

Description

METHOD FOR BUILDING SHIP ON GROUND AND LAUNCHING SHIP USING SKID LAUNCHING SYSTEM

Technical Field

- [1] The present invention relates to a method for building a ship on the ground and launching a ship using a skid launching system, and more particularly, to a method for building and launching a ship, in which two through four sections of a ship are built on the ground instead of in a shipbuilding dock and a completed ship is launched from a barge.

Background Art

- [2] Small-sized ships are built on the ground and launched into the sea. However, in large-scale shipyards, it is a general practice to build a ship in a dry dock and to launch a completed ship by filling the dry dock with water. Each section of a hull is divided into unit blocks, each of which is separately constructed. The constructed unit blocks are transported to a dry dock and assembled by welding, thereby completing the hull. After assembling the hull, the completed hull is floated by filling the dry dock with water and is launched by being pulled out of the dry dock. Such a method of building a ship in a dry dock and launching a ship allows easy shipbuilding or launching, thus coming into wide use in building large-scale ships.

[3]

Disclosure of Invention

Technical Problem

- [4] However, building a large-scale dry dock involves a high construction cost and a wide area of land, and the large-scale dry dock requires a high operation cost even after being constructed. As a result, it is impossible to construct a large-scale dry dock as needed. Moreover, since a constant order quantity of shipbuilding is not ensured, it is quite difficult and cost-ineffective to hold and operate many large-scale dry docks.

Technical Solution

- [5] The present invention provides a method for building and launching a ship, in which a ship is semi-assembled in an assembly yard and completed on a barge without using a dry dock, and a completed ship is launched from the barge.

[6]

Advantageous Effects

- [7] By using a method for building a ship on the ground and launching a ship using a skid launching system according to the present invention, in shipyards lacking dry

dock facilities, a ship can be assembled in a yard on the ground and launched from a barge, thereby improving production throughput.

- [8] In other words, a ship is divided into two through four sections, the divided sections are semi-assembled into hull blocks on the ground, the hull blocks are transported to a barge on the sea, the ship is completed on the barge, and the barge is sunk, thereby launching the completed ship. Thus, more ships can be constructed in a more space-efficient manner.

[9]

Brief Description of the Drawings

- [10] The above and other features and advantages of the present invention will become more apparent by describing in detail an exemplary embodiment thereof with reference to the attached drawings in which:

- [11] FIG. 1 is a conceptual plan view schematically illustrating a method for building and launching a ship according to the present invention;

- [12] FIG. 2 is a conceptual cross-sectional view illustrating a method of transporting a hull block using bogies;

- [13] FIG. 3 is a conceptual side view illustrating the method of transporting the hull block using the bogies;

- [14] FIG. 4 is a schematic view illustrating the bogie used in the method of transporting the hull block;

- [15] FIG. 5 is a conceptual cross-sectional view illustrating a method of transporting the hull block using a sliding pad;

- [16] FIG. 6 is a conceptual side view illustrating the method of transporting the hull block using the sliding pad;

- [17] FIG. 7 is a detailed view illustrating the sliding pad;

- [18] FIG. 8 is a conceptual cross-sectional view illustrating a method of transporting the hull block using a fluid transport system;

- [19] FIG. 9 is a conceptual side view illustrating the method of transporting the hull block using the fluid transport system;

- [20] FIG. 10 is a detailed view illustrating the fluid transport system;

- [21] FIG. 11 is a detailed view illustrating a bogie system used to transport the hull block;

- [22] FIG. 12 is a side view of the bogie system;

- [23] FIG. 13 is an exploded cross-sectional view of a portion A of the bogie system of FIG. 11; and

- [24] FIG. 14 is an exploded cross-sectional view of a portion B of the bogie system of FIG. 11.

[25]

Best Mode for Carrying Out the Invention

[26]

According to an aspect of the present invention, there is provided a method for building a ship on the ground and launching a ship using a skid launching system. The method comprises dividing the ship into two through four sections and semi-assembling the divided sections into hull blocks in a hull block assembly yard on the ground, fixing a barge at a quay wall adjacent to the hull block assembly yard in a longitudinal direction, transporting the semi-assembled hull blocks to the barge in a longitudinal direction, completing a hull by assembling the semi-assembled hull blocks on the barge, moving the barge to a launching point and sinking the barge through ballasting, and launching the built ship and floating the barge.

