United States Patent [19]

Williams

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[54] **BOAT DRY DOCKING DEVICE**

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[52] **U.S. Cl.** **61/65**

[51] **Int. Cl.** **B63c 1/00**

[58] **Field of Search** 61/64–67

[56] **References Cited**

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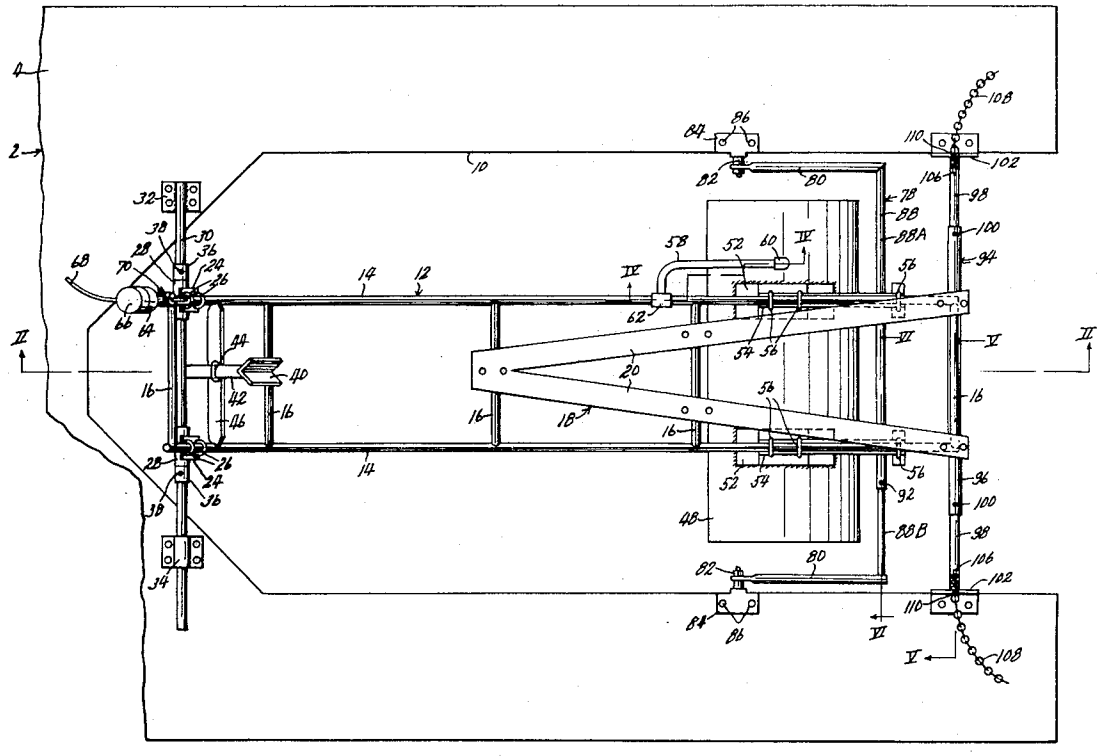
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[57] **ABSTRACT**

A boat dry docking device for small craft consisting of an elongated boat supporting frame adapted to be disposed longitudinally in the boat well of a floating dock and to be pivoted to said dock at the closed end of said well for vertical movement, whereby the end thereof at the open end of the well may be dropped below water level, to receive a boat thereon, or raised to elevate said boat above water level, a flotation tank open at its bottom secured to the frame remotely from its pivot, mechanism operable to deliver air to or exhaust it from the tank whereby to raise or lower the frame, and reinforcing devices for preventing lateral tilting and lateral sidesway of the free end of the frame.

