arms are positioned under the top side.

98. Method according to any of the clauses 91-97, wherein the provided vessel complies with any of the clauses 27-90 and the method comprises attaching cooperating second coupling members to the top side.

99. Method according to clause 98, wherein the method comprises raising the support arms relative to the water surface to couple the first coupling members with the second coupling members.

100. Method according to clause 98 or 99, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises fixating the support arms relative to the hull in a support position before the first coupling members are coupled with the second coupling members.

101. Method according to any of the clauses 98-100, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms relative to the hull to couple the first coupling members with the second coupling members.

102. Method according to any of the clauses 98, 99, 101, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises fixating the support arms relative to the hull in a support position after the first coupling members are coupled with the second coupling members.

103. Method according to any of the clauses 91-102, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises docking the vessel at the support structure via the at least one docking unit to positioning the support arms under the top side such that the support structure is located between the support arms,

104. Method according to any of the clauses 91-103, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises docking the vessel at the support structure via the at least

one docking unit before the support arms support the top side.

105. Method according to any of the clauses 91-104, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises docking the vessel at the support structure via the at least one docking unit before the support arms are raised relative to the water surface.

106. Method according to any of the clauses 91-105, wherein the method comprises disconnecting the top side from the rest of the sea platform while the support arms fully support the top side.

107. Method according to any of the clauses 91-106, wherein the method comprises

- positioning the vessel such that the support arms supporting the top side are positioned above a quay, and
- transferring the top side onto the quay.

108. Method according to clause 107, wherein the top side is transferred onto the quay by moving the top side along the support arms.

109. Method according to clause 107 or 108, wherein the top side is transferred onto the quay by hoisting the top side from the support arms and placing the top side on the quay.

110. Method according to any of the clauses 107-109, wherein the top side is transferred onto the quay by lowering the support arms.

111. Method according to any of the clauses 107-110, wherein the provided vessel complies with any of the clauses 67-90 and the top side is transferred onto the quay by moving the support arm relative to the hull.

112. Method for removing at least part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to any of the clauses 40-90,
- connecting the hoisting system to the support structure, and
- raising the support structure with the hoisting system in a substantially vertical direction while fully supporting the support structure with the support arms.

113. Method according to any of the clauses 91-111, wherein the provided vessel complies with any of the clauses 40-90 and the method comprises

- connecting the hoisting system to the support structure, and
- raising the support structure with the hoisting system in a substantially vertical direction while fully supporting the support structure with the support arms.

114. Method according to any of the clauses 112 or 113, wherein the provided vessel complies with any of the clauses 43-90 and the method comprises

- lowering the first hoist member and second hoist member towards the seabed,
- connecting the first hoist member and second hoist member to the support structure at a position below the water surface, and
- raising the first hoist member and second hoist member towards the water surface.

115. Method according to clause 115, wherein the method comprises raising the first hoist member and second hoist member to a position above the water surface.

116. Method according to clause 114 or 115, wherein the provided vessel complies with any of the clauses 50-90 and the method comprises raising the first hoist member and second hoist member above the support arms.

117. Method according to any of the clauses 112-116, wherein the provided vessel complies with any of the clauses 44-90 and the method comprises

- lowering the third hoist member and fourth hoist member towards the seabed,
- connecting the third hoist member and fourth hoist member to the support structure at a position below the water surface, and
- raising the third hoist member and fourth hoist member towards the water surface.

118. Method according to clause 117, wherein the method comprises raising the third hoist member and fourth hoist member to a position above the water surface.

119. Method according to clause 117 or 118, wherein the provided vessel complies with any of the clauses 55-90 and the method comprises raising the third hoist member and fourth hoist member above the support arms.

120. Method according to any of the clauses 112-119, wherein the method comprises dismantling the support structure while being supported by the support arms.

121. Method according to any of the clauses 112-120, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms relative to the hull before the support structure is raised with the hoisting system.

122. Method according to any of the clauses 112-121, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises fixating the support arms relative to the hull before the support structure is raised with the hoisting system.

123. Method according to any of the clauses 112-122, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises docking the vessel at the support structure via at least one docking unit before the support structure is raised with the hoisting system.

124. Method for removing at least a part of a sea platform comprising a support structure and a top side, wherein the support structure comprise support legs and the method comprises;

- providing a vessel which complies with any of the clauses 37-90,
- positioning the top side support under the top side such that the hull of the vessel is located between the support legs,
- raising the top side support relative to the water surface to fully support the top side with the top side support,
- continuing the raising of the top side support to move the top side at a distance from the support structure and
- moving the vessel away from the support structure in a substantially horizontal direction while fully supporting the top side with the top side support.

125. Method according to any of the clauses 112-123, wherein the provided vessel complies with any of the clauses 37-90, the support structure of the sea platform comprises support legs and the method comprises

- positioning the top side support under the top side such that the hull of the vessel is located between the support legs,
- raising the top side support relative to the water surface to fully support the top side with the top side support,
- continuing the raising of the top side support to move the top side at a distance from the support structure and
- moving the vessel away from the support structure in a substantially horizontal direction while fully supporting the top side with the top side support.

126. Method according to clause 124 or 125, wherein the method comprises fully supporting the top side with the top side support located on the deck of the vessel.

127. Method according to any of the clauses 124-126, wherein the method comprises raising the top side support by raising the hull of the vessel relative to the water surface.

128. Method for installing at least a part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to any of the clauses 1-90, wherein the top side of the sea platform is fully supported by the support arms,
- positioning the top side above the support structure such that the support structure is located between the support arms,
- lowering the support arms relative to the water surface to place the top side on the support structure,
- continuing the lowering of the support arms to fully transfer the weight of the top side to the support structure and to move the support arms at a distance from the top side and
- moving the vessel away from the support structure in a substantially horizontal direction.

129. Method according to clause 128, wherein the provided vessel complies with any of the clauses 11-90 and the method comprises fully supporting the top side with the support arms while the top side is positioned on the support surface.

130. Method according to clause 128 or 129, wherein the provided vessel complies with any of the clauses 24-90 and the method comprises fully supporting the top side with the support arms via the support units.

131. Method according to any of the clauses 128-130, wherein the method comprises moving the support arms relative to the hull after the transfer of the weight of the top side to the support structure.

132. Method according to any of the clauses 128-131, wherein the provided vessel complies with any of the clauses 27-90 and cooperating second coupling members are attached to the top side and coupled to the first coupling members.

133. Method according to clause 132, wherein the method comprises lowering the support arms rela-

tive to the water surface to decouple the first coupling members from the second coupling members.

134. Method according to clause 132 or 133, wherein the method comprises moving the support arms relative to the hull to decouple the first coupling members from the second coupling members.

135. Method according to any of the clauses 128-134, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises docking the vessel at the support structure via the at least one docking unit to positioning the top side above the support structure such that the support structure is located between the support arms.

136. Method according to any of the clauses 128-135, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises docking the vessel at the support structure via at least one docking unit before the support arms are lowered relative to the water surface.

137. Method according to any of the clauses 128-136, wherein the method comprises fully supporting the top side with the support arms by positioning the vessel such that the support arms are positioned above a quay on which the top side is located and transferring the top side on to the support arms.

138. Method according to clause 137, wherein the top side is transferred onto the support arms by moving the top side along the support arms.

139. Method according to clause 137 or 138, wherein the top side is transferred onto the support arms by hoisting the top side from the quay and placing the top side on the support arms.

140. Method according to any of the clauses 137-139, wherein the top side is transferred onto the support arm by raising the support arms.

141. Method according to any of the clauses 137-140, wherein the provided vessel complies with any of the clauses 67-90 and the top side is transferred onto the support arms by moving the support arm relative to the hull.

142. Method for installing at least a part of a sea platform comprising a support structure and top side, which method comprises;

- providing a vessel according to any of the clauses 40-90, wherein the support structure is connected to the hoisting system and fully supported by the support arms,
- lowering the support structure with the hoisting system in a substantially vertical direction such that the support structure is placed on the seabed or a foundation provided on the seabed and
- disconnecting the hoisting system from the support structure.

143. Method according to any of the clauses 128-141, wherein the provided vessel complies with any of the clauses 40-90, the support structure is connected to the hoisting system and fully supported by the support arms, and the method comprises

- lowering the support structure with the hoisting system in a substantially vertical direction such that the support structure is placed on the seabed or a foundation provided on the seabed, and
- disconnecting the hoisting system from the support structure.

144. Method according to clause 142 or 143, wherein the provided vessel complies with any of the clauses 43-90, the first hoist member and second hoist member are connected to the support structure, and the method comprises;

- lowering the support structure by lowering the first hoist member and second hoist member towards the seabed, and
- disconnecting the first hoist member and second hoist member from the support structure at a positioned below the water surface, and
- raising the first hoist member and the second hoist member towards the water surface.

145. Method according to clause 144, wherein the method comprises raising the first hoist member and the second hoist member to a position above the water surface.

146. Method according to clause 144 or 145, wherein the provided vessel complies with any of the clauses 50-90 and the first hoist member and second hoist member are located above the support arms while being connected to support structure.

147. Method according to any of the clauses 144-146, wherein the provided vessel complies with any of the clauses 44-90, the third hoist member and fourth hoist member are connected to the support structure, and the method comprises;

- lowering the support structure by lowering the third hoist member and fourth hoist member towards the seabed, and
- disconnecting the third hoist member and fourth hoist member from the support structure at a positioned below the water surface, and

- raising the third hoist member and the fourth hoist member towards the water surface.

148. Method according to clause 147, wherein the method comprises raising the third hoist member and the fourth hoist member to a position above the water surface.

149. Method according to clause 147 or 148, wherein the provided vessel complies with any of the clauses 55-90 and the third hoist member and fourth hoist member are located above the support arms while being connected to support structure.

150. Method for installing at least a part of a sea platform comprising a support structure and top side, wherein the support structure comprise support legs and the method comprises;

- providing a vessel which complies with any of the clauses 37-90, and wherein the top side of the sea platform is fully supported by the top side support,
- positioning the top side above the support structure such that the hull of the vessel is located between the support legs,
- lowering the top side support relative to the water surface to place the top side on the support structure,
- continuing the lowering of the top side support to fully transfer the weight of the top side to the support structure and to move the top side support at a distance from the top side and
- moving the vessel away from the support structure in a substantially horizontal direction.

151. Method according to any of the clauses 142-149, wherein the provided vessel complies with any of the clauses 37-90, the top side of the sea platform is fully supported by the top side support, and the method comprises

- positioning the top side above the support structure such that the hull of the vessel is located between the support legs,
- lowering the top side support relative to the water surface to place the top side on the support structure,
- continuing the lowering of the top side support to fully transfer the weight of the top side to the support structure and to move the top side support at a distance from the top side and
- moving the vessel away from the support structure in a substantially horizontal direction.

152. Method according to clause 150 or 151, wherein the method comprises fully supporting the top side with the top side support located on the deck of the vessel.

153. Method according to any of the clauses 150-151, wherein the method comprises lowering the top side support by lowering the hull of the vessel relative to the water surface.

154. Method according to any of the clauses 91-153, wherein the method comprises fully supporting at least one part of the sea platform with the outboard extending part of the support arms.

155. Method according to any of the clauses 91-154, wherein the method comprises fully supporting at least one part of the sea platform with the inboard extending part of the support arms.

156. Method according to any of the clauses 91-155, wherein at least two parts of the sea platform are supported by the support arms

157. Method according to any of the clauses 91-156, wherein the method comprises raising the support arms relative to the water surface by raising the hull relative to the water surface.

158. Method according to any of the clauses 91-157, wherein the method comprises lowering the support arms relative to the water surface by lowering the hull relative to the water surface.

159. Method according to any of the clauses 91-158, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms relative to the hull.

160. Method according to any of the clauses 91-159, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms relative to each other.

161. Method according to any of the clauses 91-160, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms towards each other.

162. Method according to any of the clauses 91-161, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms away from each other.

163. Method according to any of the clauses 91-162, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms in a direction transverse to the roll axis.

164. Method according to any of the clauses 91-162,

wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms in a direction perpendicular to the roll axis.

165. Method according to any of the clauses 91-164, wherein the provided vessel complies with any of the clauses 71-90 and the method comprises moving the support arms along the support trajectory.

166. Method according to any of the clauses 91-165, wherein the provided vessel complies with any of the clauses 74-90 and the method comprises moving the support arms along the support rail.

167. Method according to any of the clauses 91-166, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms to match the dimensions of the top side which in use will be supported.

168. Method according to any of the clauses 91-167, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises moving the support arms to match the dimensions of the support structure which in use will be supported.

169. Method according to any of the clauses 91-168, wherein the provided vessel complies with any of the clauses 67-90 and the method comprises fixating the support arms relative to the hull in a support position.

170. Method according to any of the clauses 91-169, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises docking the vessel at the support structure via the at least one docking unit.

171. Method according to any of the clauses 91-170, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises moving the support arms relative to the hull after the docking of the vessel.

172. Method according to any of the clauses 91-171, wherein the provided vessel complies with any of the clauses 83-90 and the method comprises fixating the support arms relative to the hull after the docking of the vessel.

173. Method according to any of the clauses 91-172, wherein the method comprises moving said at least one part supported by the support arms along said support arms.

174. Method according to any of the clauses 91-173, wherein the method comprises moving said at least one part supported by the support arms along the deck of the vessel.

175. Method according to any of the clauses 91-174, wherein the provided vessel complies with any of the clauses 8-90 and the method comprises moving said at least one part supported by the support arms in the direction of the roll axis of the vessel.

176. Method according to any of the clauses 91-175, wherein the provided vessel complies with any of the clauses 40-90 and the method comprises moving said at least one part carried by the hoisting system along said support arms with the driving system.

177. Method according to any of the clauses 91-176, wherein the provided vessel complies with any of the clauses 40-90 and the method comprises moving said at least one part carried by the hoisting system along the rails.

178. Method according to any of the clauses 91-177, wherein the provided vessel complies with any of the clauses 40-90 and the method comprises moving the hoist members along the support arms with the driving system while carrying the said at least one part.

179. Method according to any of the clauses 91-178, wherein the provided vessel complies with any of the clauses 40-90 and the method comprises placing said at least one part carried by the hoisting system on the deck of the vessel.

180. Method according to any of the clauses 91-179, wherein the method comprises transferring said at least one part from the vessel onto a quay by positioning the second hull side adjacent to the quay and moving said at least one part from the vessel to the quay while moving over the second hull side.

181. Method according to any of the clauses 91-180, wherein the method comprises transferring said at least one part from a quay onto the vessel by positioning the second hull side adjacent to the quay and moving said at least one part from the quay to the vessel while moving over the second hull side.

182. Method according to any of the clauses 91-182, wherein said at least one part is the support structure.

183. Method according to any of the clauses 91-182, wherein said at least one part is the top side.

184. Method according to any of the clauses 91-183, wherein the method comprises removing the support structure while the vessel carries the top side.

185. Method according to any of the clauses 91-184, wherein the method comprises removing the support structure while the vessel carries a further support structure.

