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(12) # EUROPEAN PATENT APPLICATION

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(54) **WORK SHIP FOR INSTALLING LARGE OFFSHORE STRUCTURE.**

(57) Work ship used to install a large offshore structure such as a marine plant onto a foundation structure installed in the sea by transporting the structure to the installation field. The ship has a lower hull (2), a plurality of guide posts (3) along both sides of the hull (2), an upper hull (4) mounted on both sides on the posts (3) so that it can be raised, and elevation devices (5) for raising the hull (4) up the posts (3). The hull (4) is raised up the posts (3) to the same height as the foundation structure, thereby enabling the easy moving and positioning of the offshore structure from the hull (4) onto the foundation structure without the use of a crane ship or the like.

FIG. 1

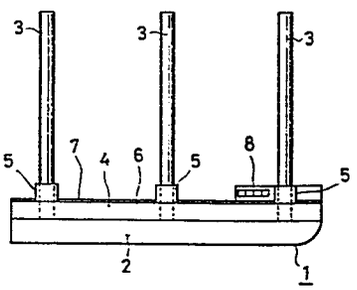

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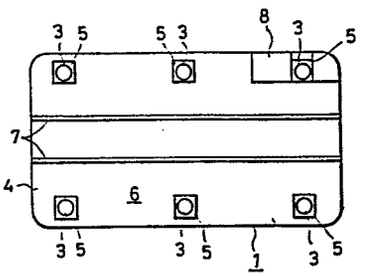
FIG. 2



TECHNICAL FIELD

The present invention relates to a working ship for installing large offshore structures, and more particularly to a working ship for use in transporting a large-scale offshore structure, such as an offshore plant, to the site of installation and installing the structure on a foundation structure which is built offshore.

BACKGROUND ART

Offshore structures, such as equipment for submarine oil fields and offshore plants, to be installed on offshore foundation structures are large-sized and heavy, so that it is impossible to build the structure in the form of an assembly and install the assembly in place with use of a crane ship or the like. Accordingly it has been conventional practice to build such a structure

in the form of divided blocks of relatively small sizes in accordance with the capacity of the crane ship, load these blocks onto a deck barge moored alongside the quay of the factory or brought into the deck with use of an offshore crane or gate-shaped crane in the factory, transport the blocks to the site of installation, install the blocks on a foundation structure one after another with use of the crane ship which structure has already been built, and thereafter connect the blocks together by piping, wiring, etc. This method therefore has the problem of involving large amounts of work for delivering the blocks from the factory, installing them at the offshore site and connecting the installed blocks, being inefficient and consequently necessitating a prolonged period of construction and an increased cost.

The object of the present invention is to provide a working ship which is adapted to easily transfer a large-sized offshore structure built in the form of an assembly or large blocks thereof onto a foundation structure so that the large-sized offshore structure can be constructed and installed in place within a greatly shortened period of time.

DISCLOSURE OF THE INVENTION

The working ship of the present invention for

installing a large offshore structure comprises a lower hull, a plurality of guide posts extending upward from opposite side portions of the lower hull, an upper hull supported at opposite side portions by the guide posts and movable upward and downward, and lifting means for moving the upper hull upward and downward along the guide posts. Accordingly the large offshore structure, which is built in the form of an assembly, or large blocks thereof can be loaded onto the upper hull and transported to the site of installation, where the upper hull is lifted along the guide posts to the same level as a foundation structure, with the working ship held in the vicinity of the foundation structure, so that the offshore structure or blocks thereof can be transferred from the upper hull onto the foundation structure easily without using any crane ship or the like. It is therefore possible to build large offshore structures in the form of an assembly or as divided in blocks of larger sizes, consequently making it possible to construct larger portions in a factory under careful control. Thus offshore structures can be built with an improved quality within a shortened period of time. Furthermore, the invention facilitates installation at the offshore site and reduces the amount of piping, wiring and like connecting work to shorten the period of installation. As a result, the invention, which assures a shortened period of construction,

provides offshore structures at reduced costs.