7 Claims, 8 Drawing Figures



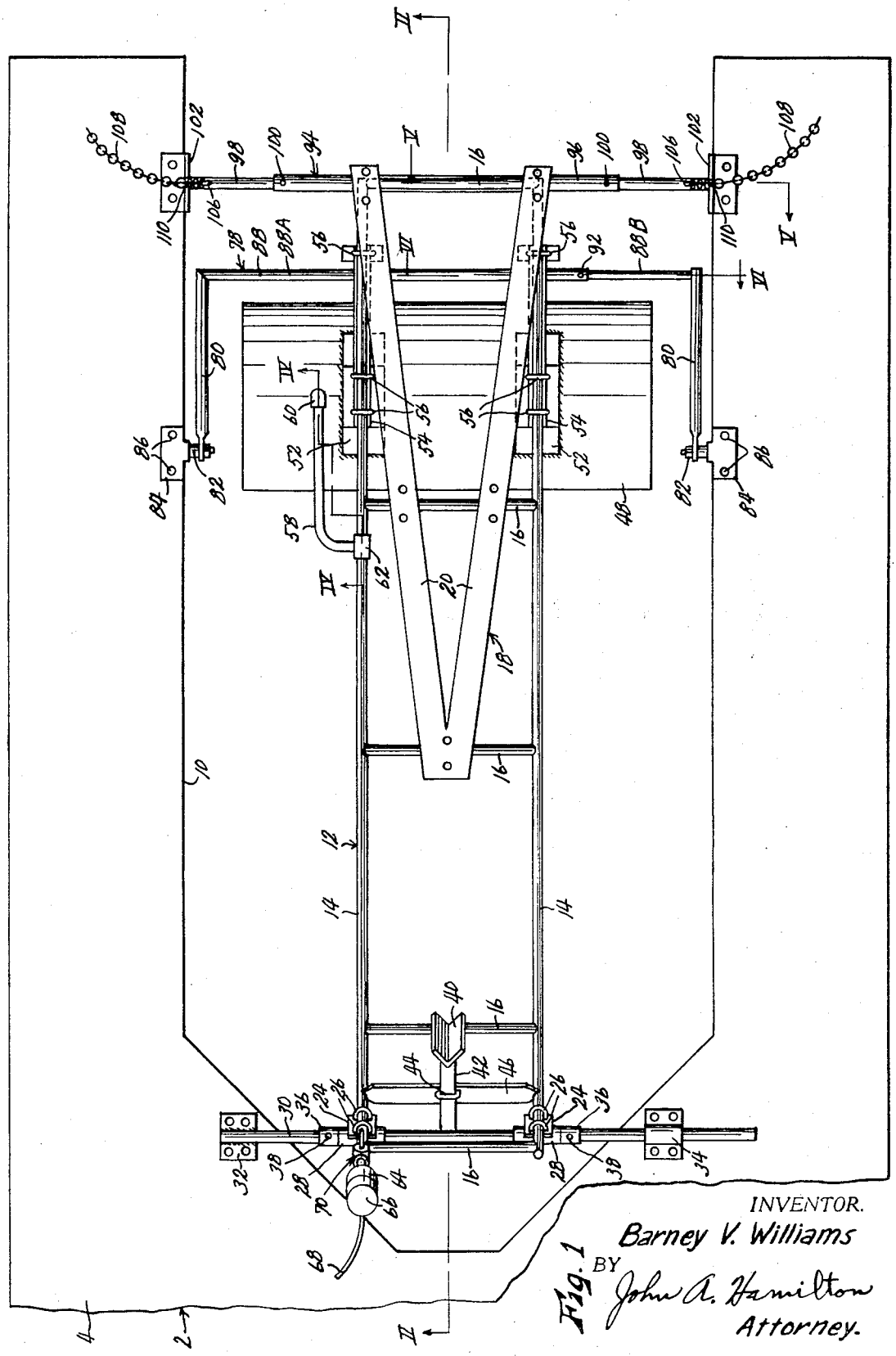


Fig. 1

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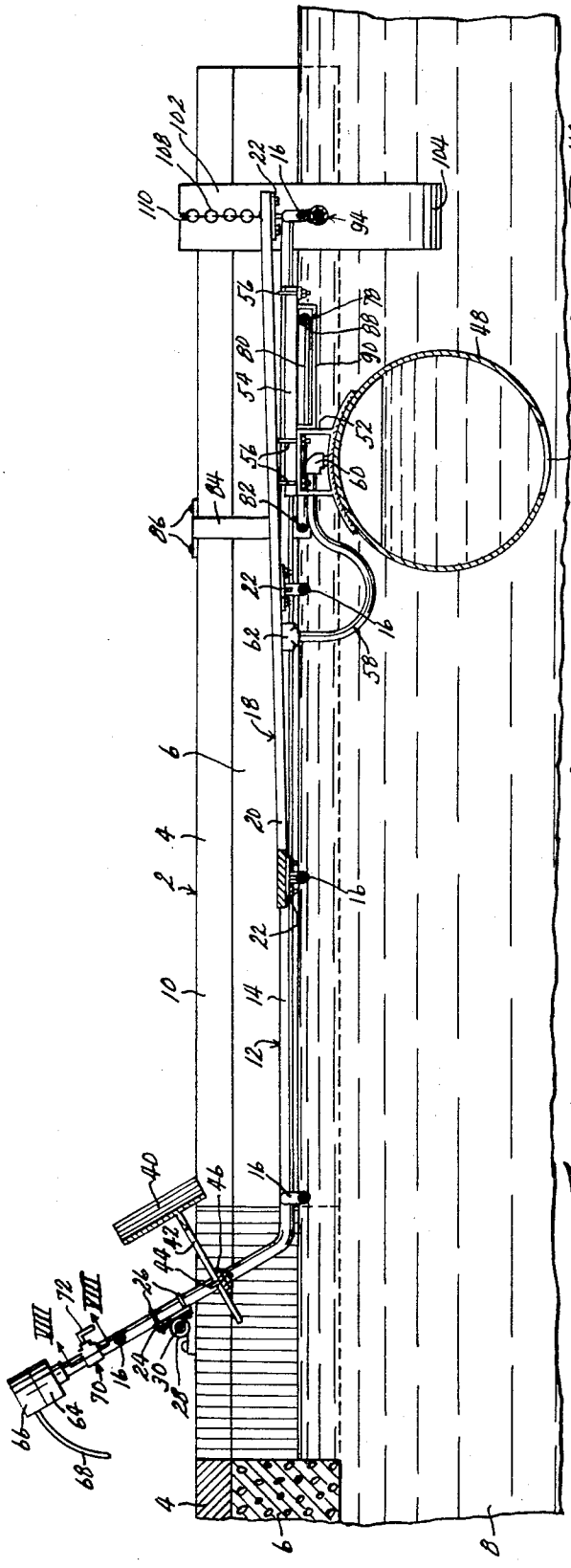