186. Method according to any of the clauses 91-185, wherein the method comprises removing the top side while the vessel carries a further top side.

187. Method according to any of the clauses 91-186, wherein the method comprises installing the support structure while the vessel carries the top side.

188. Method according to any of the clauses 91-187, wherein the method comprises installing the support structure while the vessel carries a further support structure.

189. Method according to any of the clauses 91-188, wherein the method comprises installing the top side while the vessel carries a further top side.

190. Use of a vessel according to any of the clauses 1-90.

It will be apparent to those skilled in the art that various modifications can be made to the vessel and method according to the invention without departing from the scope as defined in the claims.

Claims

1. Vessel for removal and/or installation of at least one part of a sea platform comprising a support structure and a top side, said vessel comprising a hull and two support arms located at a distance from each other and attached to the hull, wherein the support arms in use extend beyond the hull in a substantially horizontal direction.

2. Vessel according to claim 1, wherein the support arms are located above the water surface when carrying said at least one part of the sea platform.

3. Vessel according to claim 1 or 2, wherein support units are attached to the support arms and/or to the hull, and the support units comprise a first coupling member.

4. Vessel according to any of the preceding claims, wherein the support arms are movable relative to the hull.

5. Method for removing at least a part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to any of the preceding claims,
- positioning the support arms under the top side such that the support structure is located between the support arms,
- raising the support arms relative to the water surface to fully support the top side with the support arms,
- continuing the raising of the support arms to move the top side at a distance from the support structure and
- moving the vessel away from the support structure in a substantially horizontal direction while fully supporting the top side with the support arms.

6. Method according to claim 5, wherein the provided vessel complies with claim 4 and wherein the method comprises moving the support arms relative to the hull before the support arms support the top side.

7. Method according to claim 5 or 6, wherein the provided vessel complies with claim 3 and the method comprises attaching cooperating second coupling members to the top side and raising the support arms relative to the water surface to couple the first coupling members with the second coupling members.

8. Method according to any of the claims 5-7, wherein the provided vessel complies with the claims 3 and 4 and the method comprises moving the support arms relative to the hull to couple the first coupling members with the second coupling members.

9. Method according to any of the claims 5-8, wherein the method comprises

- positioning the vessel such that the support arms supporting the top side are positioned above a quay, and
- transferring the top side onto the quay.

10. Method for installing at least a part of a sea platform comprising a support structure and a top side, which method comprises;

- providing a vessel according to any of the claims 1-4, wherein the top side of the sea platform is fully supported by the support arms,
- positioning the top side above the support structure such that the support structure is located between the support arms,
- lowering the support arms relative to the water surface to place the top side on the support structure,
- continuing the lowering of the support arms to fully transfer the weight of the top side to the support structure and to move the support arms at a distance from the top side and

- moving the vessel away from the support structure in a substantially horizontal direction.

11. Method according to claim 10, wherein the provided vessel complies with claim 4 and the method comprises moving the support arms relative to the hull after the transfer of the weight of the top side to the support structure.

12. Method according to claim 10 or 11, wherein the provided vessel complies with claim 3 and cooperating second coupling members are attached to the top side and coupled to the first coupling members and the method comprises lowering the support arms relative to the water surface to decouple the first coupling members from the second coupling members.

13. Method according to any of the claims 10-12, wherein the method comprises fully supporting the top side with the support arms by positioning the vessel such that the support arms are positioned above a quay on which the top side is located and transferring the top side on to the support arms.

14. Method according to any of the claims 5-13, wherein the provided vessel complies with claim 4 and the method comprises moving the support arms to match the dimensions of the top side which in use will be supported.

15. Method according to any of the claims 5-14, wherein the method comprises installing the support structure while the vessel carries the top side.

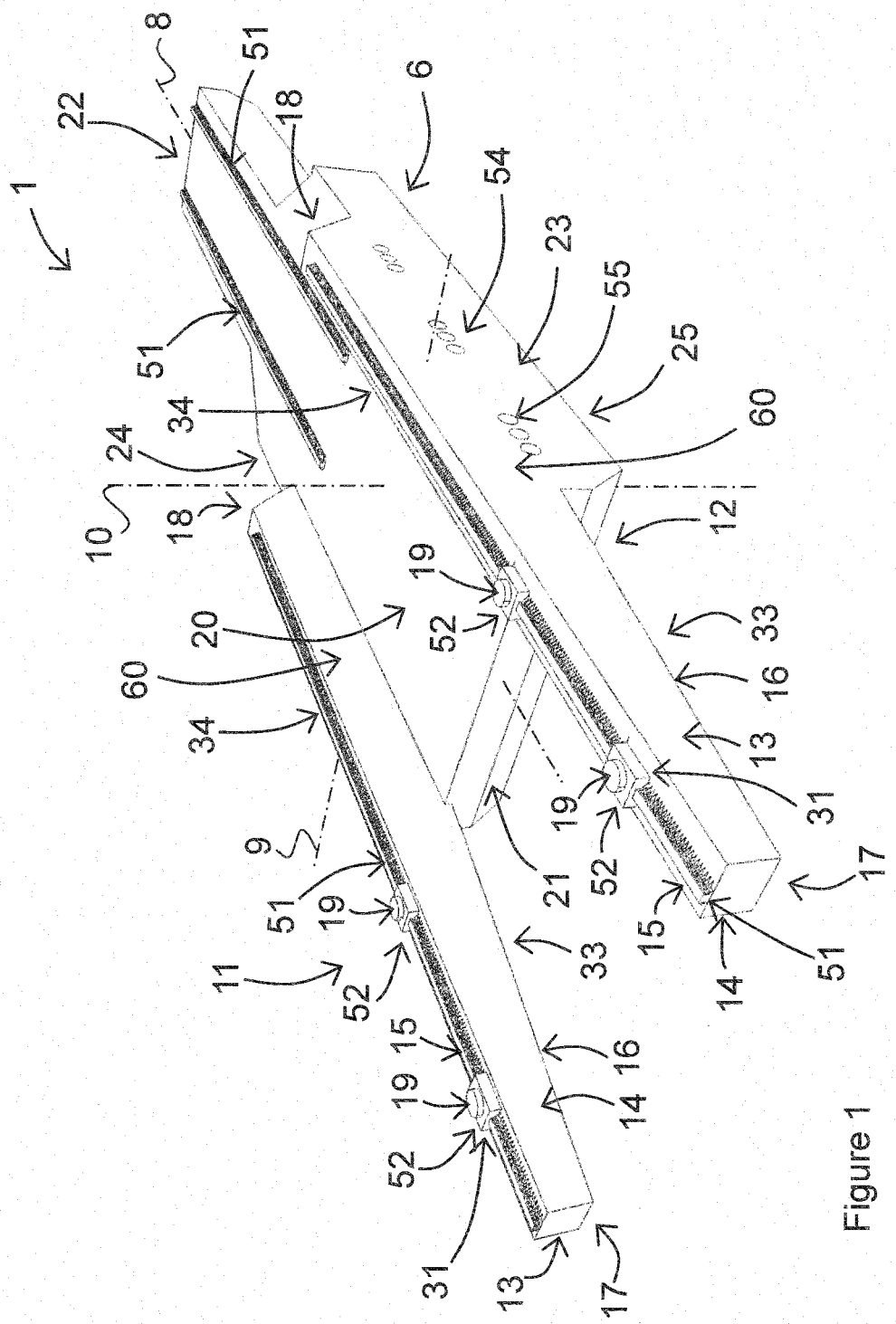
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Figure 1

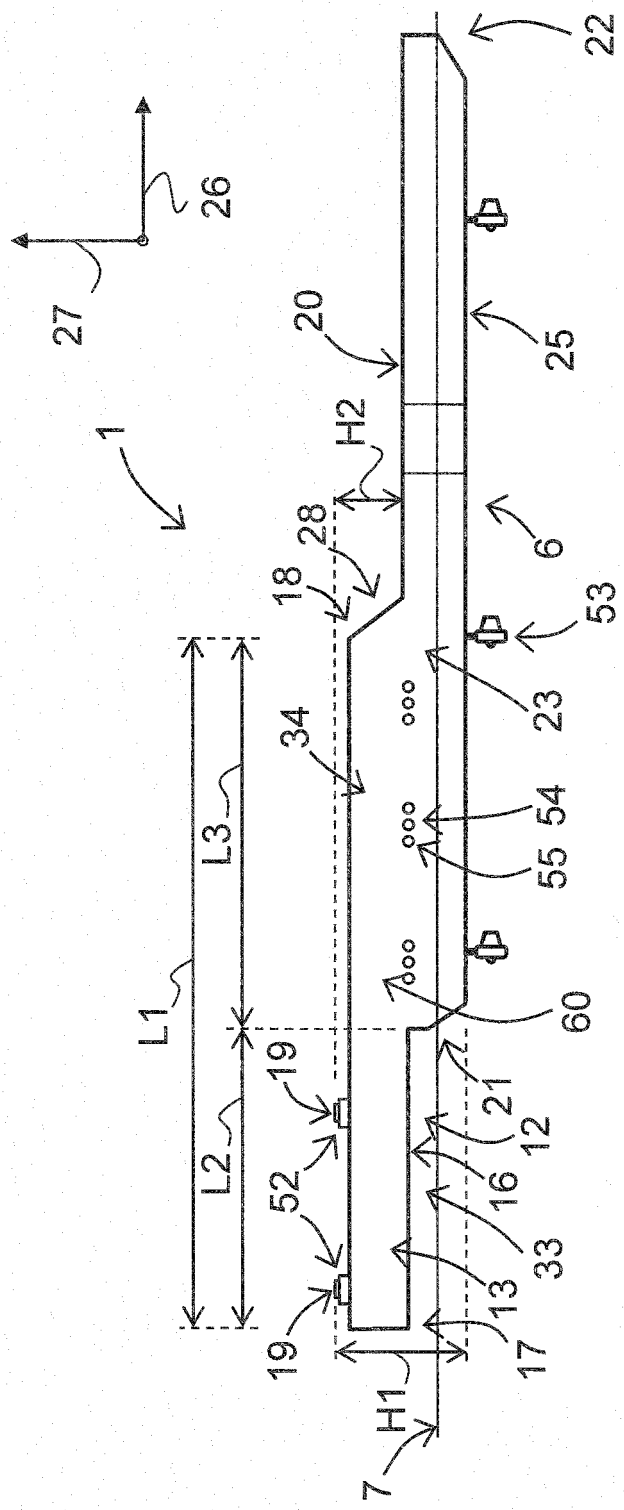
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Figure 2

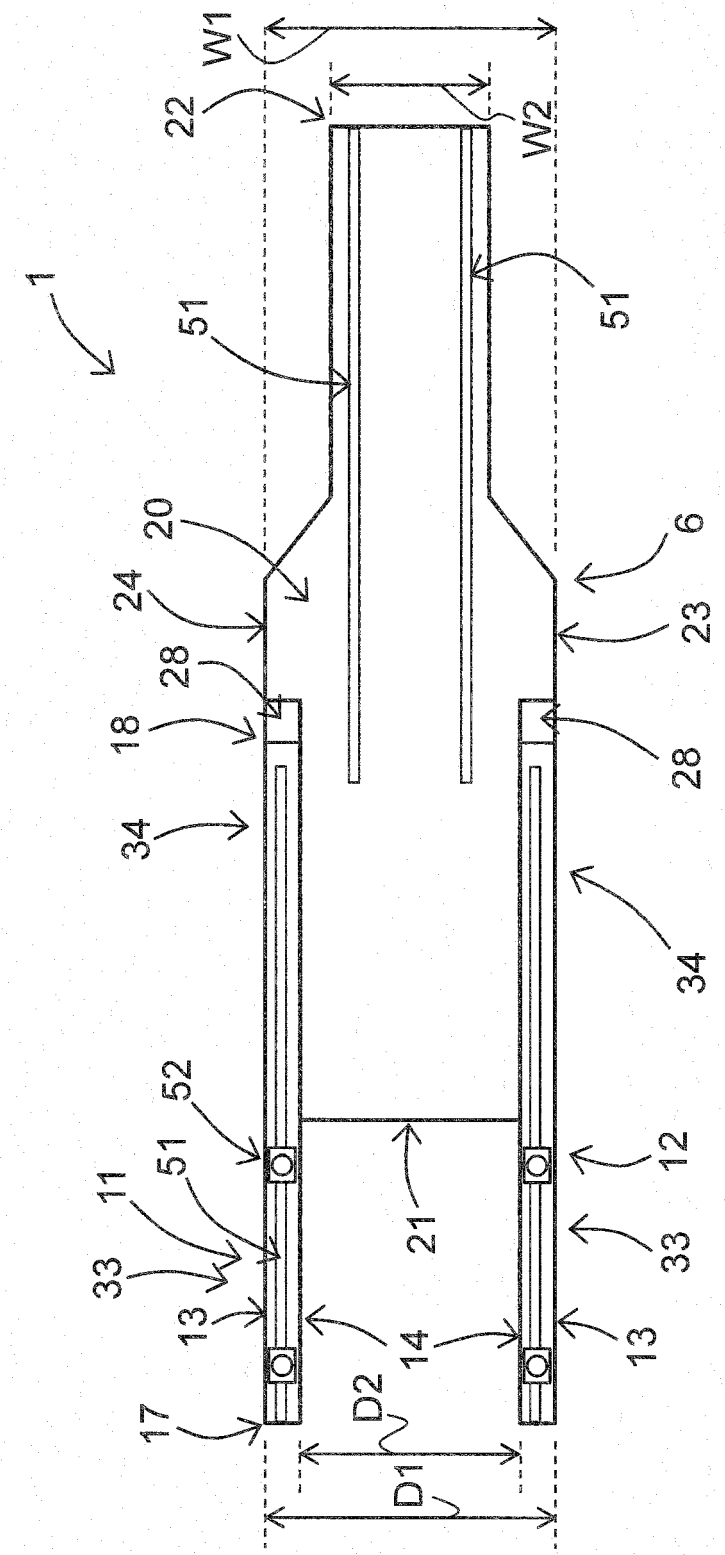
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Figure 3