[27]

The semi-assembled hull blocks can be transported to the barge by sliding the hull blocks using bogies that are installed in the hull block assembly yard down from the hull blocks and move along a rail. Alternatively, the semi-assembled hull blocks can be transported to the barge by sliding the hull blocks along a skid way installed on the ground and the barge. Alternatively, the semi-assembled hull blocks can be transported to the barge by installing a skid way on a moving path of the hull blocks and hydraulic jacks between the skid way and a hull, and sliding the hull blocks while reducing friction by spraying compressed air onto the skid way. Alternatively, the semi-assembled hull blocks can be transported to the barge by lifting and moving the hull blocks using a large-scale crane.

[28]

Also, when the semi-assembled hull blocks are transported to the barge, a pulling winch that pulls the hull blocks can be used in front of the hull blocks and a braking winch that stops movement of the hull blocks can be used in the rear of the hull blocks. Here, a plurality of winches may also be used.

[29]

Mode for the Invention

[30]

Preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

[31]

FIG. 1 is a conceptual plan view schematically illustrating a method for building and launching a ship according to the present invention. Unit blocks that are constructed in separate hull production processes are transported to a hull block assembly yard 10 and are assembled by welding into a hull block 12 of each section of a hull. In FIG. 1, two hull blocks, each composed of a bow part and a stern part, are assembled. However, the number of hull blocks may increase to 2 through 4, if necessary. At least two hull blocks can facilitate transport and improves the degree of utilization of a hull block assembly yard, thereby increasing the yield of shipbuilding.

In other words, after the hull block 12 of each section of a ship is assembled in the hull block assembly yard 10, the assembled one is transported to a barge 14 and the ship is completed on the barge 14, thereby maximizing the yield of shipbuilding.

[32] After the hull block 12 is completed by assembling the unit blocks, the barge 14 is fixed at a quay wall using a mooring line 16 and the hull block 12 is transported to the barge 14. The location of the hull block 12 is finely adjusted so as for the hull block 12 to be placed at the accurate height, and the hull block 12 is then assembled on the barge 14. Once the assembly process is completed on the barge 14, the barge 14 is moved to the shore, ballasted, and then sunk. The built ship is then launched. Thus, the ship launching process is completed by floating the barge 14.

[33] FIG. 2 is a conceptual cross-sectional view illustrating a method of transporting the hull block 12 using bogies, FIG. 3 is a conceptual side view illustrating the method of transporting the hull block 12 using the bogies, and FIG. 4 is a schematic view illustrating a bogie used in the method of transporting the hull block 12.

[34] A transport guide such as a rail 20 on which the hull block 12 is to be transported and a plurality of bogies 22 that moves along the rail 20 are installed in the hull block assembly yard 10 down from the hull block 12. It is preferable that the number of wheels of each of the bogie 22 is 4. Each of the bogies 22 includes a hydraulic jack 24 to lift the hull block 12, and a trestle 26 is placed on each of the bogies 22 to support the hull block 12. It is desirable to install a plate 28, e.g., a wood or rubber plate, between the trestle 26 and the hull block 12 to protect the hull and reduce friction.

[35] When the hull block 12 is transported to the barge 14, the hydraulic jacks 24 of all the bogies 22 are activated to lift the hull block 12 and the hull block 12 is then pulled by a winch or pushed by a push pool gripper jack so as to be moved to the barge 14.

[36] The hydraulic jacks 24 of the bogies 22 are all connected to an oil tank of a hydraulic system by a pipe, and the same oil pressure is thus applied to all the hydraulic jacks 24. The stroke of the hydraulic jacks 24 is adjusted by adjusting flux. While the hull block 12 is being transported, the pressure applied to the hydraulic jacks 24 is measured by a pressure gage and the stroke of the hydraulic jacks 24 is measured by a level gage. The hydraulic jacks 24 are controlled by increasing or decreasing the amount of oil flowing to the hydraulic jacks 24 according to changes in the measured pressure and stroke. In this way, it is possible to transport the hull block 12 to the barge 14 without inclination of the hull block 12 even at a change in the height of the hull block 12, the change occurring when the hull block 12 is transported from the hull block assembly yard 10 on the ground to the barge 14.

