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[54] PORTABLE AIR INFLATED DRYDOCK
4 Claims, 6 Drawing Figs.

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61/65

[51] Int. Cl. B63c 1/06

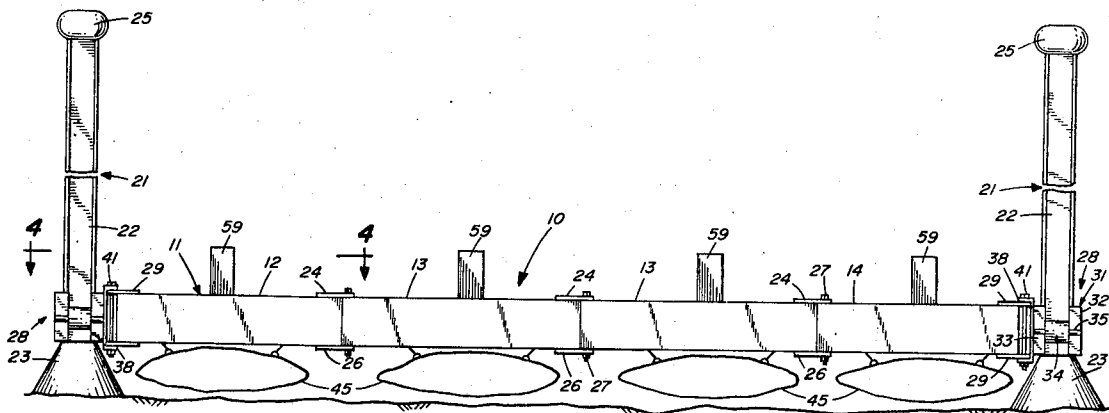
[50] **Field of Search**..... 61/46.5,
64-67; 114/.5, 26, 43.5, 44-54, 16, 123; 52/745,
126

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ABSTRACT: A portable drydock for larger boats and small ships comprising a chock equipped platform and inflatable pontoons attached to the underside thereof. The platform is retained in all horizontal directions and guided in its upward and downward movements by an upright guide rail at each corner thereof which has a pedestal of concrete resting on the bottom of the body of water in which the drydock is located and which rail extends above the water being surmounted by a marker. The boat or ship is maneuvered between the markers at each side of the platform and the pontoons are inflated to float the platform and raise the vessel from the water on the chocks.