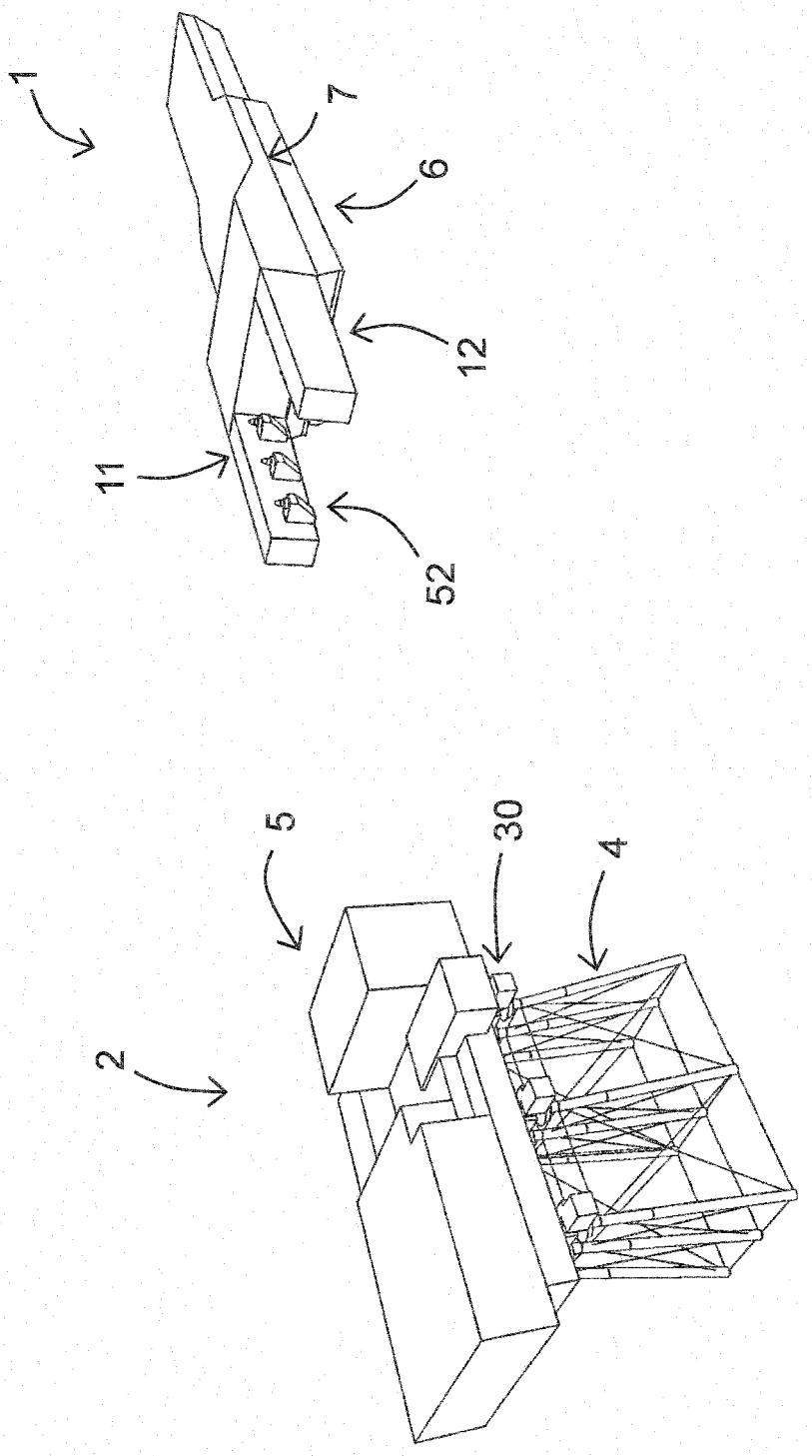


Figure 4

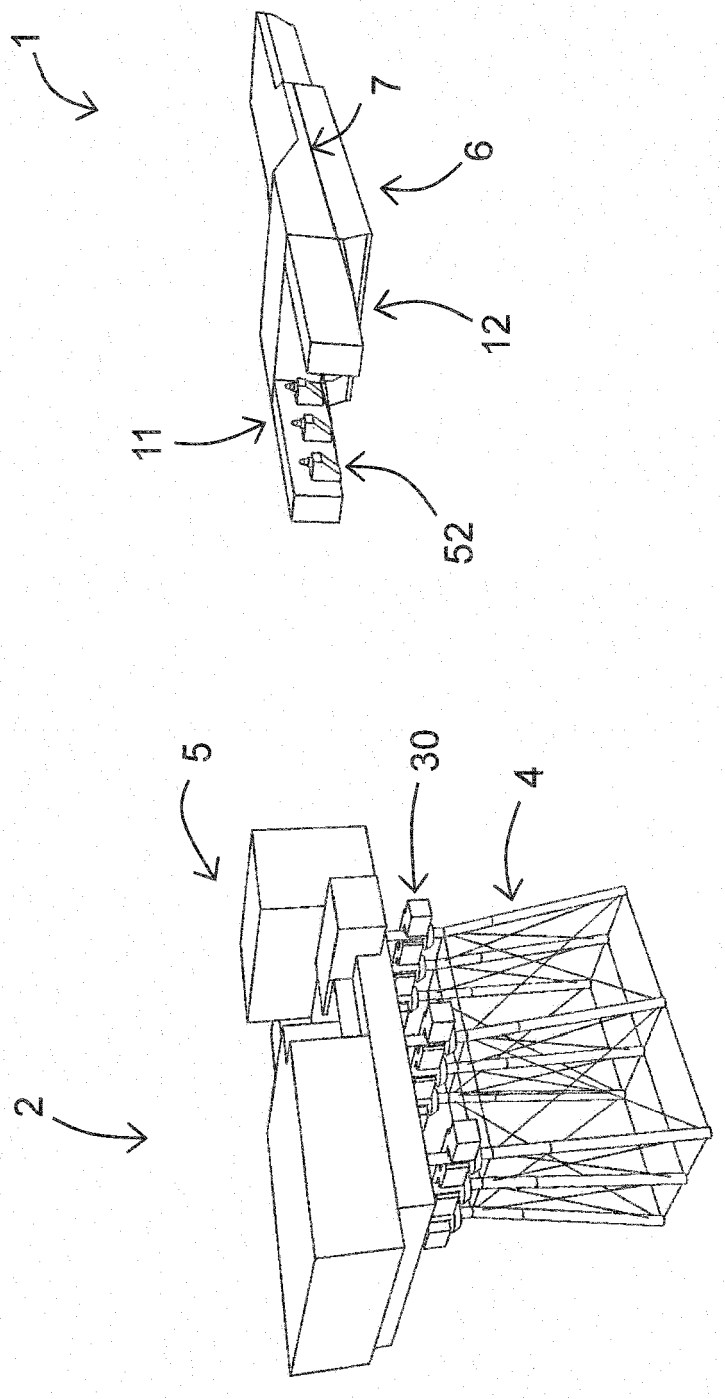


Figure 5

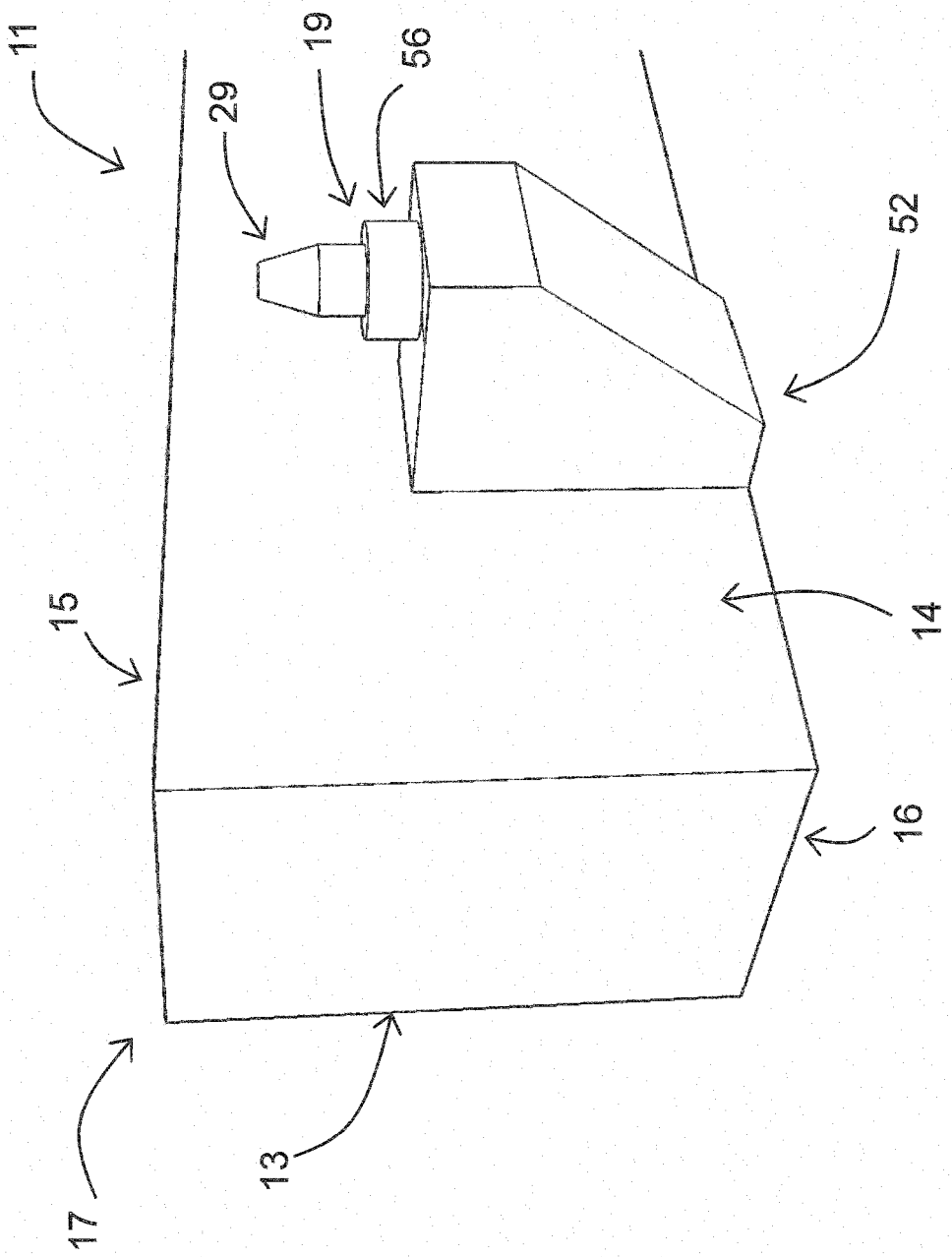


Figure 6

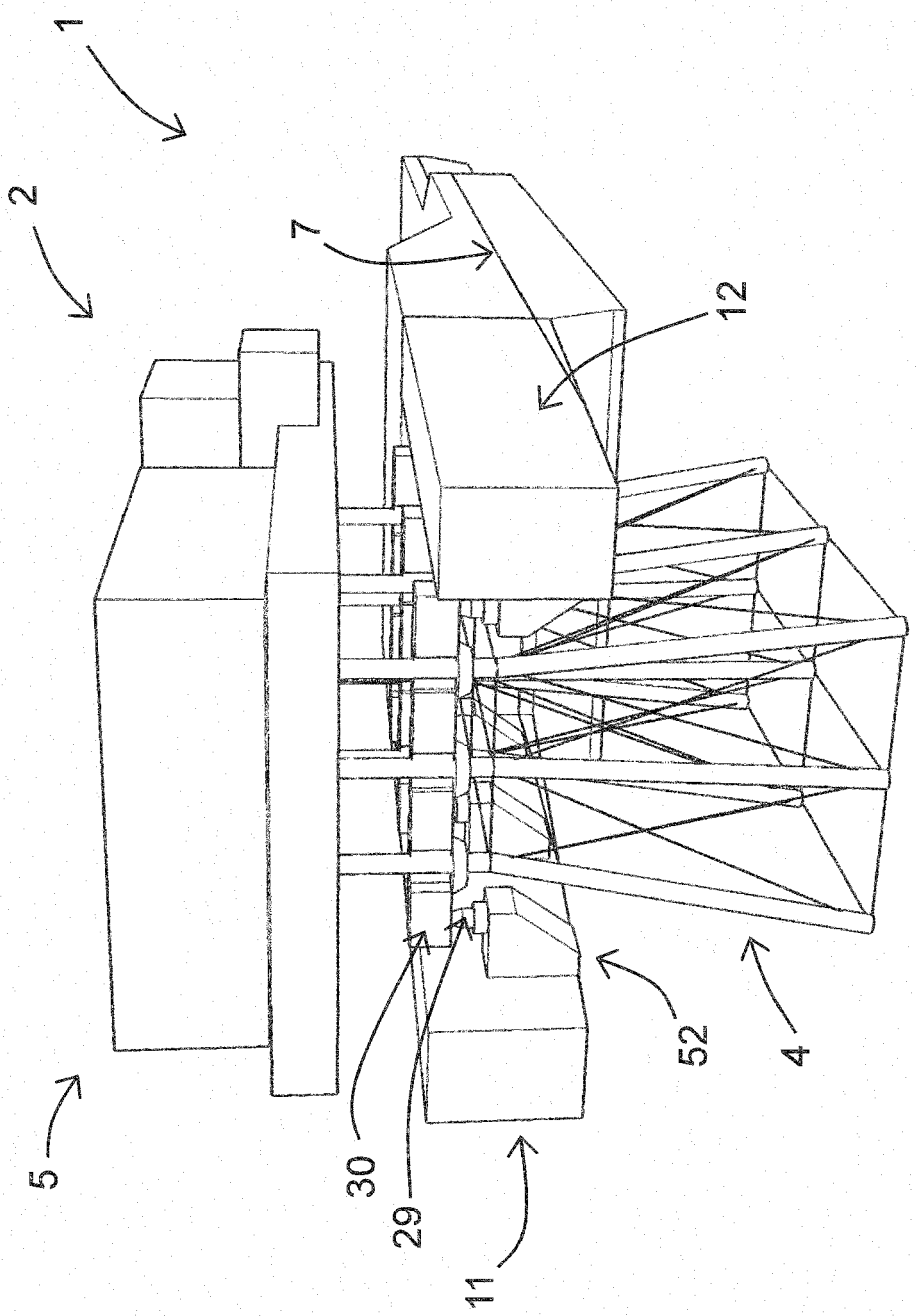


Figure 7

