United States Patent

Amirikian

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[54] **LIFT PONTOON AND DOCK**

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[52] **U.S. Cl.** .....**114/0.5 F,** 114/45, 114/121, 61/65

[51] **Int. Cl.** **B63b 35/42,** B63c 1/06

[58] **Field of Search** .....61/65, 66, 67, 48; 114/45, 114/5 F, 46, 121, 125

[56] **References Cited**

UNITED STATES PATENTS

849,378	4/1967	Donnelly	61/65 X
1,296,662	3/1919	Hohorst	61/65
1,335,497	3/1920	Hamilton	61/65
3,332,248	7/1967	Burnett	61/65 X

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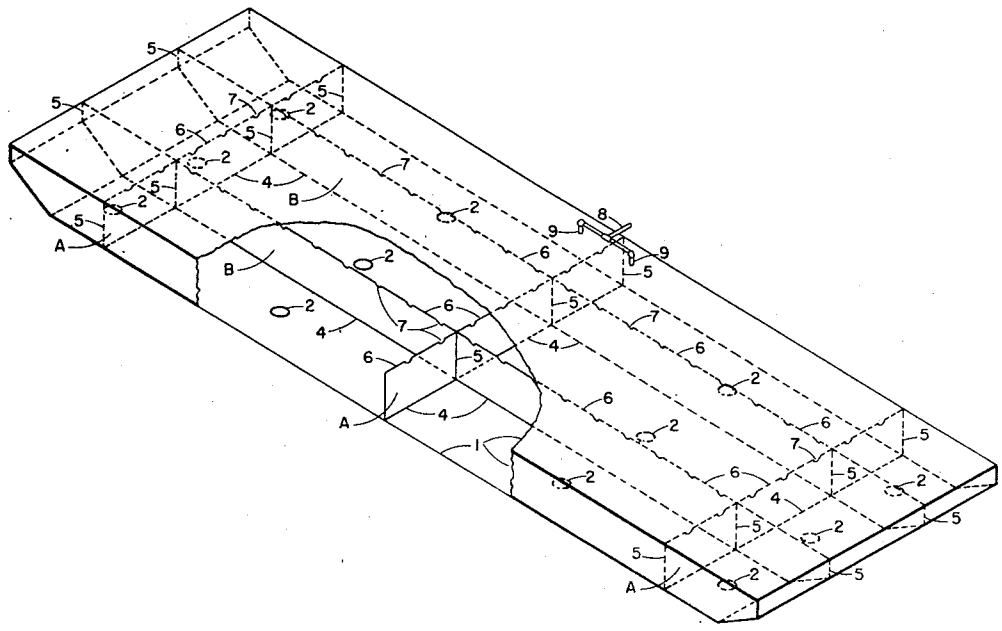
[57] **ABSTRACT**

Pontoon structures, particularly a low-cost watercraft defining a plurality of isolated compartments vented at their tops with respect to each other and each compartment having an independent valve in its bottom. The isolation of the compartments assures stability or seaworthiness, while the venting of the compartments at their tops assures the use of compressed air for uniform control of water level in the compartments. The independent valve in the bottom of each compartment enables precise regulation of discharge and admission of seawater.

1 Claim, 5 Drawing Figures



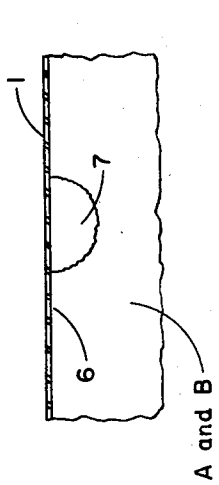


Fig. 1a

Fig. 1

Fig. 2

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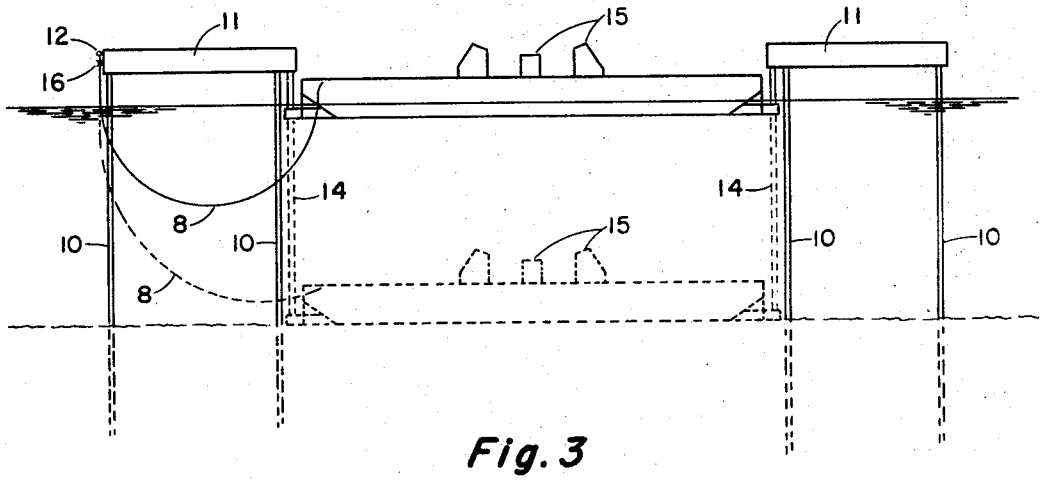