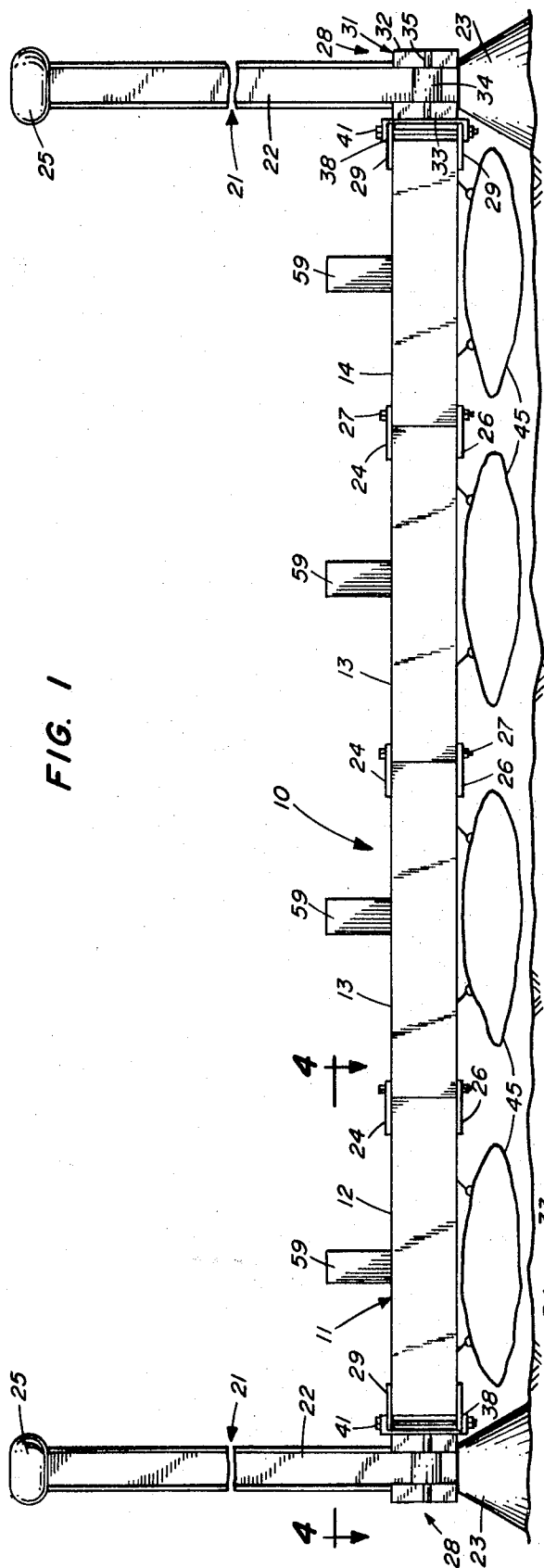


FIG. 1

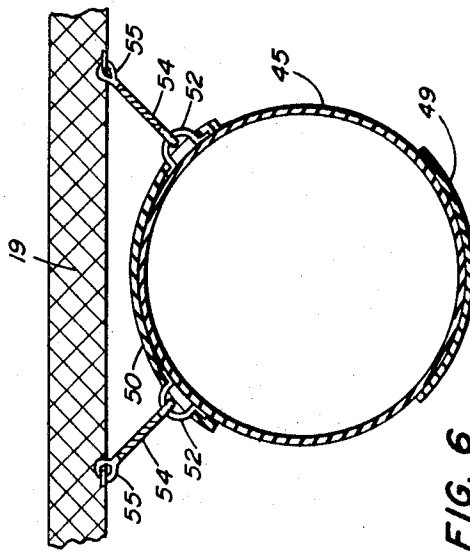


FIG. 6