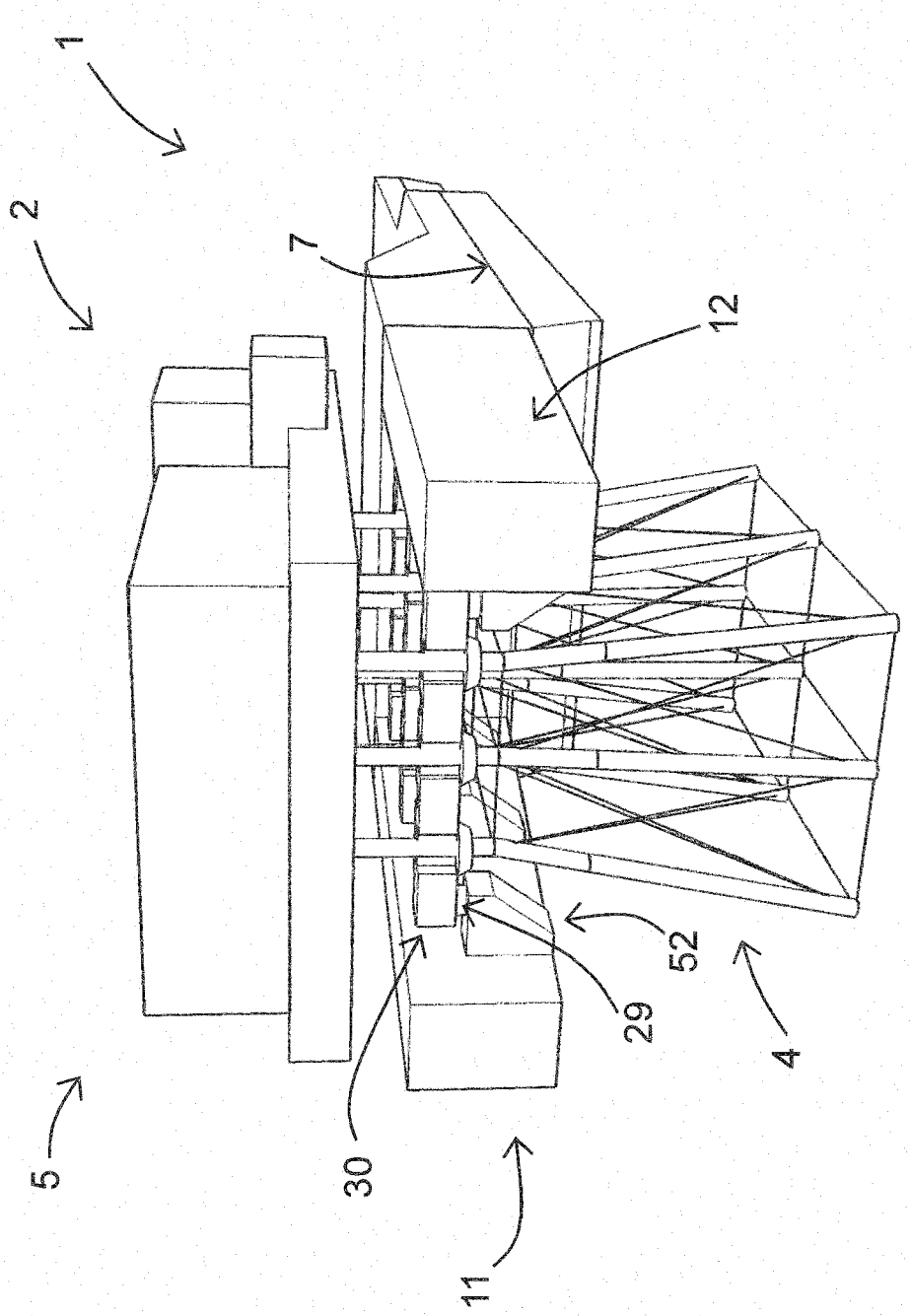


Figure 8

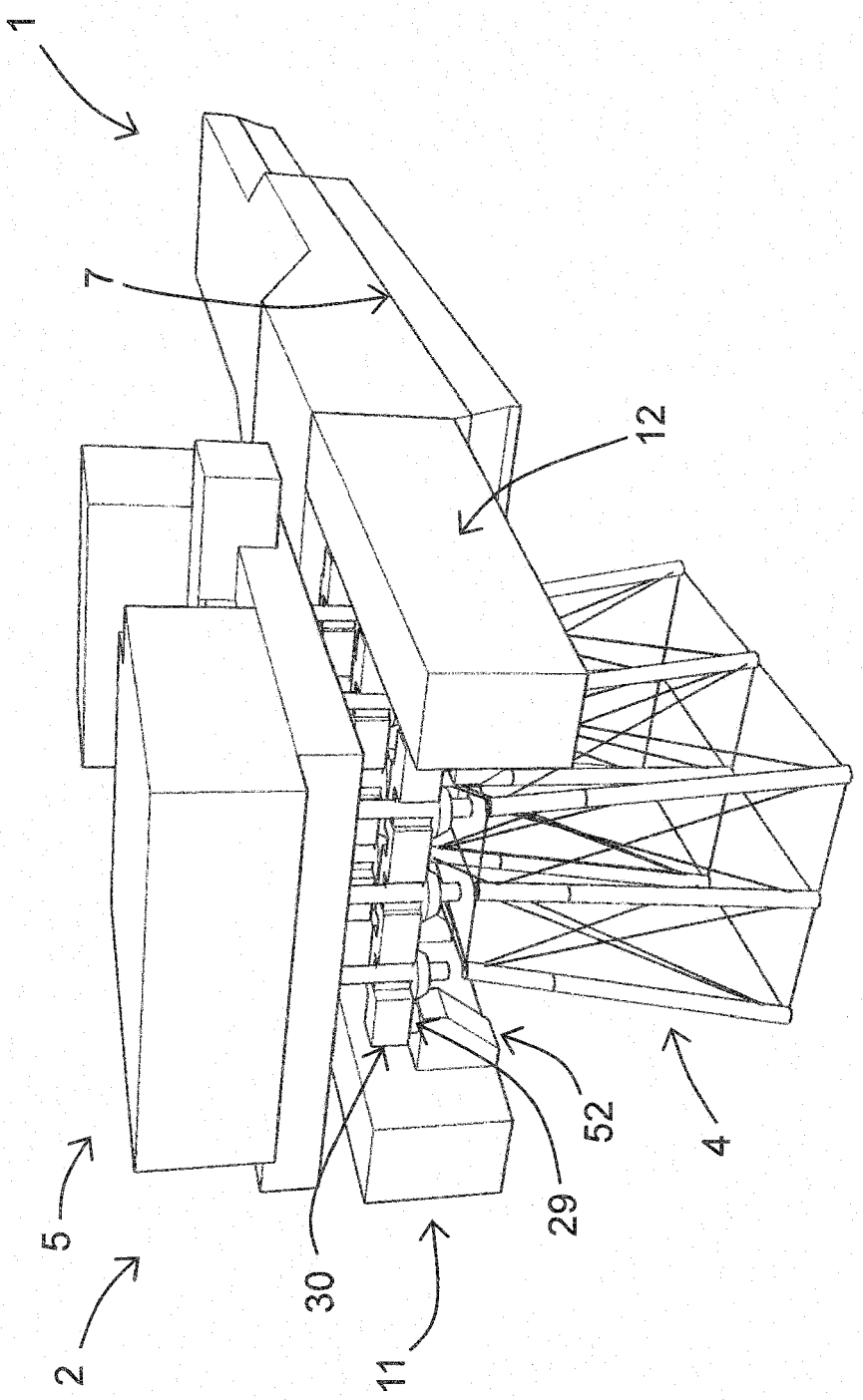


Figure 9

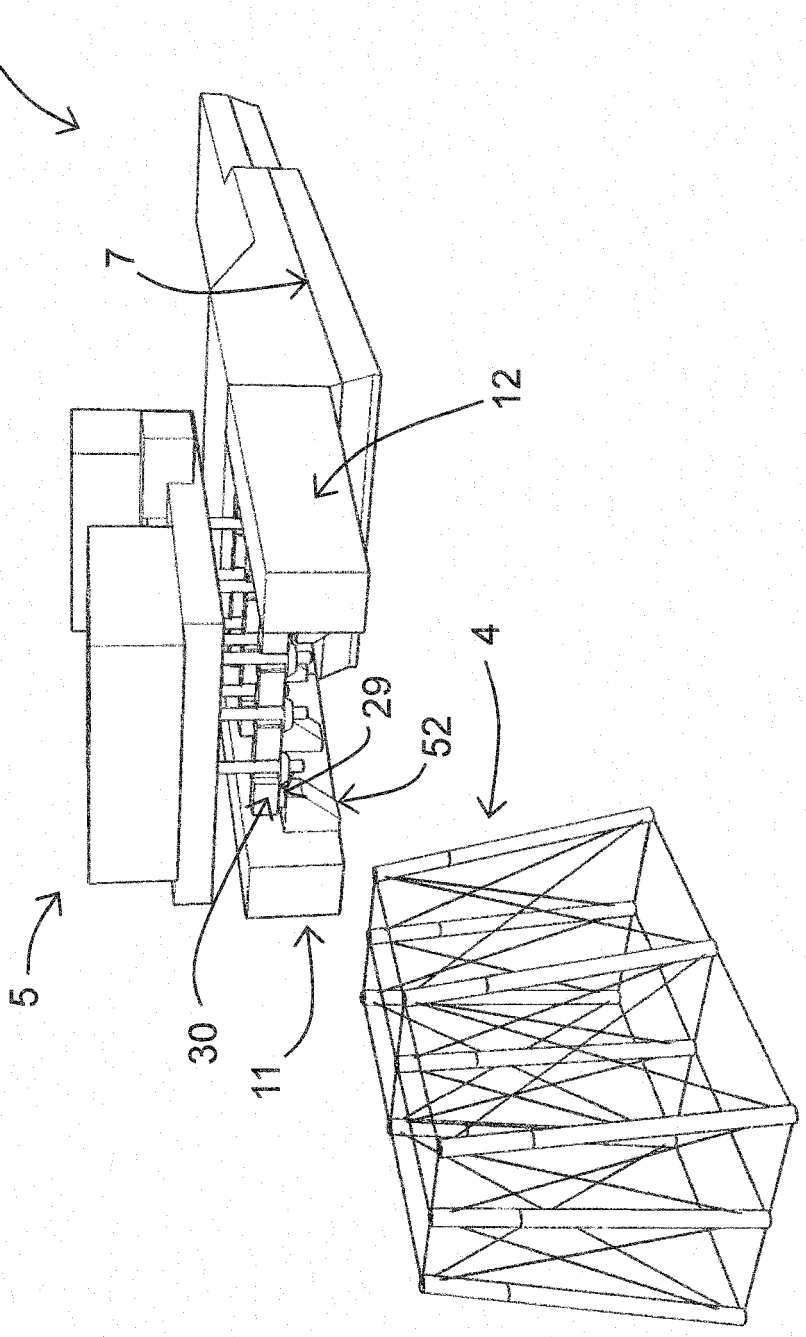


Figure 10

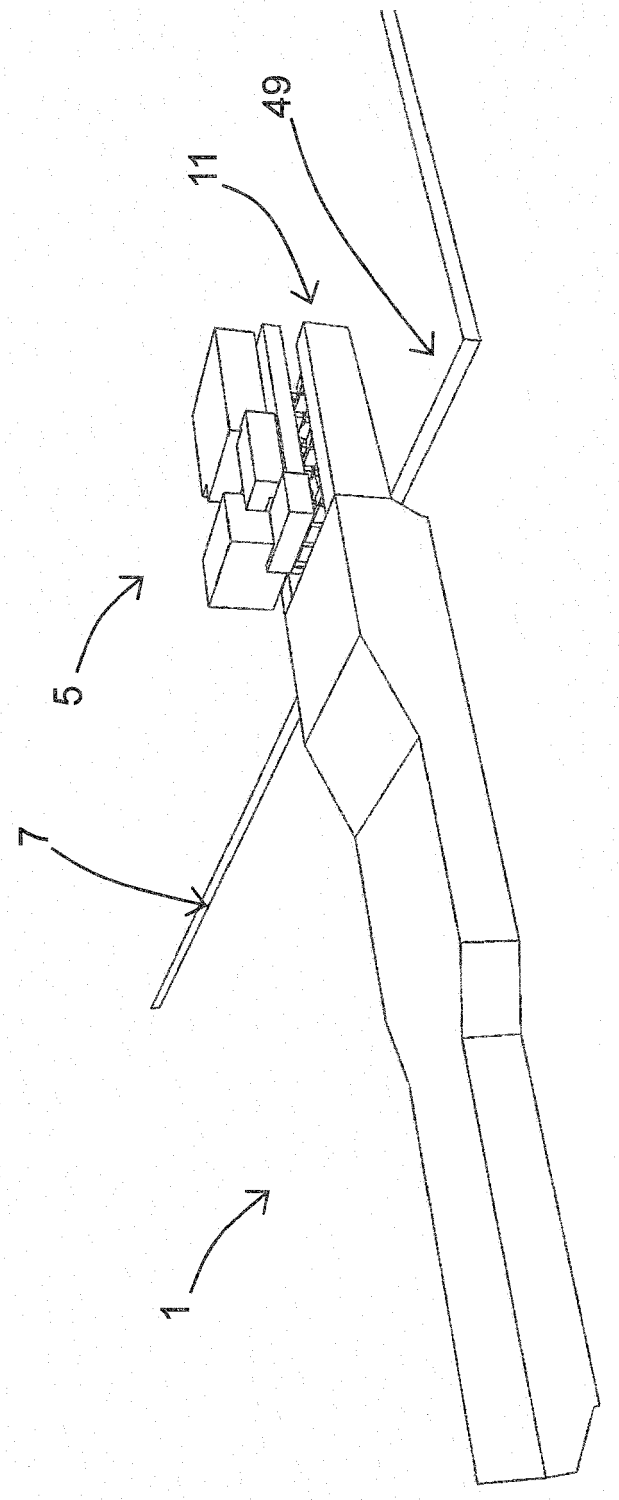
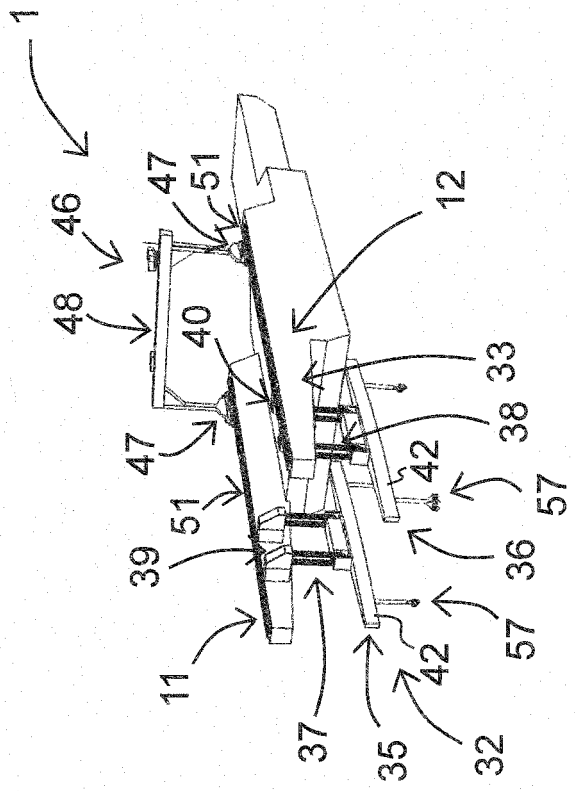