[37] FIG. 5 is a conceptual cross-sectional view illustrating a method of transporting the hull block 12 using a sliding pad, FIG. 6 is a conceptual side view illustrating the method of transporting the hull block 12 using the sliding pad, and FIG. 7 is a detailed

view illustrating the sliding pad.

[38] The hull block 12 is placed on a bearing support 30 made of concrete or steel, a sliding pad 32 made of a sliding member such as resin is placed on the bearing support 30, and a plate 34 for hull protection and sliding is placed on the sliding pad 32. It is preferable that a wood plate 36 or a rubber plate is installed just under the hull block 12.

[39] A winch or a push pool gripper jack can be used to transport the hull block 12 to the barge 14. In an embodiment of the present invention, a push pool gripper jack 37 is shown. A gripper rail 38 is installed under the hull block 12, and the push pool gripper jack 37 moves along the gripper rail 38 to transport the hull block 12 by pushing the hull block 12.

[40] FIG. 8 is a conceptual cross-sectional view illustrating a method of transporting the hull block 12 using a fluid transport system, FIG. 9 is a conceptual side view illustrating the method of transporting the hull block 12 using the fluid transport system, and FIG. 10 is a detailed view illustrating the fluid transport system.

[41] A skid way 40 and a plurality of hydraulic jacks 42 that moves along the skid way 40 are installed in the hull block assembly yard 10 down from the hull block 12. The hydraulic jacks 42 are each composed of a hydraulic cylinder to lift the hull block 12 and spray compressed air towards the skid way 40 to reduce friction during movement. The trestle 26 is placed on the hydraulic jacks 42 to support the hull block 12. It is desirable to install the plate 28, e.g., a wood or rubber plate, between the trestle 26 and the hull block 12 to protect the hull and reduce friction.

[42] FIGS. 11 through FIG. 14 shows a detailed example of a bogie system used to transport the hull block 12. The bogie 22 includes bogie wheels 53 at the lower sides of a bogie frame 52, and the bogie wheels 53 can move along the rail 20. A loading beam 50 that are supported by two pairs of bogies 22 is installed, and the trestle 26 is placed on the loading beam 50 to support the hull block 12. The loading beam 50 can be lifted by a hydraulic jack 58 installed in the bogie frame 52 of the bogie 22. A jack cap saddle 57 is installed under the loading beam 50, and the jack cap saddle 57 is settled down on a protrusion formed on a jack cap 56 installed on the hydraulic jack 58. A cylinder of the hydraulic jack 58 is arranged to rise once hydraulic oil is supplied to the hydraulic jack 58, whereby the jack cap 56 rises and the loading beam 50 is lifted.

[43] A main saddle 55 is installed on the center of the loading beam 50 and takes the form of a circular-arc cylinder. When a height difference occurs during movement of the bogies 22, the main saddle 55 causes an angular change to the loading beam 50. Also, the main saddle 55 can move horizontally within a limited range, which makes it possible to horizontally adjust the location of the hull block 12 such that the hull block 12 is accurately engaged with the main saddle 55 when assembled on the barge 14.

Relative displacement is possible by coating lubricant between the jack cap saddle 57 and the protrusion and on the main saddle 55. Such relative displacement enables the hull block 12 to maintain horizontality without inclination even when a height difference occurs during movement of the hull block 12 and the bogies 22 are inclined.

[44] When the hull block 12 is transported to the barge 14, all the hydraulic jacks 24 are activated to lift the hull block 12 and the hull block 12 is then pulled by a winch or pushed by a push pool gripper jack so as to be moved to the barge 14.

[45] Hull blocks that are semi-assembled by the above-described method are transported to the barge 14 and are then completely assembled on the barge 14, thereby completing a ship. After completion of the ship, the mooring line 16 that fixes the barge 14 is released and the barge 14 is pulled to the shore into which the completed ship is to be launched. After the completed ship is floated by filling a ballast tank of the barge 14 with water and sinking the barge 14, the completed ship is pulled and the barge 14 is floated, thereby completing the launching process.

[46]

Industrial Applicability

[47] By using a method for building a ship on the ground and launching a ship using a skid launching system according to the present invention, in shipyards lacking dry dock facilities, a ship can be assembled in a yard on the ground and launched from a barge, thereby improving production throughput.