With the working ship of the present invention for installing large offshore structures, a skidway is provided on the upper deck of the upper hull for transferring the offshore structure. The large offshore structure or large blocks thereof can therefore be loaded and unloaded with ease.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side elevation showing a working ship of the present invention for installing large offshore structures;

Fig. 2 is a plan view of the same;

Fig. 3 is a side elevation showing the working ship loaded with a large offshore structure;

Fig. 4 is a plan view of the same;

Fig. 5 is a side elevation showing the working ship moored to a foundation structure; and

Fig. 6 is a side elevation showing the offshore structure being transferred onto the foundation structure.

BEST MODE OF CARRYING OUT THE INVENTION

The present invention will be described below in greater detail with reference to the accompanying drawings.

As shown in Fig. 1 and Fig. 2, a working ship 1 for installing large offshore structures comprises a lower hull 2, a plurality of guide posts 3 extending upward from opposite side portions of the lower hull 2, an upper hull 4 supported at opposite side portions by the guide posts 3 and movable upward and downward, and lifting means (jacking-up means) 5 for moving the upper hull 4 upward and downward along the guide posts 3. The lower hull 2 and the upper hull 4 are each in the form of a box. The upper side of the lower hull 2 and both upper and lower sides of the upper hull 4 are horizontal. The lifting means 5, each provided for each of the guide posts 3, are fixed to the upper deck 6 of the upper hull 4. The guide posts 3 each extend vertically through the upper hull 4 and the lifting means 5. By means of the lifting means 5, the upper hull 4 is movable upward and downward along the guide posts 3 and can be secured to the guide posts 3 at the desired level.

Provided on the upper deck 6 of the upper hull 4 are a skidway 7 for facilitating loading and unloading of large-sized structures, a known transfer device (not shown) of the hydraulic or winch wire type for moving the structrue on the skidway 7, and a control room 8 for operating the lifting means 5, etc.

A large offshore structure constituting a plant, for example, will be installed in the following manner with

use of the working ship 1 described above (see Fig. 3 to Fig. 6).

First, the stern end of the working ship 1 is brought alongside the quay 9 of the factory, with the upper hull 4 lowered to the upper side of the lower hull 2, and the skidway 7 of the working ship 1 is positioned at the same level as a skidway 10 on the quay 9 by adjusting the ballast of the lower hull 2. The large offshore structure 11 built in the form of an assembly in the factory is then transferred from the skidway 10 on the quay 9 onto the skidway 7 on the working ship 1 by the transfer device on the ship 1 or a transfer device provided on the quay 9 (see Fig. 3 and Fig. 4).

The offshore structure 11 transferred to a specified position is fastened to the upper hull 4 when so desired, and the working ship 1 is towed by a tugboat or the like to the site where the structure is to be installed.

A foundation structure (jacket) 12 for supporting the offshore structure is fixed to the sea bottom at the site. The foundation structure 12 has an upper end projecting above the surface of the sea and carrying a cap truss 13.

After the working ship 1 loaded with the offshore structure 11 has reached the site, the ship 1 is moored to the foundation structure 12, and the position of the ship

is adjusted (see Fig. 5).

By the lifting means 5, the upper hull 4 is then lifted along the guide posts 3 and locked in the position where the skidway 7 is at the same level as the cap truss 13. Subsequently a temporary skid is provided between the upper hull 4 and the cap truss 13. The offshore structure 11 is transferred from the upper hull 4 to the specified position on the cap truss 13 with use of the transfer device on the working ship 1 (see Fig. 6). Finally the offshore structure 11 is secured to the cap truss 13 as by welding.

The construction of the lower hull 2 and the upper hull 4 and the number of the guide posts 3 are not limited to those of the above embodiment but can be varied suitably.

INDUSTRIAL APPLICATION

The working ship according to the present invention is suited to use in transporting a large offshore structure, such as an offshore plant, to the site of installation and installing the structure on a foundation structure which is built offshore.

CLAIMS

1. A working ship for installing large offshore structures comprising a lower hull 2, a plurality of guide posts 3 extending upward from opposite side portions of the lower hull 2, an upper hull 4 supported at opposite side portions by the guide posts 3 and movable upward and downward, and lifting means 5 for moving the upper hull 4 upward and downward along the guide posts 3.

2. A working ship for installing large offshore structures as defined in claim 1 wherein a skidway 7 is provided on the upper deck 6 of the upper hull 4 for transferring the large offshore structure.