Figure 11



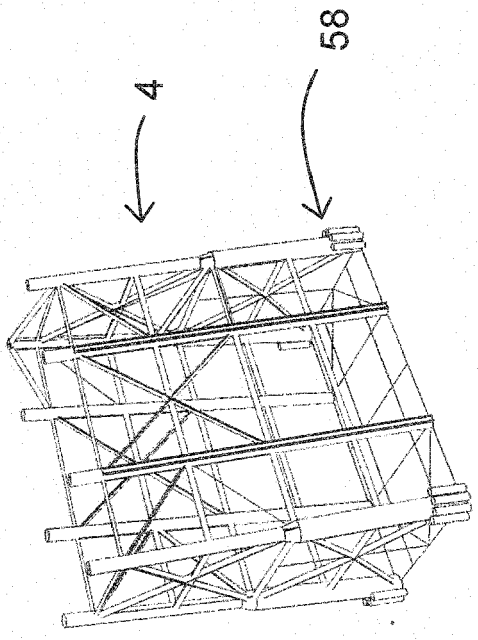


Figure 12

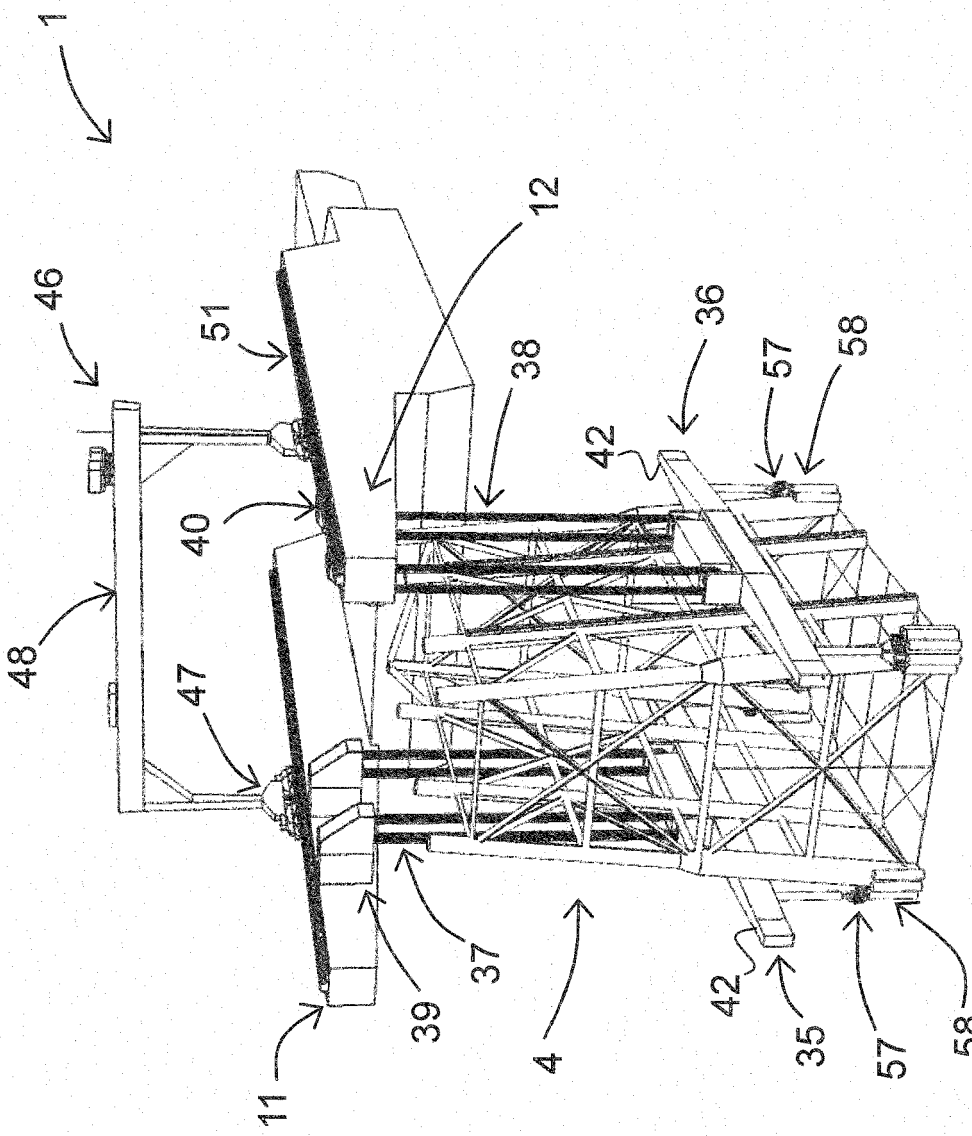


Figure 13

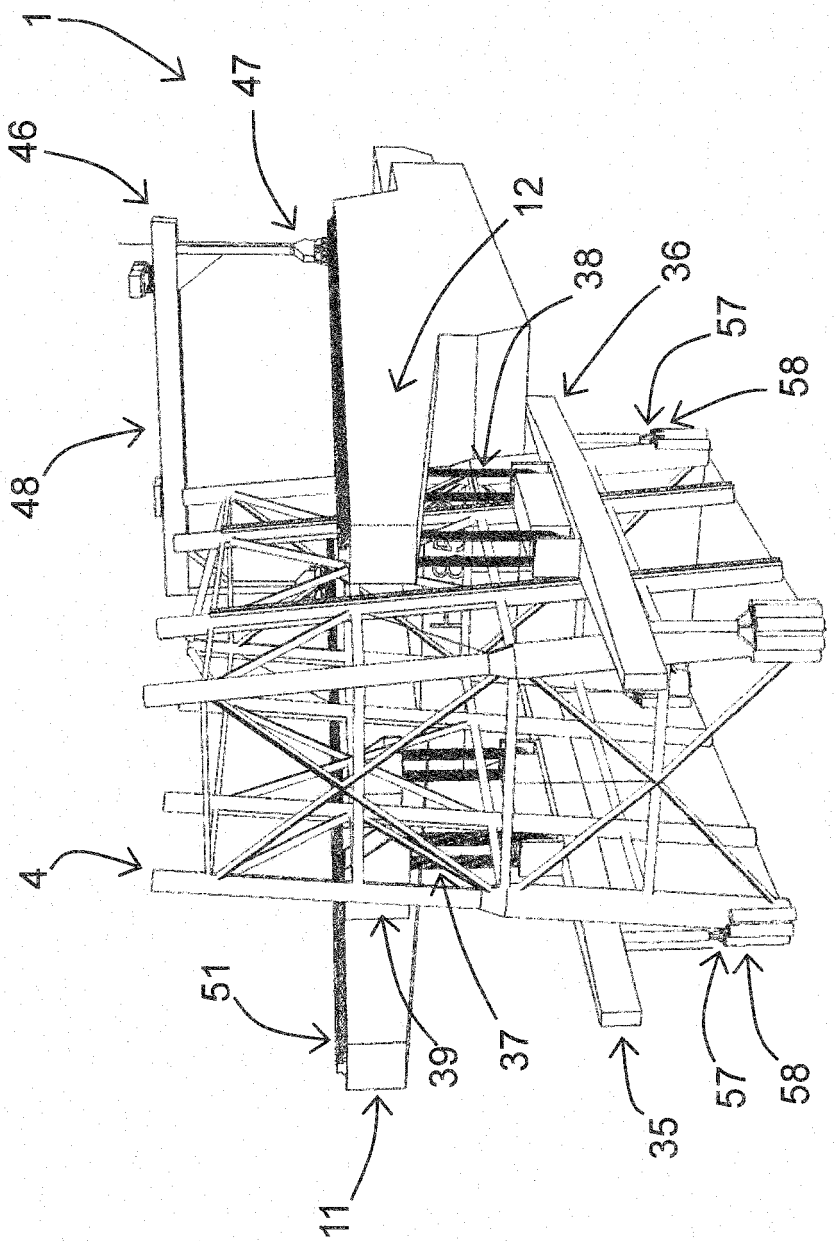


Figure 14

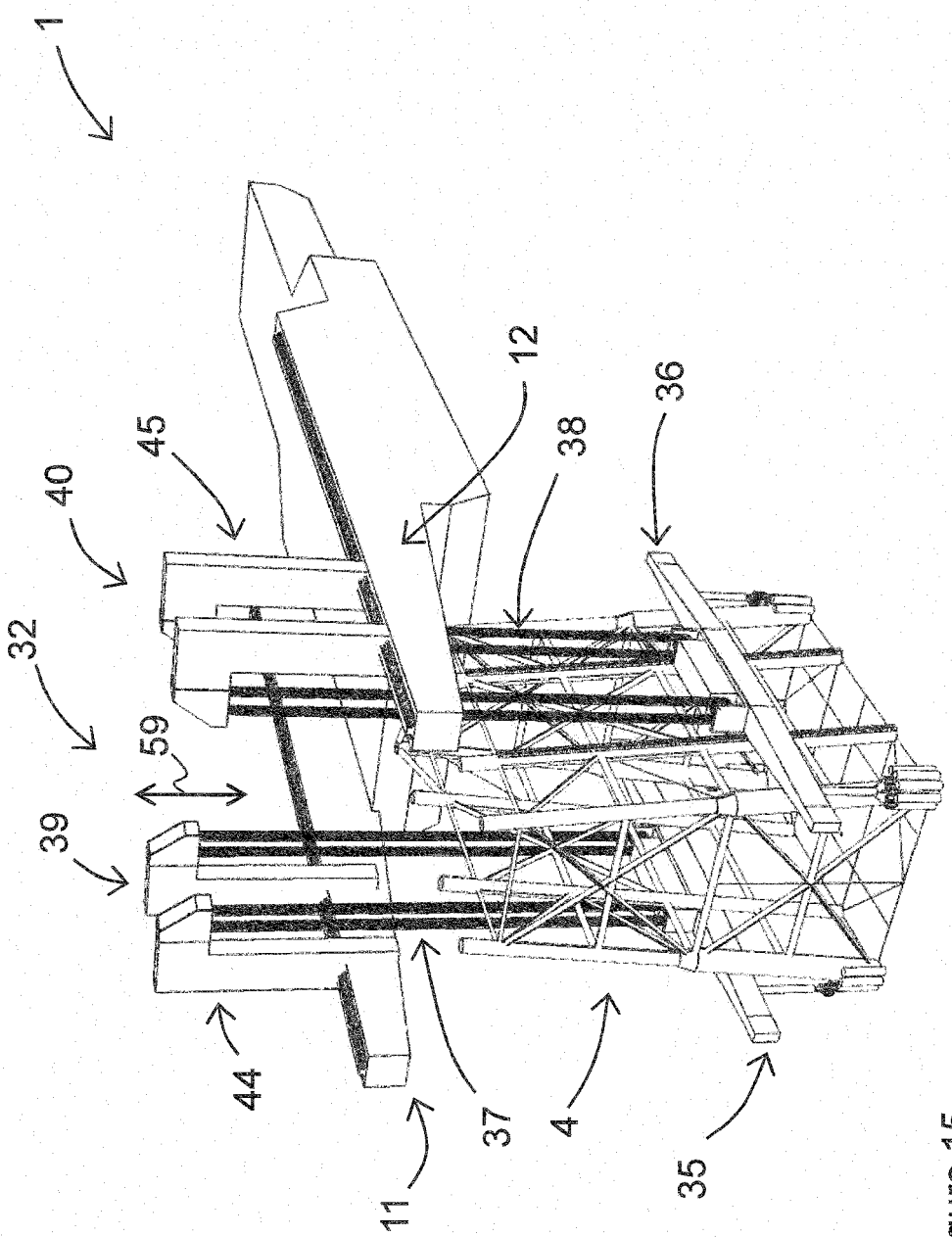


Figure 15