Fig. 3

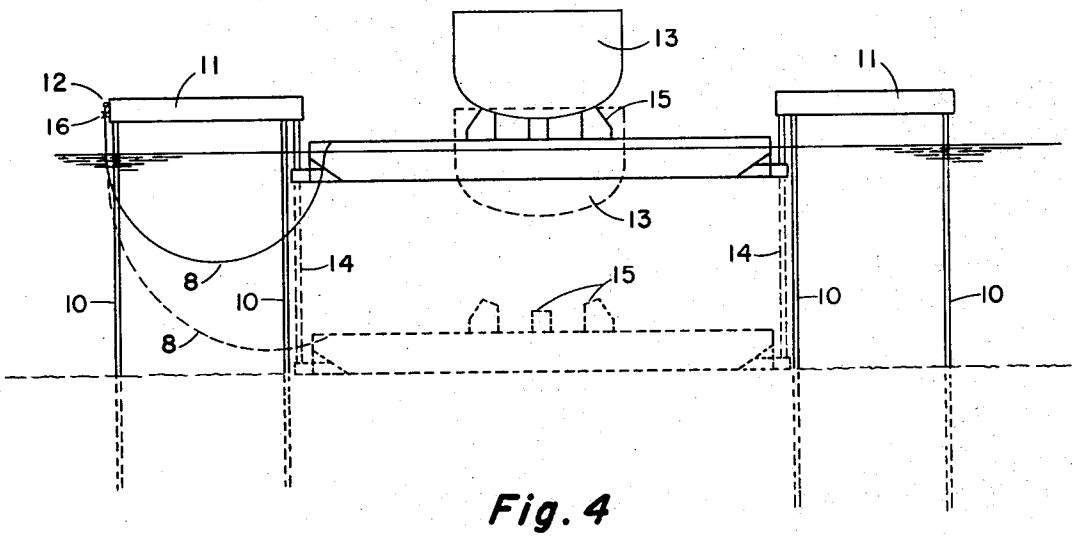

Fig. 4

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LIFT PONTOON AND DOCK

The invention relates to a submersible pontoon structure and its water ballasting system.

The main object of the invention is to provide a compartmented pontoon which, through a specially devised water ballasting system, could be submerged or floated to various drafts.

Another object of the invention is to utilized such a pontoon, either singly or in multiple assemblies, as a lifting and lowering device for docking and undocking of ships.

Still another object of the invention is to use such a pontoon, either singly or in multiple units, as a float or draft reducing device for transfer or docking of ships.

In recent years, drydocking facilities for ship repairs and maintenance have reached a critical stage by reasons of reduced efficiency and decreased capacity. This deficiency is particularly noticeable in facilities servicing naval vessels where increased draft requirements have restricted or eliminated the use of many existing dry docks. Also, due to the prevailing very high construction costs, the number of new dry docks built as replacement or additional facility has been small. It is believed that the adoption and use of a more economical drydocking system envisioned by this invention would greatly alleviate this situation.

In external view, the pontoon looks like an ordinary deck barge, with a flat top and bottom, and raked ends. However, internally, there are a number of distinguishing features which form the basis of this invention. The function and advantages of these features will become apparent by the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is an isometric view of the pontoon, showing the basic framing arrangement and the compartmentation.

FIG. 1*a* is an enlarged, fragmentary section, showing a semicircular venting hole cut in the transverse and longitudinal bulkhead adjacent its intersection with the deck;

FIG. 2 is an enlarged side elevation, partially in section, showing the controlling valve 3 mounted in the bottom of the hollow body and extending above the deck;

FIG. 3 is a schematic view, partially in phantom, showing the use of the present pontoon structure with docking blocks, inboard of flanking piers with lift cables; and

FIG. 4 is a similar view, showing the pontoon structure, supporting a vessel within flanking piers 11.

It is composed of an outer shell or slab 1, transverse bulkheads A and longitudinal bulkheads B. Through the bulkheads A and B the body of the pontoon is subdivided into a series of isolated compartments, each of which is provided with a hole 2 at the bottom for ingress and egress of the water ballast, and a controlling valve 3. The bulkheads have watertight connections along their bottom joints 4 and side joints 5. Along their top connections 6 with the deck shell, a series of small semi-circular holes 7 are provided for the diffusion of compressed air, which is introduced through an air duct 8 and inlets 9. By this unique arrangement, while the water in the various compartments will remain separated from each other, the pressure of the introduced or vented compressed air will be of the same intensity and diffuse uniformly through all the compartments. This, in turn, will assure two important operational advantages. First, with the valves 3 in the open position, when an air pressure is applied, or the prevailing pressure is vented, the ballast water in all the compartments will rise or fall uniformly as it were a single compartment, and thus the water level is controlled by the simple device of a single air line. Second, under external disturbing forces, when the pontoon tends to list or trim, the moments produced by the resulting shift of water in the compartments will be minimized by the presence of the separating watertight bulkheads. This is an important stability advantage and essential for the use of the pontoon as a float.

