Dec. 5, 1961 N. V. SVENSSON 3,011,252

METHOD AND EQUIPMENT FOR SHIPBUILDING

Filed March 31, 1958 2 Sheets-Sheet 1

Fig. 2

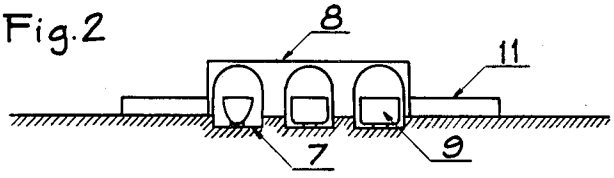


Fig. 1

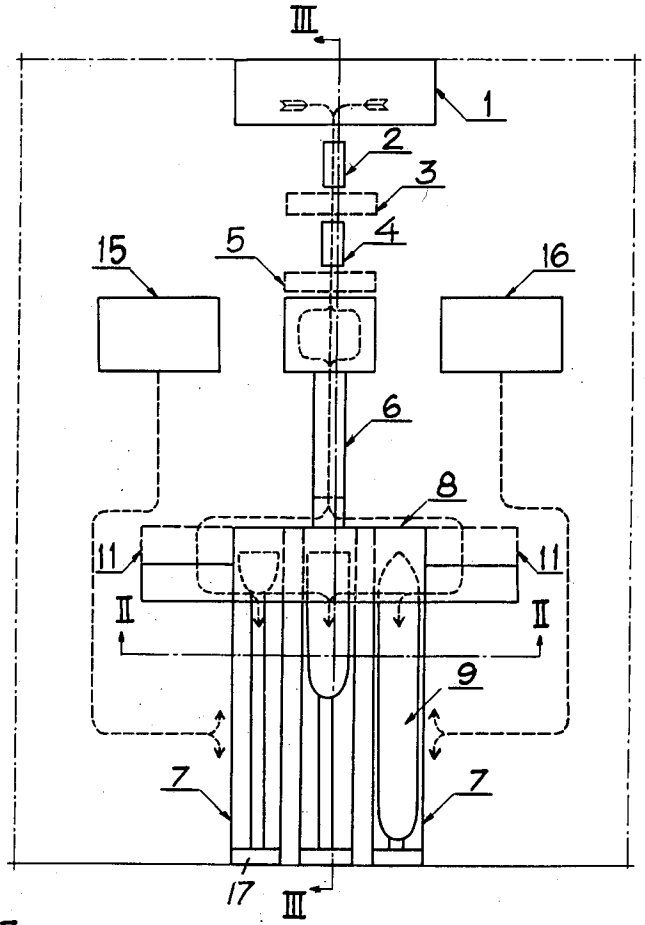
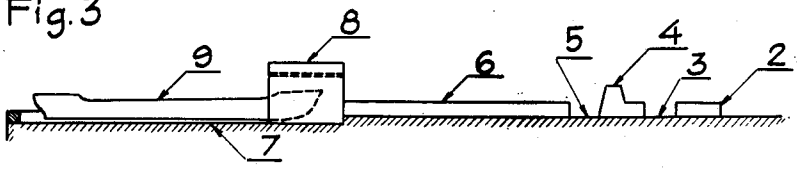


Fig. 3

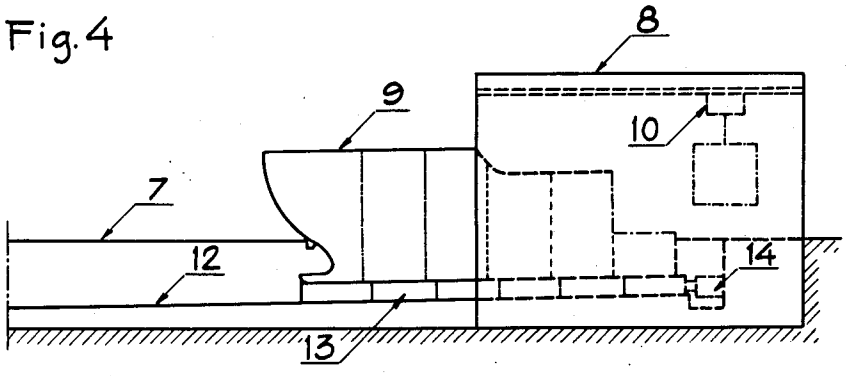


Dec. 5, 1961 N. V. SVENSSON 3,011,252

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Filed March 31, 1958 2 Sheets-Sheet 2

Fig. 4



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3,011,252

METHOD AND EQUIPMENT FOR SHIPBUILDING

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This invention relates to a method and an equipment for shipbuilding. The main object of the invention is to render possible the manufacturing of the hull under a shelter. Up to now the workmen who assemble the hull or portions thereof by welding and riveting methods, have worked out of doors, which in rainy and cold whether considerably reduces the working efficiency. On the other hand, it is scarcely possible to build a hall over the whole stocks of ways on account of the vast dimensions of modern ships, especially tankers.