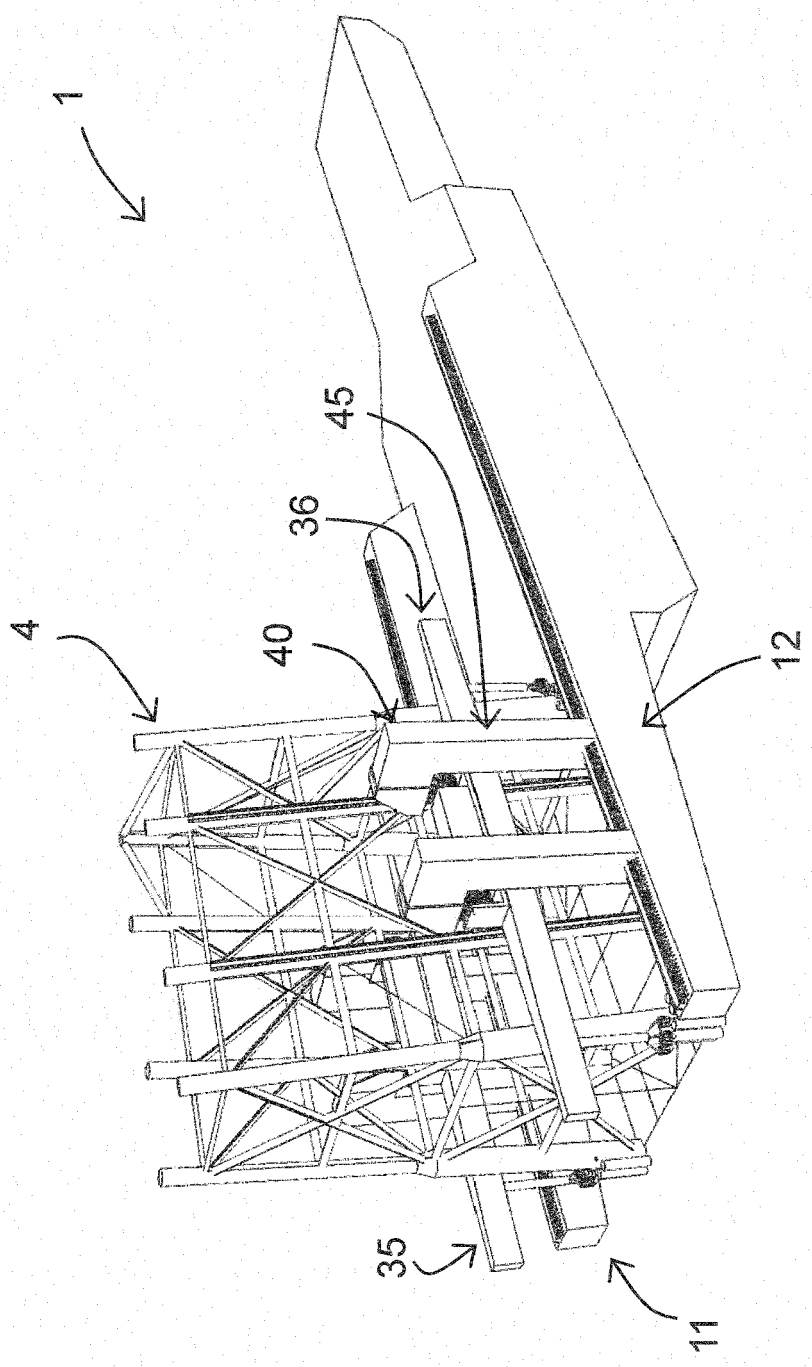


Figure 16

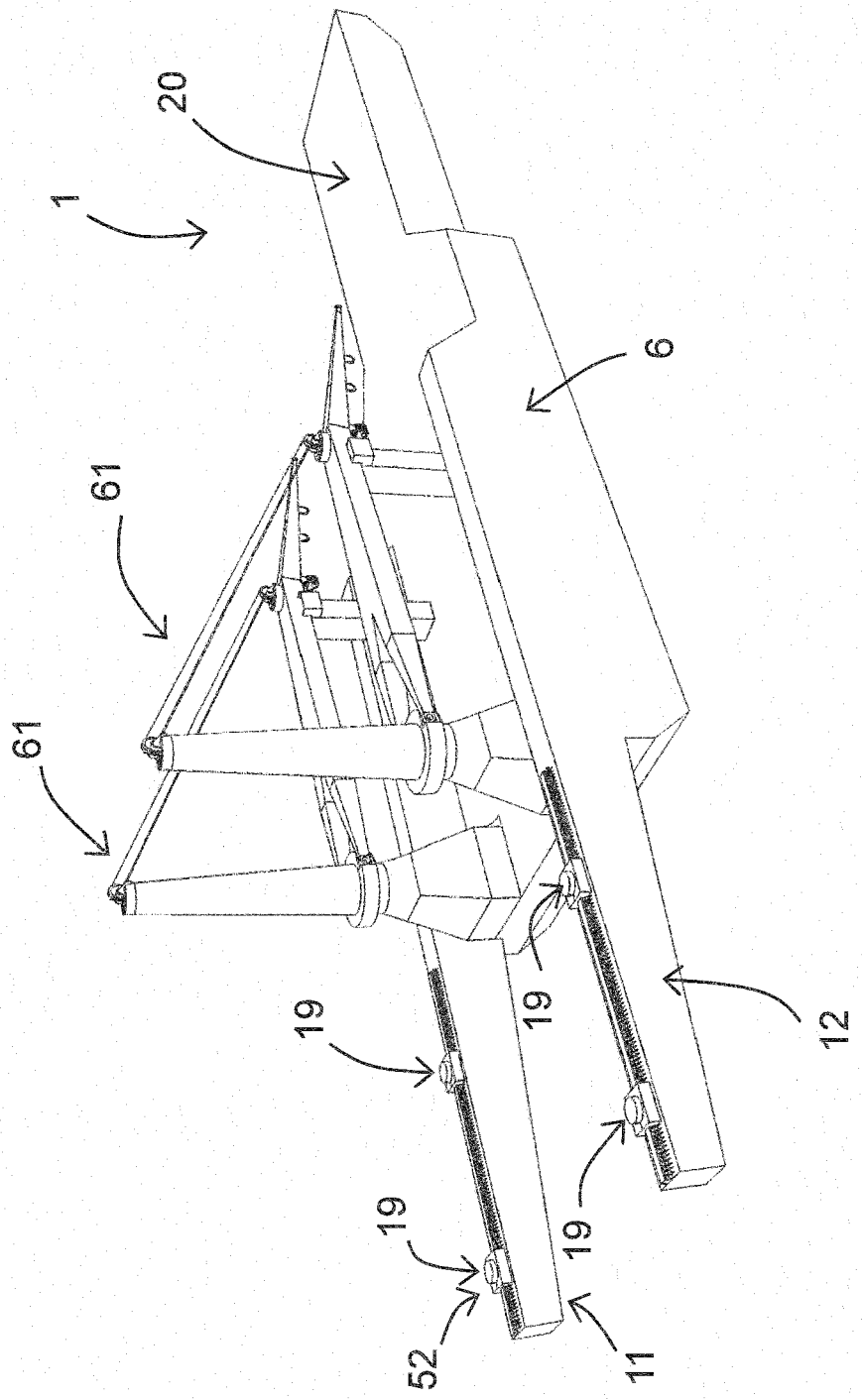


Figure 17

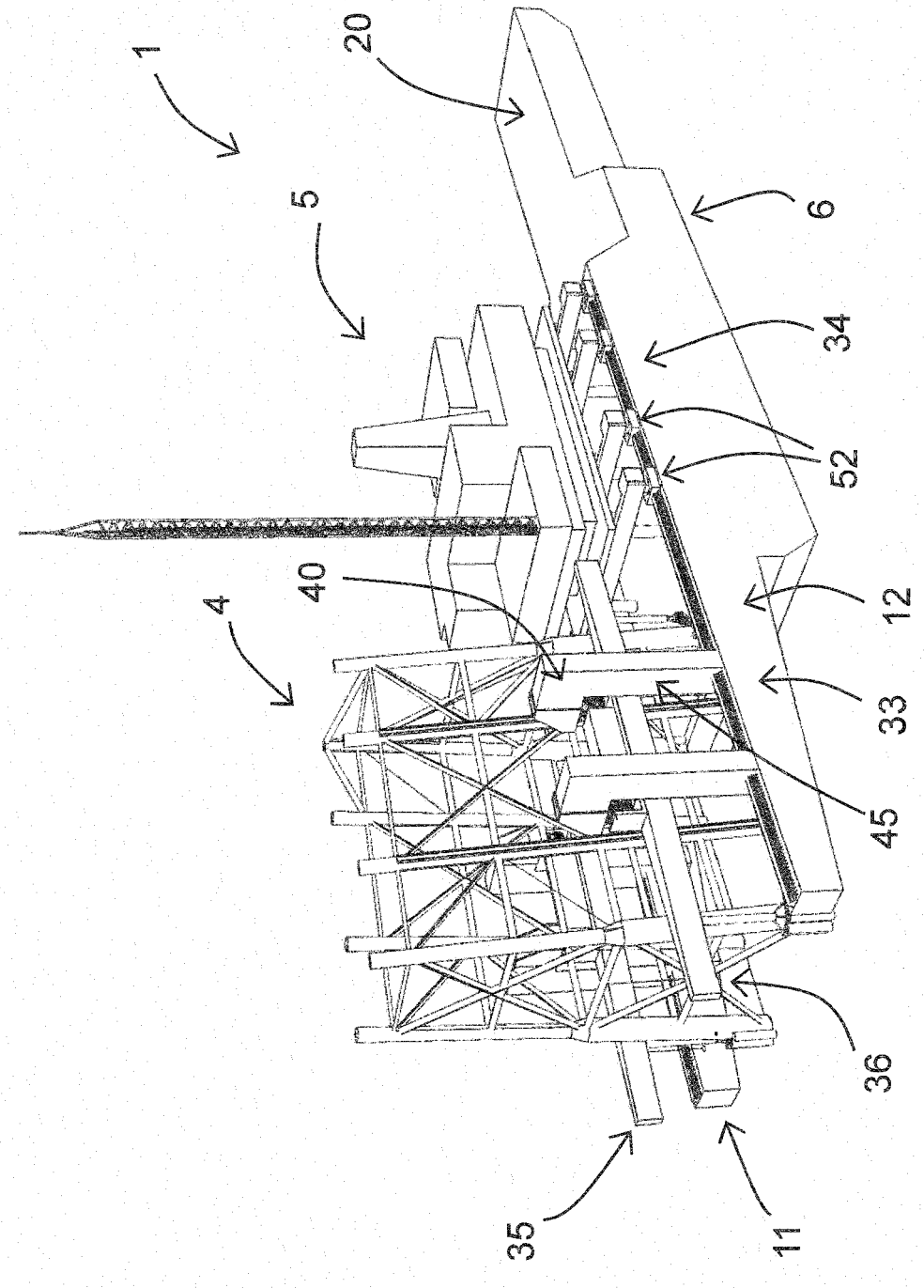


Figure 18

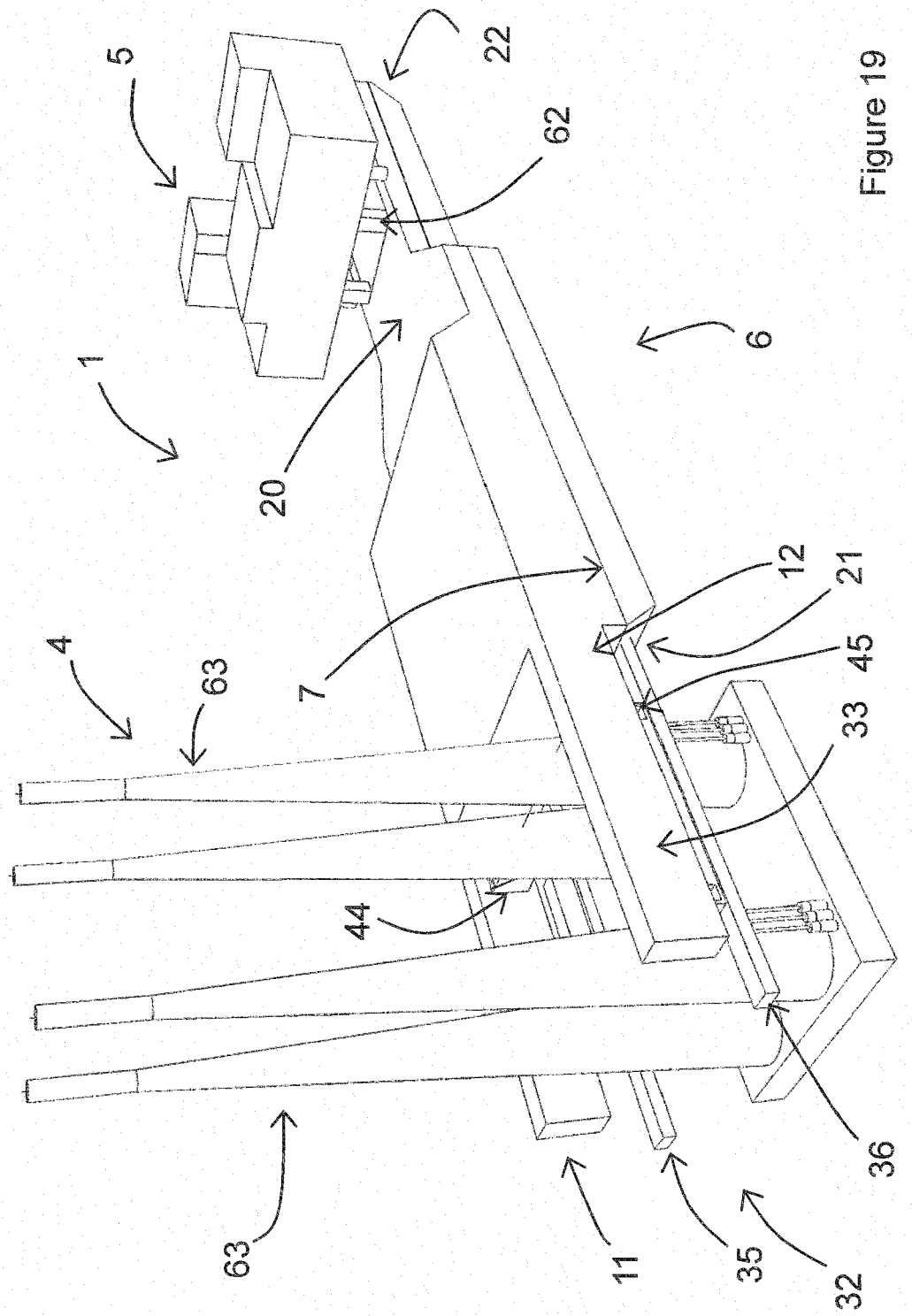


Figure 19

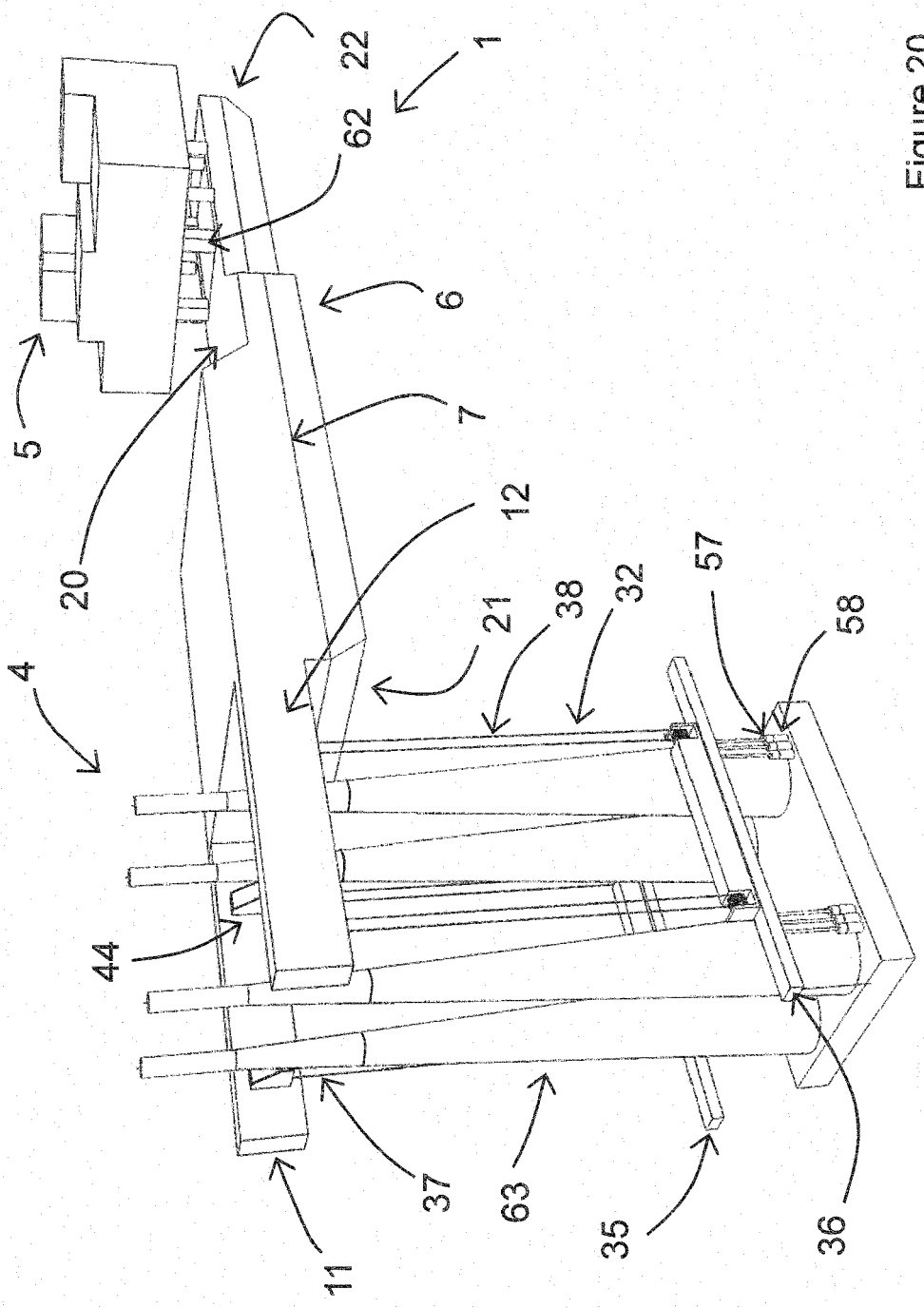