The pontoon will normally be built of steel. However, in certain application, reinforced concrete, plastics and other framing materials may also be used, according to comparative cost and service requirements.

As a water-ballasted floating craft, whose draft is regulated by a simple application of compressed air described in this invention, the pontoon can be used for many purposes. In some applications, it may constitute the whole facility; in others, it may be supplemented with adjuncts for the required service.

In its simplest form, requiring only a source of compressed air or a compressor, the pontoon, either singly or in a multi-unit assembly, could serve as a float or draft-reducer platform for docking deep draft vessels into relatively shallow dry docks or basins. In this function, which restores the use of the latter facility, the lift and the delivery of the vessel is accomplished in a larger dry dock of sufficient depth for the pontoon and the superposed vessel.

Another important use of the pontoon is as the main component and lifting device of a new type of a dock which may be designated as Lift Dock. Such an application is shown diagrammatically in FIGS. 3 and 4. In this application, two flanking piers 11, supported on piles 10, form an open slip or channel in which the pontoon submerges down or floats up by controlling the water ballast. Air lines 8 connected to a supply manifold 12, mounted on the outboard edge of one of the piers 11, furnish the compressed air needed for the ballast control. To provide stability in the submerged position of the pontoon, a set of cables 14, suspended from the inboard faces of the flanking piers 11, are attached to the pontoon near its four corners. The sequence of operation of a Lift Dock thus composed is as follows: Referring to FIG. 3, first the pontoon is floated to its maximum freeboard, by opening the water valves 3 and blowing the water ballast, at which position, shown in solid lines, the pontoon deck is leveled and the docking blocks 15 are set. Next, the compressed air contained in the pontoon is vented through valves 16 located at the manifold 12, thus allowing the water ballast to enter into the compartments, causing submergence of the pontoon to the bottom of the slip, as shown by the dotted lines in FIGS. 3 and 4, at which time the floating vessel 13 is brought into the channel and positioned for docking. In the following step, the air venting valves 16 are closed, the compressed air is introduced into the pontoon to remove the water ballast and initiate the ascent. After contact is made with the bottom of the vessel 13, additional air is injected

into the pontoon to remove the remaining ballast water and thus to create the needed buoyancy for the lift of the vessel. In this final position, shown in solid lines in FIG. 4, with the pontoon afloat with a freeboard and the vessel supported on the blocks 15, the water valves 3 in all the compartments are closed to complete the docking operation.

Normally the needed repairs to the vessel would be accomplished in place in this floating position. However, where a shallow basin or an underwater support grid is available, the work can be performed more advantageously by setting the assembly on a fixed base. For this purpose, the stabilizer cables 14 are detached and the assembly is moved as a float to the repair site, at which place the water valves 3 are opened to admit additional water ballast for setting the float on the support base. Obviously, the depth of water in such a basin at high tide should be less than the depth of the pontoon, so that the pontoon deck would remain above the surrounding water level and thus serve as a dry work platform.

Upon completion of the repair work in the basin, compressed air is applied to remove the water ballast and refloat the assembly, at which stage the water valves 3 are closed again. It is quite possible that the assembly in its free floating position may have some list and/or trim. To obtain the desired levelment, the water valves in the corner compartments on low side or end are opened and, through injection of additional compressed air, a part of the remaining water ballast is ejected from these compartments, thus creating the necessary balancing buoyancy for an even keel flotation. When this condition is attained, the water valves are closed and the assembly is brought back to the Lift Dock site. Here the stabilizer cables are reattached to the pontoon, the water valves 3 in all the compartments, as well as the air venting valves 16 at the manifold 12, are opened to readmit ballast water for initiating and continuing submergence of the pontoon until the vessel is fully water-borne. This completes the undocking operation.

The arrangement shown in FIG. 1 and described above constitutes the basic concept of this invention. While certain deviations, either in the arrangement or details, as well as in the manner of applications, can be introduced, it will be understood that such modifications may be made without departing from the spirit of the invention. For example, in some applications it may be deemed desirable to leave certain compartments permanently dry or buoyant, in which case the water inlet hole 2 in the bottom and the air holes 7 at the top will be omitted. In other instances, certain compartments may be left open to the sea permanently, in which case the controlling water valve 3 will be omitted.

Having thus described my invention, I claim:

1. A pontoon structure, comprising in combination:

A. a substantially hollow body defining end, side, deck, and bottom portions and including an air outlet;

B. a plurality of intersecting longitudinal and transverse bulkheads, vertically supported within said hollow body, so as to define a series of closed compartments, each of said bulkheads having an opening extending through its top portion adjacent to said deck, so as to provide a passageway between said compartments fore and aft, as well as laterally with respect to each other;

C. a valve fitted within the bottom of each compartment so as to independently control ballast water level in each compartment; and

D. a source of compressed air communicating with said hollow body, at the top thereof, so as to be distributed through each said opening into each compartment.

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