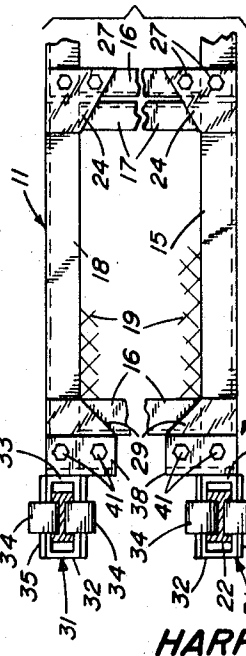


FIG. 4

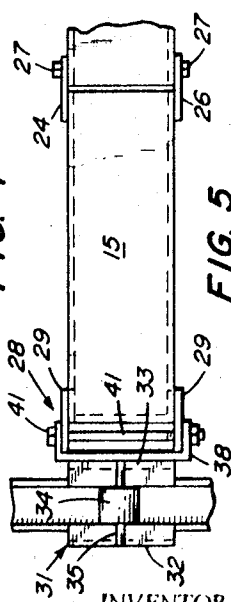
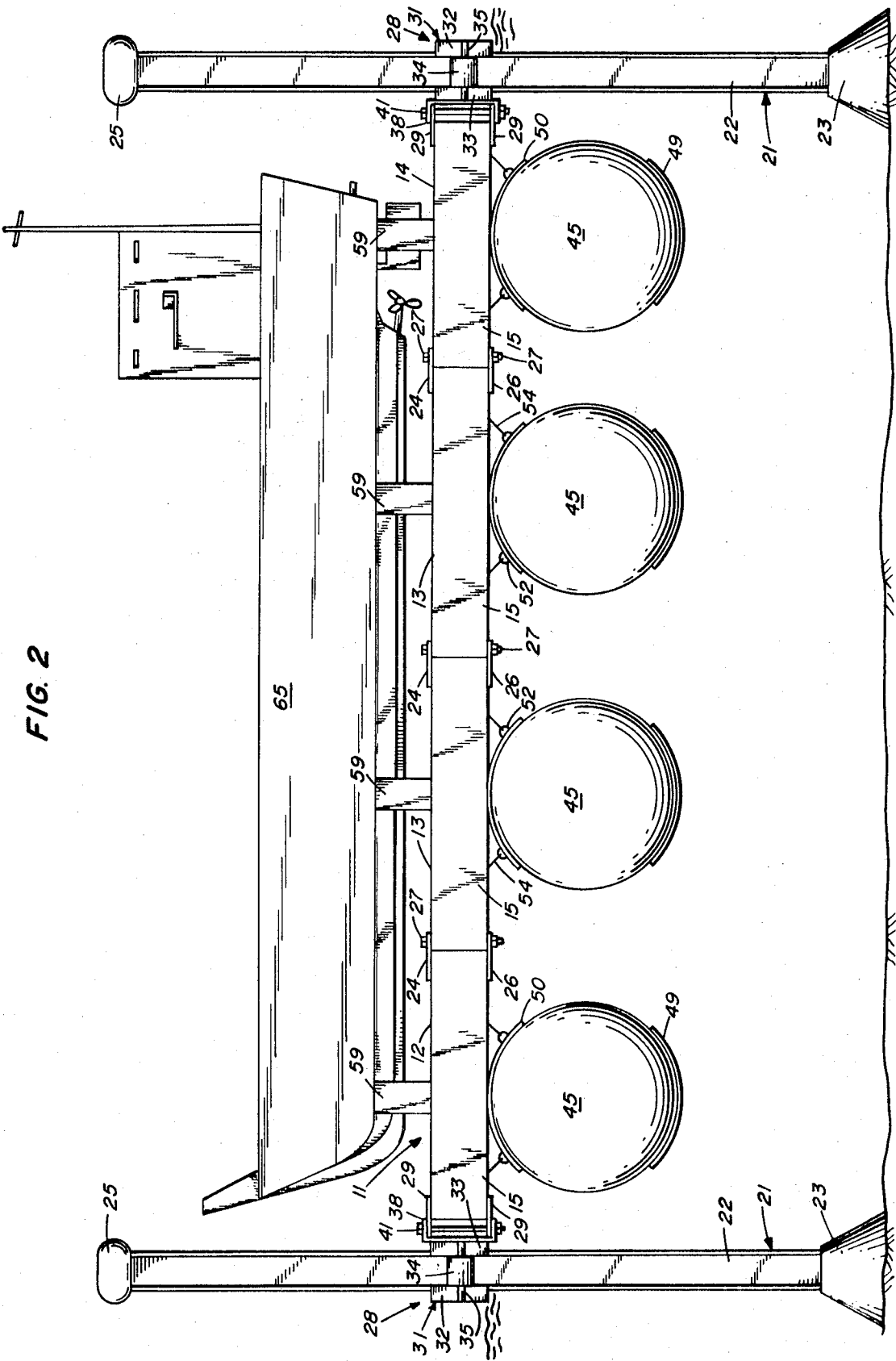