Figure 20

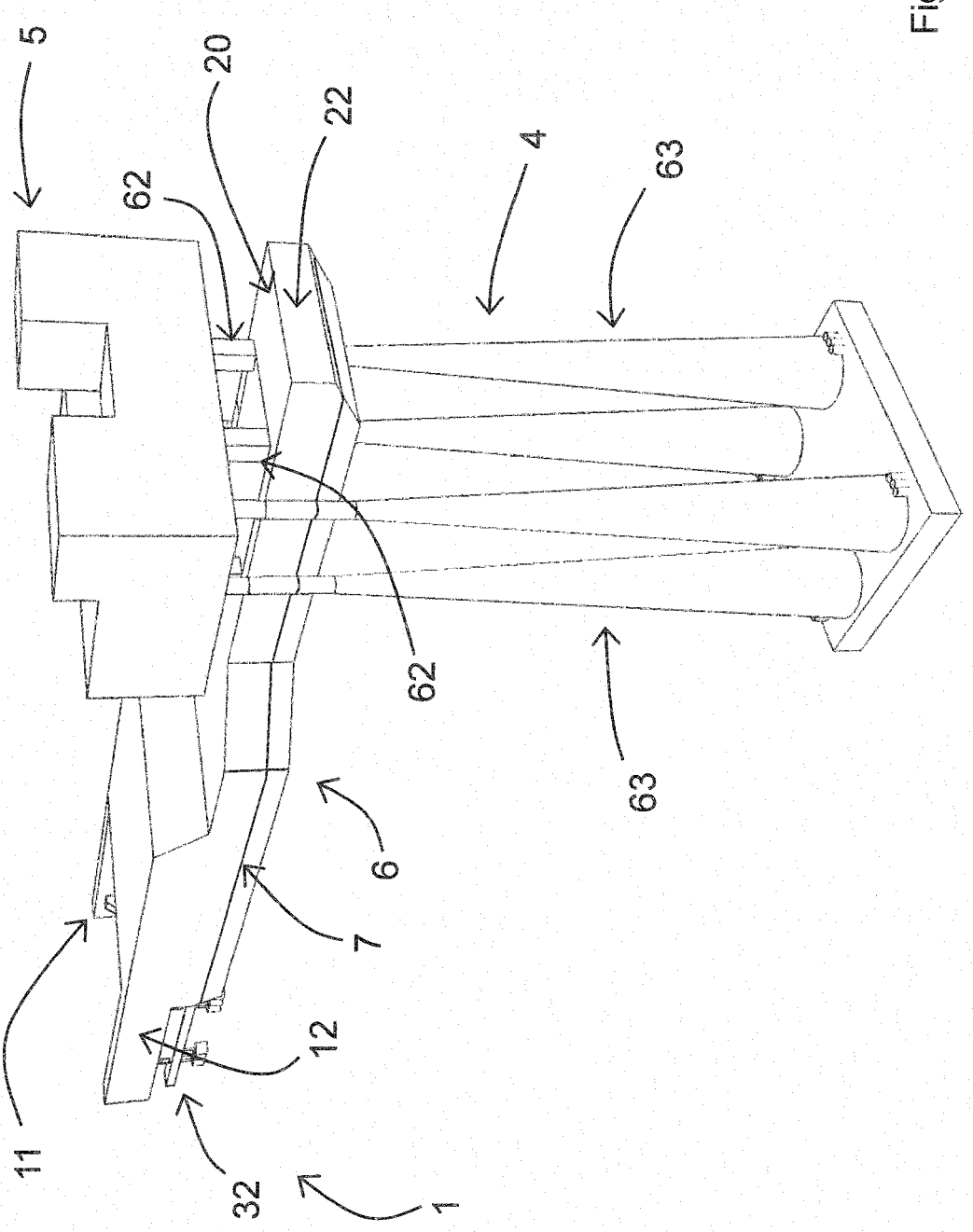


Figure 21

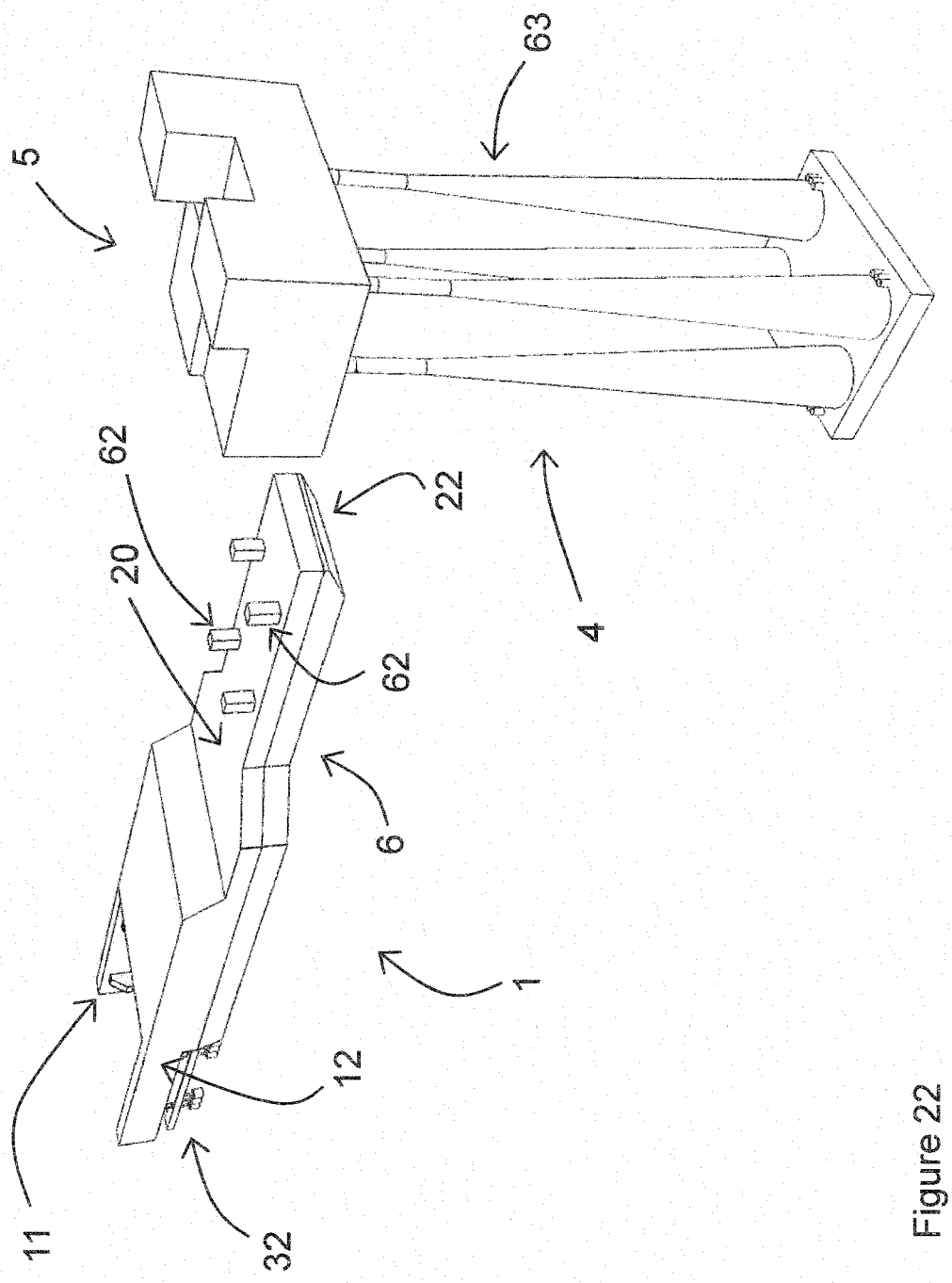


Figure 22

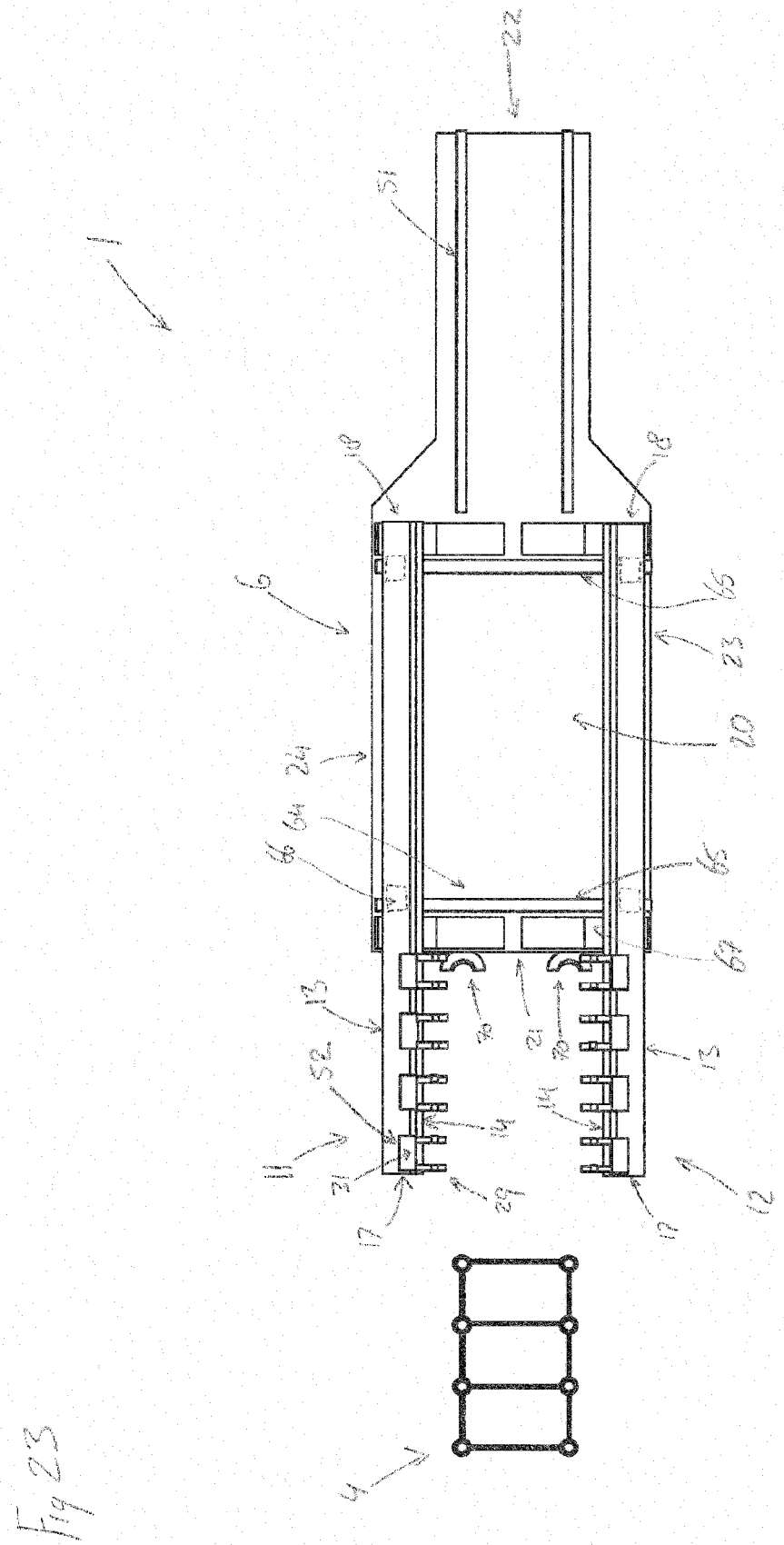


Fig 23

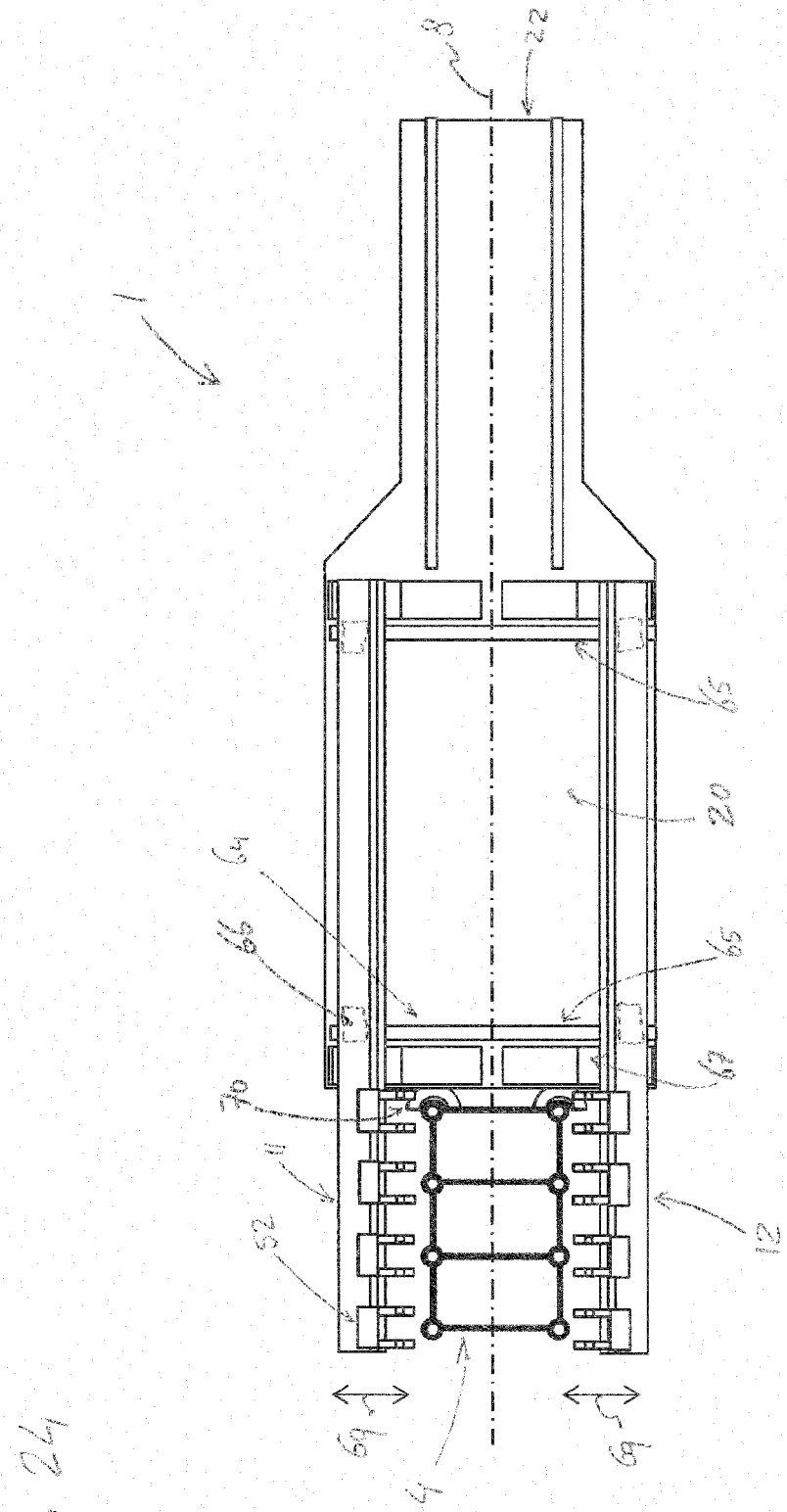


Fig. 2b