In order to realize the main object of the invention, i.e. to render possible to a very great extent the building of the hull under shelter, one or more sections of the hull are manufactured in a hall which is situated at one end of the way. As soon as one such section has been completed, the finished portion of the hull is moved along the way to such extent that the building of the next following section can be commenced in the hall.

For this purpose the hall need only extend longitudinally over a minor part of the way, and in addition means are provided to move the hull or portions thereof within the hall and out of the latter.

One form of embodiment of the invention is described more fully hereinafter, reference being had to the accompanying drawings which show diagrammatically a shipyard arranged in accordance with the invention.

In the drawings, FIG. 1 is a plan view of an equipment for shipbuilding in a dock being provided with ways. FIG. 2 shows a vertical section along the line II—II of FIG. 1. FIG. 3 shows a longitudinal section along the line III—III of FIG. 1, and FIG. 4 is a lateral view of one end of the way having a hall erected over the said end of the way.

In order to make use of the space at disposal in the most effective manner and further to reduce the time for constructing the hull to the shortest possible, workshops and stores for the necessary material must be arranged in close proximity to the way and be made accessible in proper order of succession.

The equipment shown in FIG. 1 is only one of the proposals which may come into consideration in planning the shipyard. Plates and girders are received in a store 1, and from this store the building material is transferred to a workshop 2 being equipped with rolling mills and blasting furnaces, whereupon the material, if necessary, is stored in another storing room 3, from which the plates are being taken out one after the other for marking the same, for instance, by optical means, in a building 4. Thereafter, the plates may be transferred via a store 5 to be handled and worked properly in a plate-mill 6 which is equipped with machine-tools for bending, cutting and other requisite working operations in order to complete minor sections which in the form of whole unities can then be assembled to make the hull. The workshop is erected in close proximity to the ways 7, and a shelter or hall 8 is built over that end of the ways which is turned towards the workshop 6. In this end of the hall the assembling of the hull takes place. The hall is provided with necessary equipments such as hoisting cranes 10 for transferring hull-building material to the ways 7 from stores 11 arranged at the sides of the hall 8.

The ways comprise launching ways 12 which are preferably horizontal but may also be made inclining

towards the water end of the way, at an angle which is less than the normal angle of friction for launching a ship from a stationary way. Cradles 13 are in the usual manner positioned on the launching way 12 in the hall 8, and on these cradles the hull 9 or portions thereof are assembled, preferably beginning with the stern of the ship. As soon as a section of the hull is completed, it is moved a shorter distance by means of a suitable device, such as a hydraulic press 14 which pushes the cradles 13 together with the hull portions thereon along the launching way 12 towards the water. A new section of the hull can then be built in the hall 8. In accordance with the completion of the hull sections they are moved successively out of the hall along the launching way, until the whole hull 9 has been finished. For this reason all hull-building work can be carried out in the hall 8. If desired, various sections of the hull, for instance, the fore and stern parts of a ship, can be assembled on different mounting ways and be afterwards fitted together to form a unity.

In the completed portions of the hull all equipment work, such as the installation of the engines and other machinery, can be attended to parallel to hull-building in the hall, so that practically all work on the ship is done under shelter, with the exception of work which is unavoidably necessary at the external parts of the hull and on deck. For this purpose movable cranes are arranged on the dock-yard, and, furthermore, workshops 15, 16 for the construction of machinery and other equipment should be set up in cooperation of the shipyard

When the hull is completed, it is launched into the water, in that the ports 17 of the ways are opened and thereafter the hull is towed to an equipment wharf in order to make room for the next hull-building.

Inasmuch as the launching way 12 may not include too much, the friction between the same and the cradles 13 must be reduced as much as possible, so that the moving operation of the hull or portions thereof might be carried out with the least consumption of energy. With this in view, the way and the cradles are provided with means for supplying lubricant to the gliding surfaces between them. The friction can also be reduced by providing the way or the cradles or both of them with ball or roller bearings or similar antifriction means.

The invention is naturally also applicable to ways of ship docks of usual construction and arrangement. It is however necessary to adjust the angle of inclination of the ways so as to be less than the normal angle of friction adopted for ordinary launching. For this reason, the launching must in accordance with the arrangement used by the invention, be effected by drawing the hull from the way with the aid of tugs.