FIG. 5

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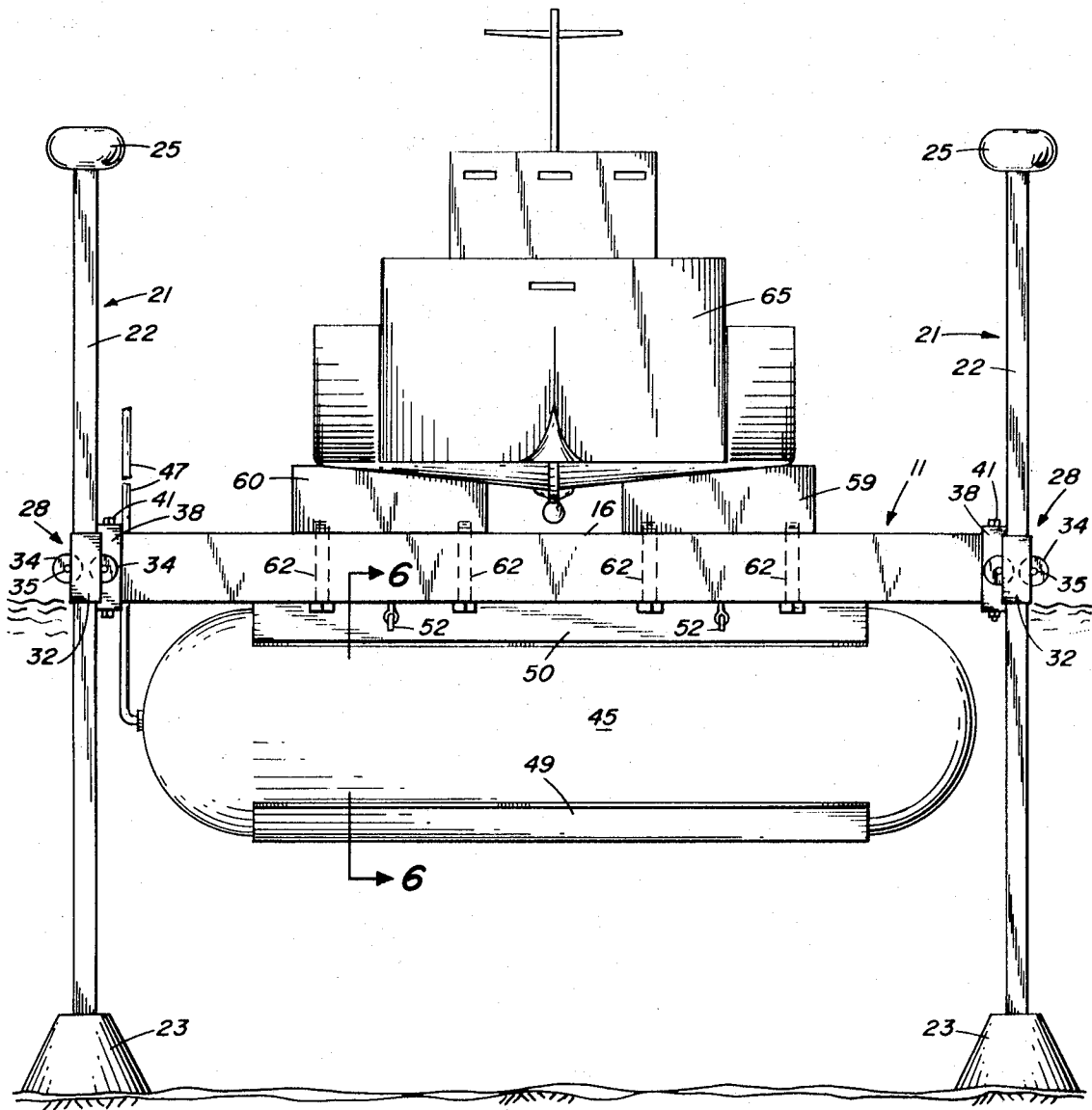


FIG. 3

PORTABLE AIR INFLATED DRYDOCK

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

The invention pertains to drydocks and, more particularly, to drydocks which elevate boats up out of the water for inspection and work thereon.

Boats of fairly large size and of large size, such as armed river patrol boats and landing craft for example, are normally gotten out of the water for work thereon by being raised up out of the water by very heavy and expensive cranes and set down in yards or on the shore on large wheeled dollies of rugged construction which are then towed and jockeyed by tractors into vacant places in buildings where present. This process is very slow and cumbersome, usually taking all day, and requires much manpower. After the work is completed, the boats are returned to the water by the reverse tedious and time-consuming process. The only other known way of getting boats of such large size out of the water is by the use of the usual shipyard concrete drydocks which are normally used only for ships. Both of these methods, of course, require extremely expensive equipment and/or facilities which take much time to build and set up. Obviously, such equipment and facilities cannot be provided in or near a combat area.

The present invention provides a simple, inexpensive, yet very effective drydock for raising boats of such size from the water for work thereon which drydock can be easily brought to and assembled in or near combat areas and then moved to new locations as desired.