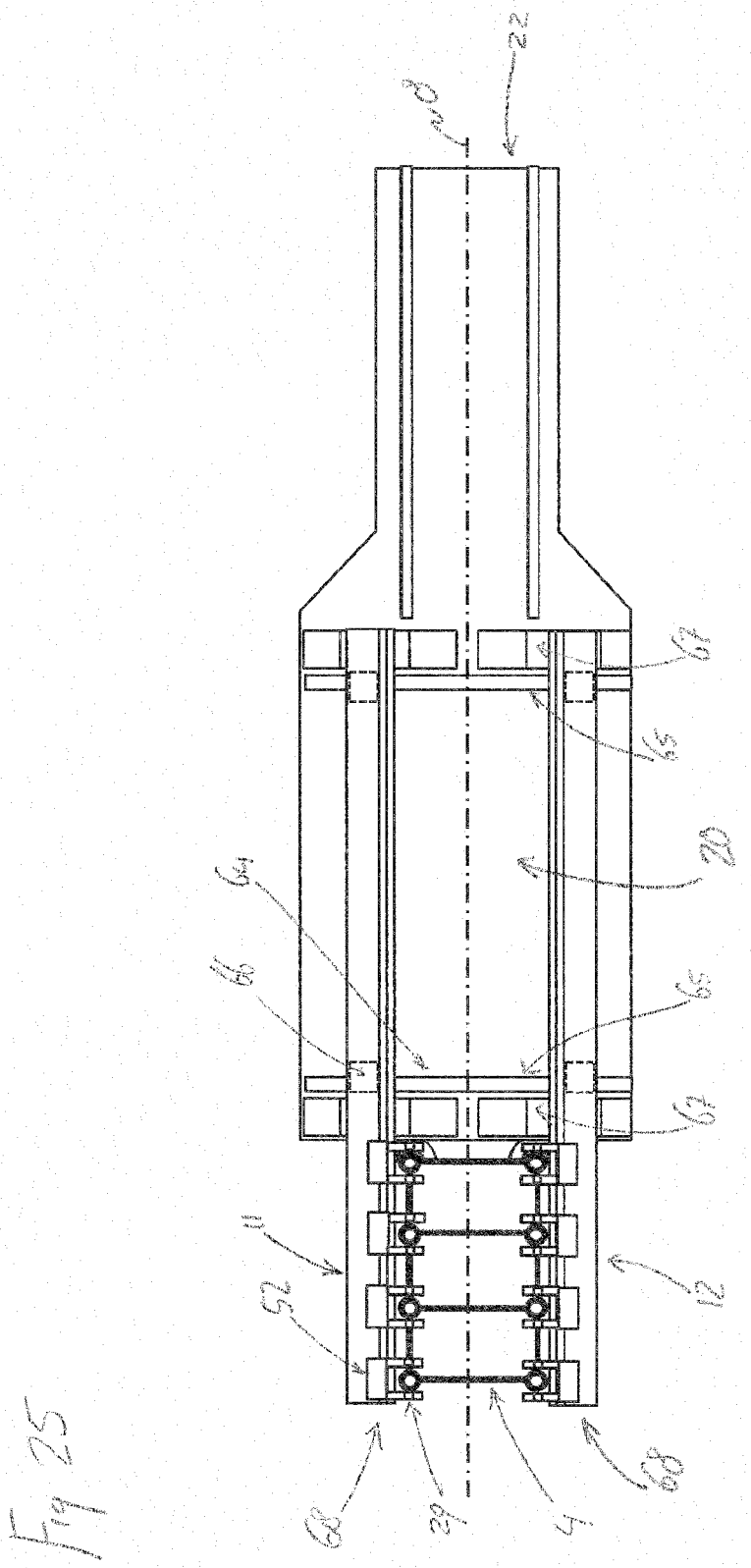


Fig 25

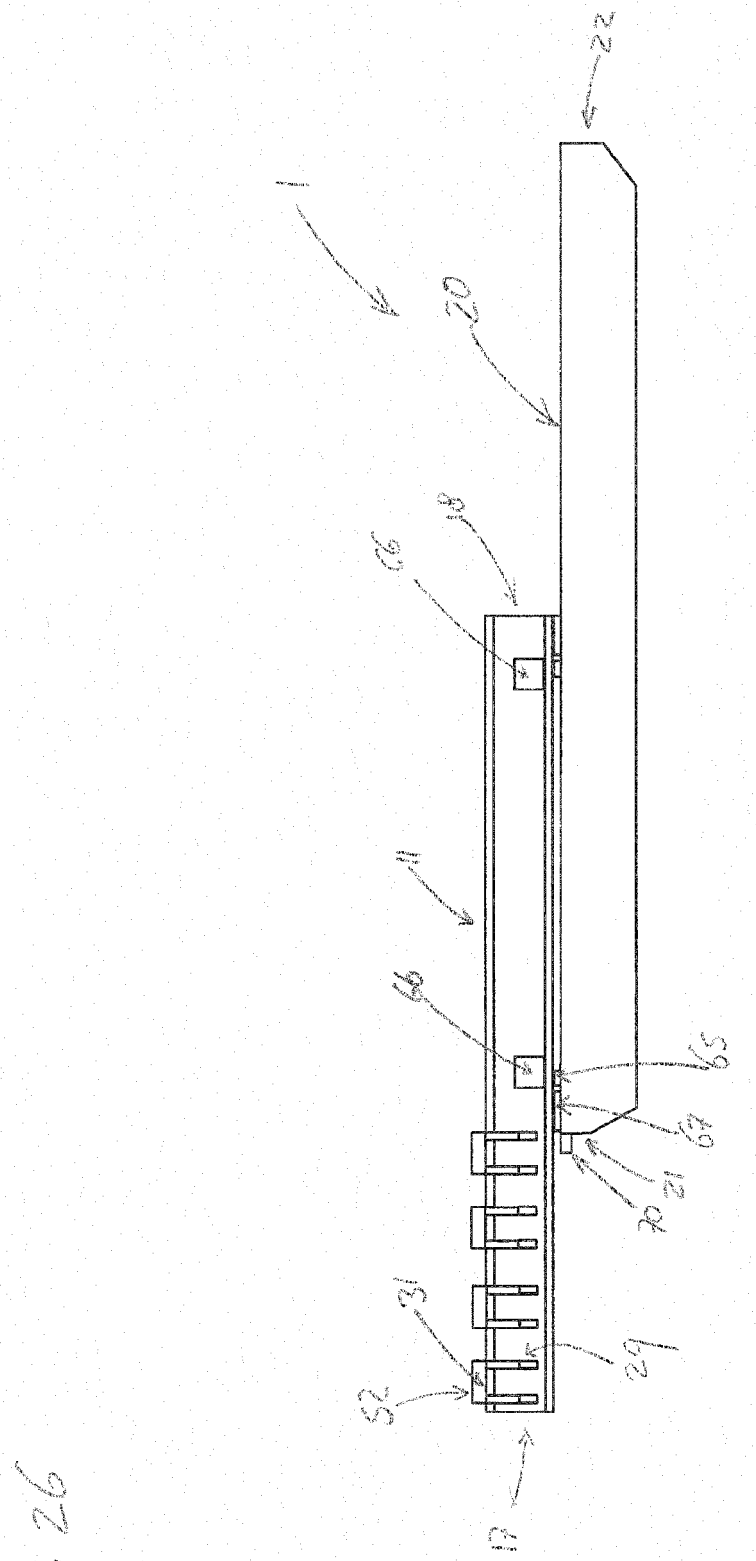


Fig 2c

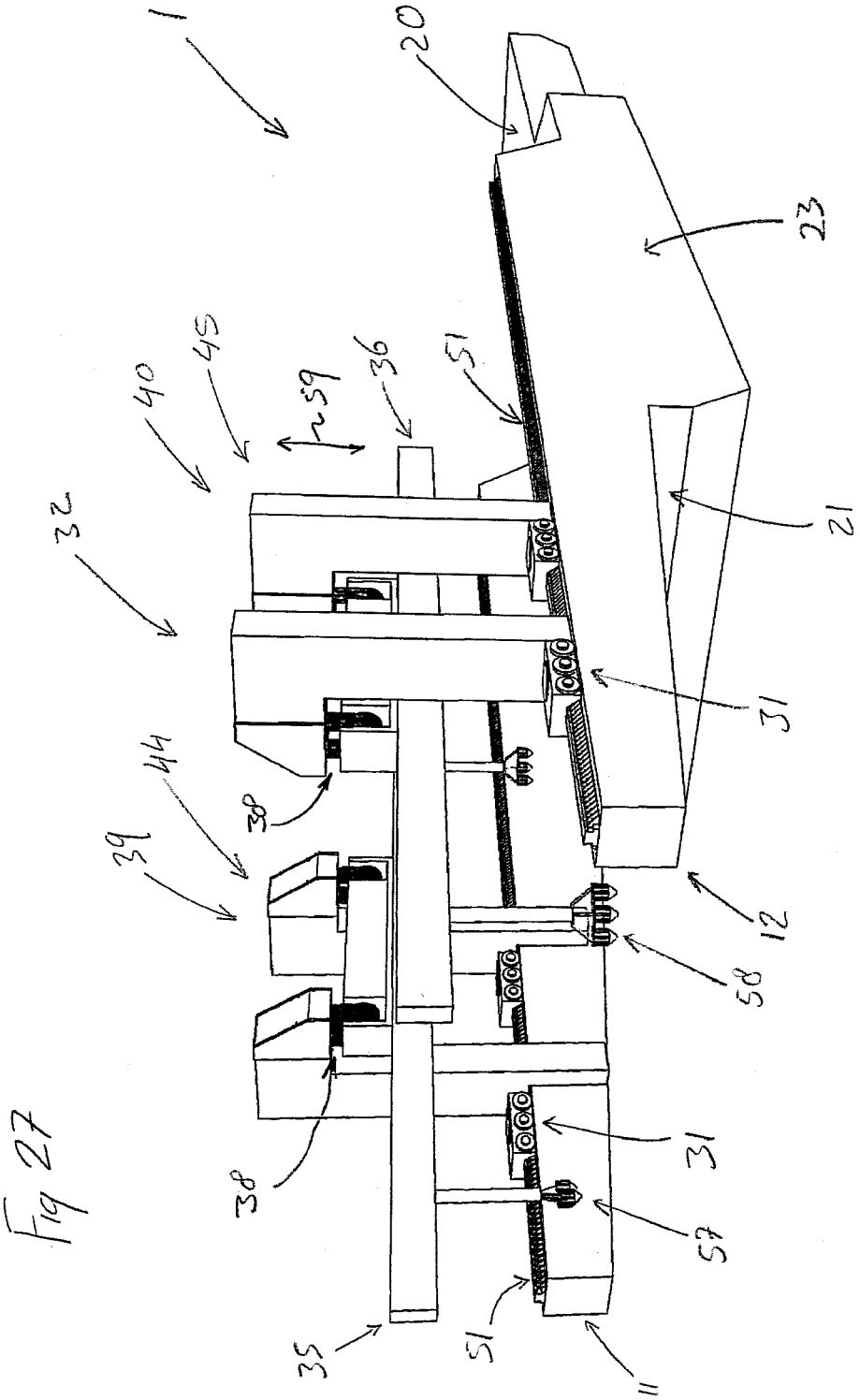


Fig 27

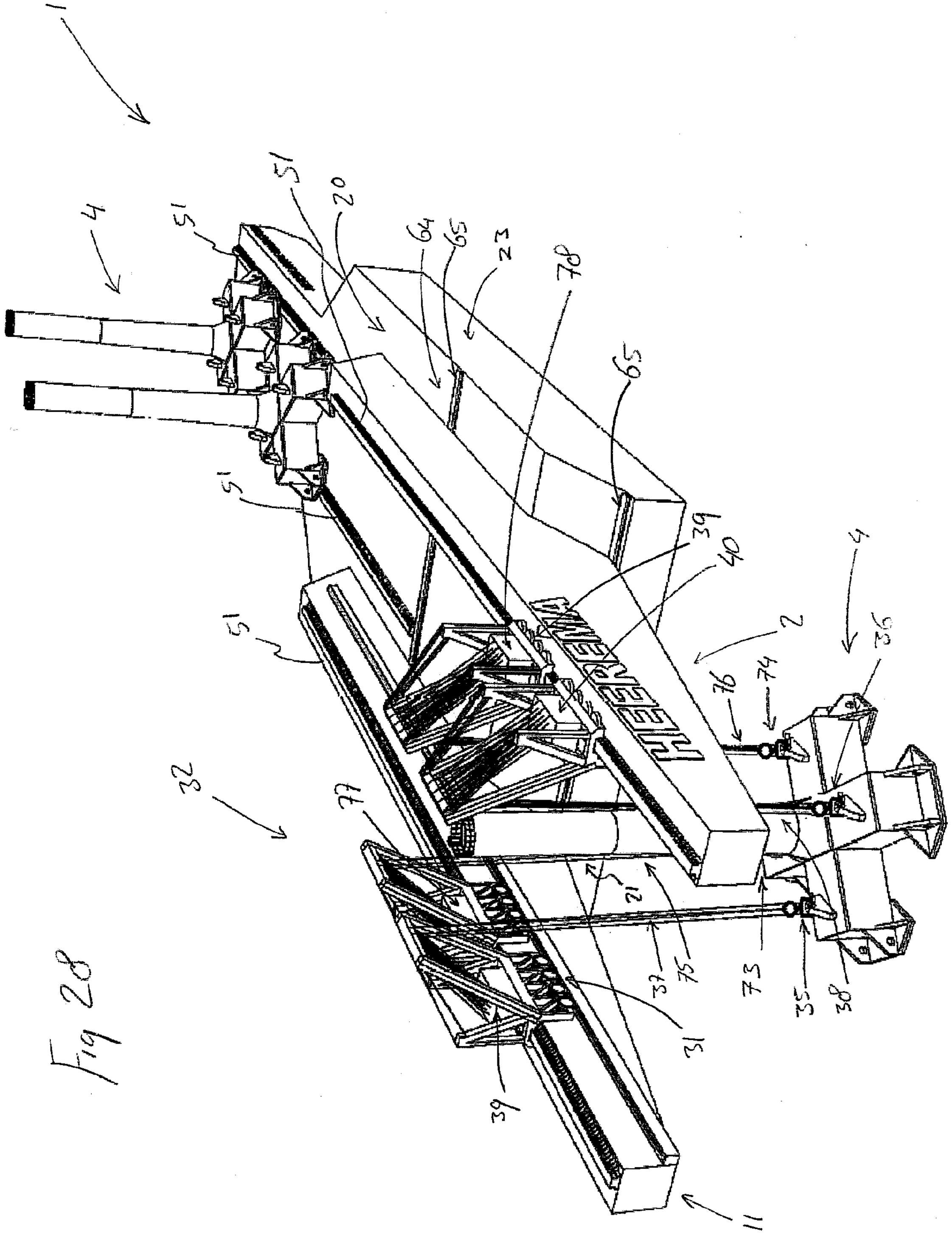

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Fig 28