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FIG. 1

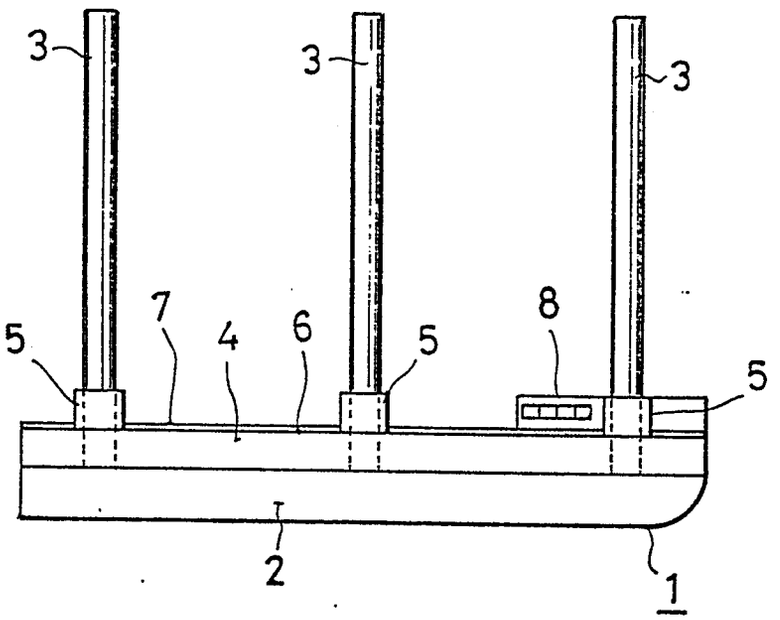


FIG. 2

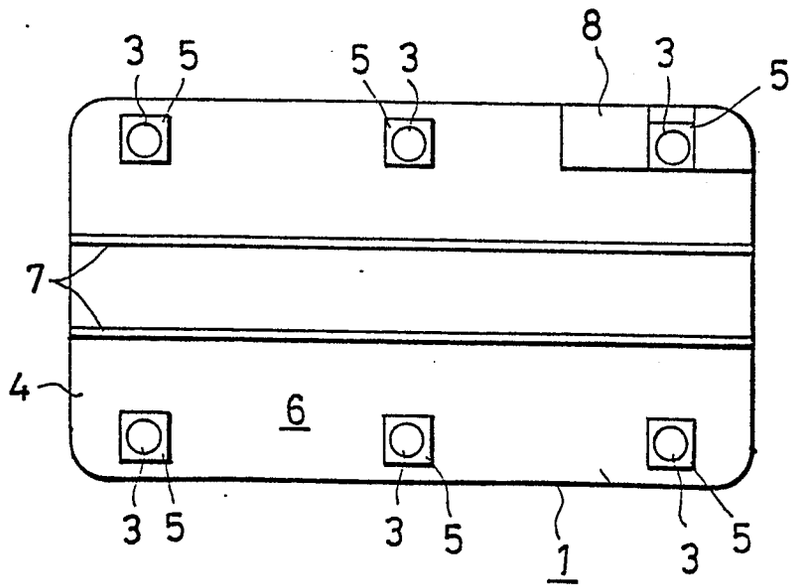


FIG. 3

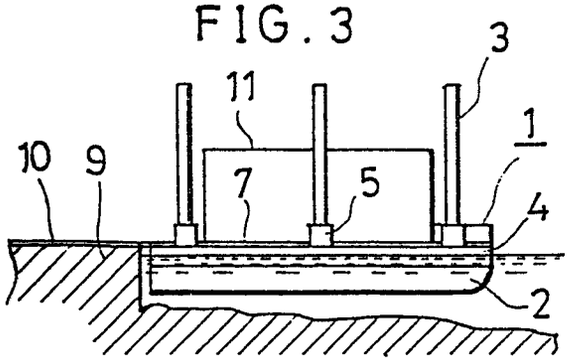


FIG. 5

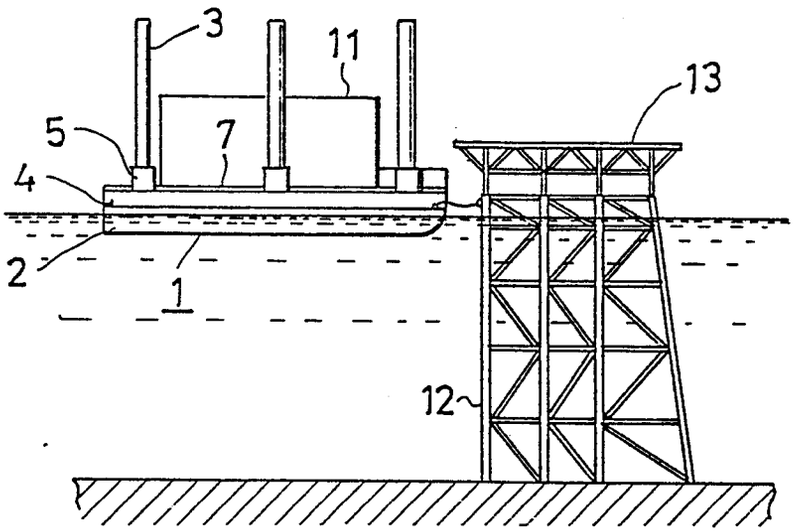


FIG. 4

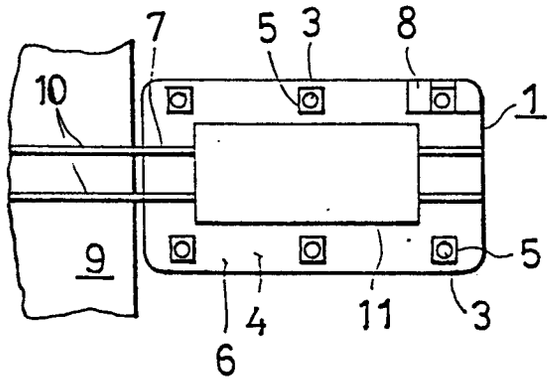
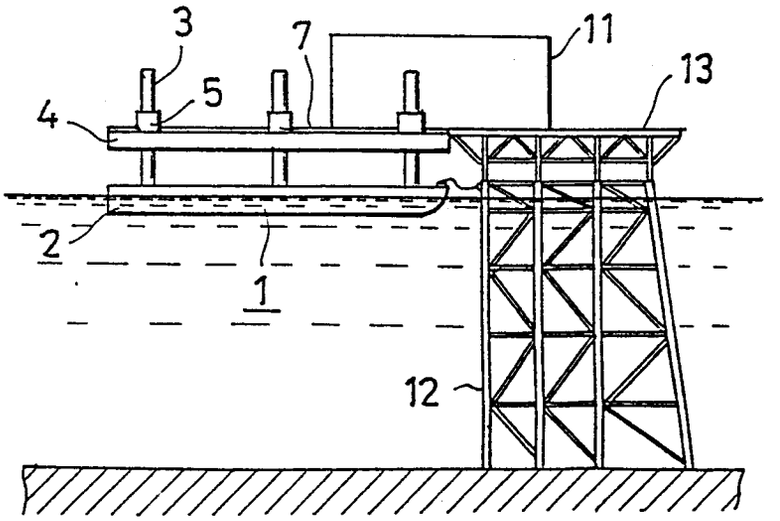


FIG. 6



INTERNATIONAL SEARCH REPORT

0094433

International Application No. PCT/JP82/00446

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] B63B 35/02, 35/44

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
I P C	B63B 35/02, 35/08-35/12, 35/28, 35/44

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [5]

Jitsuyo Shinan Koho	1929 - 1982
Kokai Jitsuyo Shinan Koho	1972 - 1982

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category*	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	US,A, 2,308,743 (William P. Bulkley), 19. January. 1943 (19. 01. 43), Column 2, lines 48 to 58 Fig. 7 to 9	1 - 2
Y	JP,B2, 56-47035 (Air Logistics Corp.), 6. November. 1981 (06.11.81), Column 7, lines 8 to 21 & US,A, 3,817,199 & GB,A, 1,389,532	1 - 2
Y	JP,U, 52-110193, (Nippon Kokan Kabushiki Kaisha), 22. August. 1977 (22.08.77)	1 - 2

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
February 7, 1983 (07.02.83)	February 28, 1983 (28.02.83)
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Japanese Patent Office	