In the midpart of the last century, ideas were advanced for raising very small and lightweight open or fishing-type wooden boats from the water employing buoyancy. However, besides apparently being limited to such small lightweight craft, these devices were operated by and therefore dependent on the tides, an obvious disadvantage, and in one case the boat was raised out of the water at each low tide and dropped back into the water at each high tide, an added disadvantage.

The drydock of the present invention can raise the largest and heaviest of boats and even small ships and such raising is independent of the tides.

SUMMARY OF THE INVENTION

The inventive drydock represents a significant advance over the prior art. Such drydock and its use represents only a very small fraction of the cost of the previously noted crane and dolly and concrete drydock facilities and required manpower for getting larger size boats out of the water and ready for work thereon. Also, the present drydock can be built or assembled easily and quickly most any place in the world including in or near combat areas and further, the same can be as easily moved to a new location.

The inventive drydocks also represents an advance over past flotation actuated drydocks in that it can raise the largest and heaviest boats and even small ships whereas such prior drydocks are limited to very small and lightweight boats. Also and more important, the present drydock is not dependent on the tides for operation thereof and remains effective regardless of the tides. The drydock can be used in tide water at any time and also in rivers and other fresh water. The present drydock is also portable which is not the case with such prior art drydocks.

The above advantages are attained by the use of a submerged platform which is raised to lift the boat from the water by the inflation of collapsed pontoons on the under side thereof, the platform being guided in its upward movement by fixed upright members.

OBJECTS OF THE INVENTION

It is a primary object of the invention to provide an effective device for getting larger boats out of the water for work thereon which is most inexpensive and easy to build and set up and maintain as compared to the prior art facilities which heretofore have been necessary.

It is another object to provide such a device which can be erected in or near a combat zone or in any location in the field which is not the case with prior art facilities.

Yet another object is to provide such a device which is portable or easily separable into and removable in only a few principal parts for quick placement and reassembly in another location.

Still another object is to provide a drydock which operates by the action of flotation to raise larger boats from the water for work thereon which cannot be accomplished by any known prior art drydock employing flotation.

A further object is to provide such a drydock which is not dependent on the tides to cause operation thereof but which operates independently of the tides and which can also operate just as well in fresh water.

A still further object is to provide such a drydock construction which employs easily attachable platform sections thereby permitting assembly of drydocks of different lengths to handle different size boats.

Yet another object is to provide a construction of the above type which can be employed for other purposes, as, for example, a helicopter landing pad which can remain slightly under the surface of the water prior to or even in actual use by a helicopter to help protect the pad from observation and destruction by the enemy, a raisable underwater platform for the storage of sealed items such as arms and ammunition and other supplies and oil and gasoline drums or storage tanks, a raisable portable dock or ramp, and an unobservable and water protected underwater bridge across a river or the like for movement of troops, tanks and supplies thereacross which can be raised to a suitable distance below the surface just prior to use.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a drydock in accordance with the present invention with the platform shown in the lowermost submerged position;

FIG. 2 is a view like the above but with the platform shown in a raised position supporting a medium size landing craft;

FIG. 3 is an end elevational view of the drydock with the platform in the raised position shown in FIG. 2;

FIG. 4 is a broken top plan view of one end of the drydock;

FIG. 5 is an enlarged fragmentary side elevational view of one of the guide rails and one of the guide rail engaging means of the platform; and

FIG. 6 is an enlarged sectional view on line 6-6 of FIG. 3 showing the manner of attachment of one of the pontoons to the platform.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in detail, reference numeral 10 generally designates the portable drydock. The drydock comprises a rectangular platform generally designated 11 which is made up of rectangular sections 12-14 of the same size and construction and attached together along their edges. Considering section 12 as an example, the section comprises a rectangular frame constructed of four channel irons 15-18 (see FIG. 4) preferably of aluminum or other nonrusting metal turned inwardly and secured together at the corners as by welding. A rectangular body of conventional aluminum honeycomb material or grillwork 19 extends between the

channel irons being snugly received along its four edges between the flanges of the irons and extending substantially to the webs of the channel irons.