What I claim is:

1. A method for constructing ships such as large carriers or the like on a shore-based berth having a length which equals the maximum length of the ship to be constructed and provided with ways extending the length thereof, said berth having a hall erected above the end thereof only which is remote from the water and partly above a preparatory station beside said end and at a different level from that of the ways, comprising the steps of prefabricating subsections of the ship at the preparatory station, transporting a first set of said subsections from said preparatory station to the ways within the hall, assembling said subsection into a closed first section of the ship the breadth and depth of which corresponds to that of the ship and the length of which constitutes an appropriate portion thereof, moving said first section along the ways a sufficient distance to allow a second set of subsections to be assembled on the ways within the hall in close relation to the first section, transporting a second set of said subsections from said preparatory stations to

the ways within the hall and assembling said set of subsections in close relation to said first section and with the edges thereof in juxtaposition, joining said first and second sections, moving the joined first and second sections of the ship along the ways, assembling, joining and moving further sections of the ship on the ways step by step until the ship is completed, and finally transferring the completed ship from the berth to the water whereby a large carrier or the like the length of which may be equal to that of the berth is assembled completely under the protection of the hall.

2. A method for constructing ships such as large carriers or the like on a shore-based berth the length of which equals the maximum length of the ship to be constructed, said berth being provided with ways extending the length thereof and having a hall erected above the end thereof only which is remote from the water and partly above a preparatory station beside said end and at a different level from that of the ways, a plurality of detachable cradles being slidably mounted on said ways, comprising the steps of prefabricating subsections of the ship at the preparatory station, arranging a first set of cradles on said ways within the hall, transporting a first set of subsections of the ship from said preparatory station to said first set of cradles, assembling the subsections to a closed first section of the ship the breadth and depth of said section corresponding to that of the ship and the length of which constitutes an appropriate portion thereof, moving said first set of cradles with the section of the ship thereon along the ways a sufficient distance to allow a second set of cradles to be arranged on the ways within the hall, transporting a second set of subsections to said second set of cradles and assembling them thereon in close relation to said first section and with the edge portions of the respective parts lying in juxtaposition, joining said first and second sections and moving the sets of cradles with the joined sections of the ship along the ways, assembling and joining further sections of the ship on consecutive sets of cradles, moving said cradles step by stop along the ways until the ship is completed, and finally transferring the completed ship from the berth to the water whereby a large carrier or the like the length of which may be equal to that of the berth is assembled completely under the protection of the hall.

3. In a plant for constructing ships, such as large carriers or the like, the combination of a shore-based berth having a length which equals the maximum length of the ship to be constructed, ways on said berth extending the length thereof and designed to carry the ship, a plurality of detachable cradles slidably mounted on said ways, a hall erected above only the end of the berth remote from the water and partly above a preparatory station beside said end of the berth at a level different from that of the ways, means for transporting prefabricated subsections of the ship from said preparatory station to cradles arranged on the ways within the hall, means for assembling said subsections to a closed first section of the ship, the breadth and depth of said first section corresponding to that of the ship and the length of said section constituting an appropriate portion thereof, further means to move said set of cradles with the first section thereon along the ways a sufficient distance to allow a new set of cradles to be arranged on the ways within the hall in close relation to the preceding set of cradles, and means for joining subsequent sections of the ship to each other, said moving means being designed to move the cradles with the joined sections thereon step by step until completion of the ship.

4. In a plant for constructing ships such as large carriers or the like, the combination of a shore-based berth the length of which equals the maximum length of the ship to be constructed, the level of said berth being sunk below water level and provided with removable means at its outer end to close the entrance from the berth to the water, ways on said berth extending the length thereof and designed to carry the ship, a plurality of detachable cradles slidably mounted on said ways, a hall erected above one end only of said berth and partly above a preparatory station beside said end of the berth at a level different from that of the ways, means for transporting prefabricated subsections of the ship from said preparatory station to cradles arranged on the ways within the hall, means for assembling said subsections to a closed section of the ship the breadth and depth of said section corresponding to that of the ship and the length of which constitutes an appropriate portion thereof, further means to move said first set of cradles with the section thereon along the ways a sufficient distance to allow a new set of cradles to be arranged on the ways within the hall in close relation to said first set of cradles, means for joining subsequent sections of the ship to each other, said moving means being designed to move the cradles with the joined sections thereon step by step until completion of the ship, and further means to fill the berth with water upon completion of the ship and to float it out of the berth after opening of the closing means.

5. In a plant for constructing ships, such as large carriers or the like, the combination of an inclined shore-based berth the length of which equals the maximum length of the ship to be constructed, the angle of inclination being less than the usual launching angle for transferring ships from the shore to the water, ways on said berth extending the length thereof and designed to carry the ship, a plurality of detachable cradles slidably mounted on said ways, a hall erected above one end only of said berth and partly above a preparatory station beside said end of the berth at a level different from that of the ways, means for transporting prefabricated subsections of the ship from said preparatory station to cradles arranged on the ways within the hall, means for assembling said subsections to a closed section of the ship, the breadth and depth of said section corresponding to that of the ship and the length of which constitutes an appropriate portion thereof, further means to move said first set of cradles with the section thereon along the ways a sufficient distance to allow a new set of cradles to be arranged on the ways within the hall in close relation to said first set of cradles, and means for joining subsequent sections of the ship to each other, said moving means being designed to move the cradles with the joined sections thereon step by step until completion of the ship.

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