[48]

Claims

1. A method for building a ship on the ground and launching a ship using a skid launching system, the method comprising:

semi-assembling unit blocks into hull blocks of two through four sections in a hull block assembly yard on the ground;

fixing a barge at a quay wall adjacent to the hull block assembly yard in a longitudinal direction;

transporting the semi-assembled hull blocks to the barge in a longitudinal direction;

completing a hull by assembling the semi-assembled hull blocks on the barge;

moving the barge to a launching point and sinking the barge through ballasting; and

launching the built ship and floating the barge,

wherein the transporting of the semi-assembled hull blocks to the barge comprises measuring pressure applied to hydraulic jacks arranged under the hull blocks during transport of the hull blocks, measuring stroke of the hydraulic jacks, and controlling the hydraulic jacks by increasing or decreasing the amount of oil flowing to the hydraulic jacks according to changes in the measured pressure and stroke, thus transporting the hull blocks to the barge without inclination of the hull blocks even at a change in the height of the hull blocks, the change occurring when the hull blocks are transported from the hull block assembly yard on the ground to the barge.

2. The method of claim 1, wherein the transporting of the semi-assembled hull blocks to the barge comprises installing a guide on which the hull blocks are transported and a plurality of bogie systems including hydraulic jacks that moves along the rail in the hull block assembly yard under the hull blocks and installing a trestle that supports the hull blocks on each of the bogie systems.

3. A method for building a ship on the ground and launching a ship using a skid launching system, the method comprising:

semi-assembling unit blocks into hull blocks of two through four sections in a hull block assembly yard on the ground;

fixing a barge at a quay wall adjacent to the hull block assembly yard in a longitudinal direction;

transporting the semi-assembled hull blocks to the barge in a longitudinal direction;

completing a hull by assembling the semi-assembled hull blocks on the barge;

moving the barge to a launching point and sinking the barge through ballasting; and

launching the built ship and floating the barge,

wherein the transporting of the semi-assembled hull blocks to the barge comprises placing a sliding pad made of a sliding member on a bearing support made of concrete or steel, using a skid system in which a plate for hull protection and sliding is placed on the sliding pad and the

hull blocks are placed on a wood or rubber plate, and transporting the hull blocks using a winch or a push pool gripper jack.

4. A method for building a ship on the ground and launching a ship using a skid launching system, the method comprising:

semi-assembling unit blocks into hull blocks of two through four sections in a hull block assembly yard on the ground;

fixing a barge at a quay wall adjacent to the hull block assembly yard in a longitudinal direction;

transporting the semi-assembled hull blocks to the barge in a longitudinal direction;

completing a hull by assembling the semi-assembled hull blocks on the barge;

moving the barge to a launching point and sinking the barge through ballasting; and

launching the built ship and floating the barge,

wherein the transporting of the semi-assembled hull blocks to the barge comprises installing a skid way to transport the semi-assembled hull blocks and a plurality of hydraulic jacks that moves along the skid way and also sprays compressed air towards the skid way in the hull block assembly yard under the hull blocks, installing a trestle that supports the hull blocks on the hydraulic jacks, and installing a plate, e.g., a wood or rubber plate, between the trestle and the hull blocks for hull protection and friction reduction.

5. The method of **claims 3 or 4**, wherein the transporting of the semi-assembled hull blocks to the barge comprises measuring pressure applied to hydraulic jacks **arranged under the hull blocks** during transport of the hull blocks, measuring stroke of the hydraulic jacks, and controlling the hydraulic jacks by increasing or decreasing the amount of oil flowing to the hydraulic jacks according to changes in the measured pressure and stroke, thus transporting the hull blocks to the barge without inclination of the hull blocks even at a change in the height of the hull blocks, the change occurring when the hull blocks are transported from the hull block assembly yard on the ground to the barge.

6. The method of claim 2, wherein in the installing of the plurality of bogie systems including hydraulic jacks, each of the bogie systems includes a loading beam that is supported by two pairs of bogies, the loading beam rises by the hydraulic jacks, a hydraulic cylinder of the hydraulic jacks is arranged to rise, the horizontality of the hull blocks is maintained by an angular change of the hull blocks using a jack cap saddle installed on the hydraulic jacks and a main saddle installed on the center of the loading beam when a height difference occurs during movement of the bogies, and the main saddle moves horizontally, thus making it easy to assemble a hull on the barge.