For connection of the sections 12-14 together, each section except end section 14 is provided with pairs of spaced, outwardly extending plates 24 and 26 welded to the upper and lower flanges, respectively, of channel irons 17 of the platform sections at intervals therealong. Channel iron 16 of the next platform section is received between the plates 24 and 26, nut and bolt units passing through the plates and the adjacent flanges of the channel iron 16 for completing the connection between the adjacent platform sections.

Since the inner platform sections 13 are identical, the platform 11 can be made up employing one or any suitable number of these sections to handle the boat or type of boat to be worked on. That is the length of the platform 11 can be varied depending on the particular length of boat or of the type of boat, if necessary or desired. Although the platform has been shown and described as being made up of sections, the platform may be made in one piece, that is, without sections. Although the sections of the platform have been described as being of aluminum honeycomb construction inwardly of the frame, other grill work or open work construction may be employed therefor to permit easy raising and lowering of the platform through the water, that is, that there be openings extending through the platform pretty much all over the platform. Where wooden construction should be employed, spaced boards or planks could be used for example.

Four upright members or guide rails generally designated 21 are provided at the sides of the platform 11 to retain the latter in all horizontal directions whether the platform is motionless in a submerged or elevated condition or is moving upwardly or downwardly between these positions. During such movement the members 21 guide the platform. Each guide rail 21 comprises a length of structural I-beam 22 set in a block of concrete 23 of generally conical form, a marker member 25 of wood or any suitable material preferably being mounted at the upper end of each I-beam 22 to complete the member 21.

For cooperation with the guide rails 21, the end sections 12 and 14 of the platform 11 are each provided with a pair of guide rail cooperating portions generally designated 28. Each of these portions includes a pair of coextensive, outwardly extending horizontal plates 29 which are welded to the upper and lower surfaces, respectively, of the rectangular frame of its platform section. Each portion 28 further includes a collar-like unit generally designated 31 which extends around one of the guide rail I-beams 22. Each unit 31 is made up of a pair of end portions 32 and 33 which extend around the flanges of the I-beam 22 and a pair of nylon rollers 34 supported between such end portions on spindles 35 attached to the outer surfaces of each end portion intermediate the top and bottom edges thereof by welding. The rollers 34 are arranged to loosely ride along the web portion of the I-beam 22 during upward and downward movement of the platform 11 for the guidance thereof which arrangement also provides the lateral positioning or retention of the platform when not so rising or descending. Each unit 31 is provided with a short piece of channel iron 38 the back of which is welded to the back of the collar end portion 33. This channel piece 38 receives the outer ends of the pair of plates 29, nut and bolt units 41 extending through said plate ends and the flanges of the channel piece 38 for removably attaching the units 31 to the platform 11. Quick attach and detach means may be employed in place of the nuts and bolts if desired, the same also applying to the nut and bolt units 13 which fasten the platform sections together. In any event, noncorrosion fasteners should be employed.

Each platform section is provided with an inflatable, chloroprene covered nylon pontoon generally designated 45 extending across the major portion of the length of each platform section or width of the platform 11. The front end 46 of each pontoon is of hemispherical form in the inflated condition of the pontoon and is attached through a suitable fitting to a flexible air supply line 47 which is connected to a shore

based or floating air compressor with reservoir (not shown). Each pontoon 45 is provided with chafing strips 49 and 50 of the same material as the pontoon vulcanized on the lower and upper surfaces, respectively, of said pontoon to protect the latter against abrasion caused by any contact thereof with the bottom of the body of water in which the drydock is located and also by the contact of the pontoon with the bottom of the platform.

A pair of metal half rings 52 are attached to each end of each pontoon 45 by patches vulcanized to the pontoons and extending over out-turned ends of the half rings. Short lengths of metal cable 54 each having a snap hook 55 at the upper end thereof are attached to the metal half rings 52 by each of the latter passing through eye portions at the lower ends of the cables 54, respectively. The snap hooks 55 are snapped onto a lower crosspiece portion of the bodies of honeycomb material of the platform sections for attaching the pontoons 45 to the latter. It can thus be appreciated that the pontoons can be easily and quickly detached from and attached to the platform sections.

Although a pontoon 45 has been provided for every platform section, some of the sections may not be provided with such pontoons if sufficient buoyancy is provided by fewer pontoons. Also, pontoons of different sizes may be used to increase or decrease the buoyancy as desired depending on the size of the boat to be raised and worked on. Where the platform is of one-piece construction, particularly, one pontoon near each end of the platform may be all that is necessary to give sufficient buoyancy for raising a boat that is not very heavy.

Pairs of spaced chock halves 59 and 60 of hard rubber or chloroprene are provided on the platform 11 being secured to the latter by means of screws 62 extending up through openings in the platform and into the chocks halves.

OPERATION OF THE INVENTION

With the platform 11 in the lowermost submerged position shown in FIG. 1, a landing craft for tanks 65 or other boat maneuvers between the guide rails at the opposite sides of the platform and as nearly as possible over the chock halves 59 and 60. Air is then caused to flow through hoses 47 and inflate the pontoons. The platform then rises being guided by the rails 21. Upon sufficient ascent of the platform, the chocks halves engage the bottom of the boat whereupon continued upward movement of the platform and halves raise the boat out of the water into the position shown in FIG. 2 ready for work on the boat. The platform 11 serves as a work platform for the men working on the boat. When the work has been completed, air is allowed to escape from the pontoons through the hoses 47 by the opening of valves (not shown) whereupon the platform 11 and chocks descend to the FIG. 1 position, the boat descending to the water and becoming buoyant in the process.

When it is desired to move the location of the drydock the bolt units 41 are taken out and each of the guide rails 21 and platform 11 are separately moved to the new location whereupon the platform and four guide rails are reconnected. If desired, the sections 12 through 14 of the platform may be separated from each other for this relocation. The entire platform 11 or its individual sections may either be lifted up and carried by ship or floated to its new location depending on how far away the latter is.

While a pair of guide rails 21 is disclosed at opposite sides of the platform 11, a third centrally located guide rail or additional guide rails may be employed on each side of the platform especially where the platform is quite long or large.

Although the device just described has been called and has been used as a portable drydock, the device with the chocks eliminated may have other uses. For example, the device of proper dimensions may be used as a helicopter landing pad or a portable dock or ramp in or near combat areas, the platform being submergible when not in use so as to avoid easy detec-

tion and destruction by the enemy. The device may also be used for the storage of sealed items such as arms and ammunition underwater free from observation and/or destruction by the enemy and raisable as needed by inflation of the pontoons. The device can also provide underwater raisable gasoline and oil storage.

It is thus seen that a very useful device has been provided which is very inexpensive to build, operate and maintain and which can be used anywhere through the world in relatively shallow water and which can be easily and quickly moved to other locations.

Although a preferred embodiment of the invention has been disclosed in detail and illustrated and other forms suggested, it should be appreciated that still other forms and modifications can be had. It is, therefore, desired that this invention be limited only by the terms of the appended claims construed in the overall broad light of the invention.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings.

What is claimed is:

1. A portable drydock for use in a body of water which comprises:

a platform adapted to receive a load;
inflatable means suspended from the underside of said platform for raising and lowering the same in the water, the inflatable means having sufficient capacity to raise the loaded platform to the surface of the water;

at least four substantially upright members each having an enlarged lower portion adapted to be supported on the bottom of the water body, one of the upright members being positioned substantially at each corner of the platform with the upper portion of each extending above the surface of the water body, the upright members being stationary with respect to the bottom of the water body upon inflation of the inflatable means; and

a plurality of restraining means equal in number to the number of upright members, each of the restraining means being rigidly attached to said platform and encircling a different one of the upright members for restraining the platform in all horizontal directions while allowing vertical platform movement upon inflation and deflation of the inflatable means.

2. The drydock of claim 1 wherein the upright members comprise a length of structural I-beam and the restraining means comprise a collar which extends around the upright member and supports a pair of roller positioned to ride in the web portion of the I-beam upright members.

3. The subject matter of claim 1 in which the platform is made up of sections removably attached together.

4. The subject matter of claim 1 in which the platform is of open work construction to permit easy passage of water therethrough during raising and lowering of the platform.

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