Fig. 2

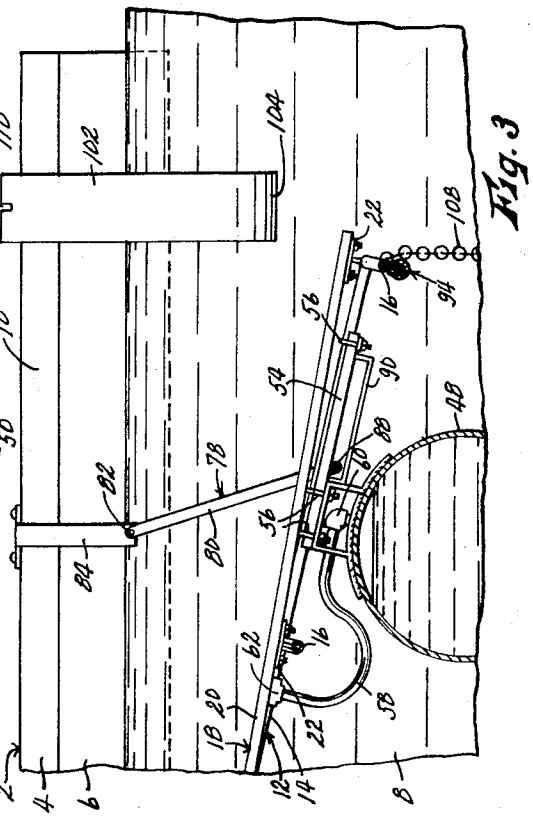


Fig. 3

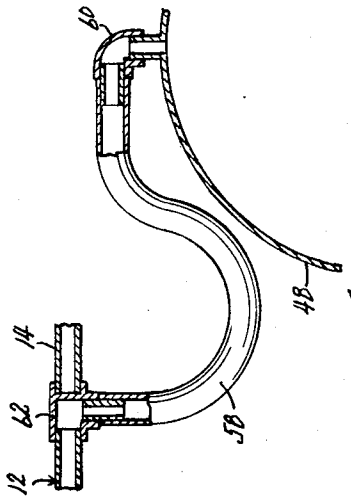


Fig. 4

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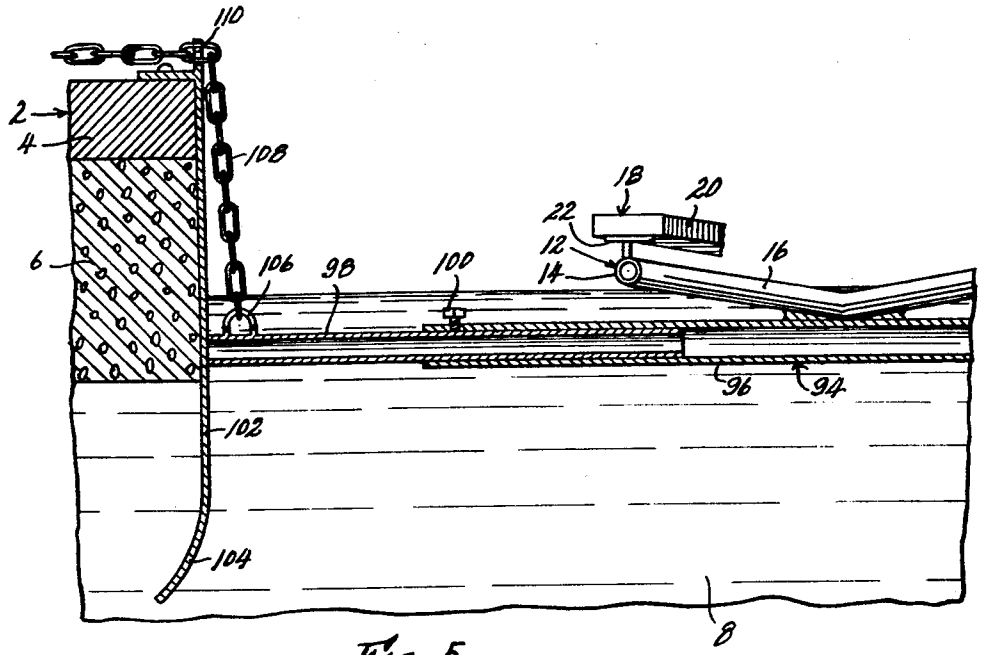


Fig. 5

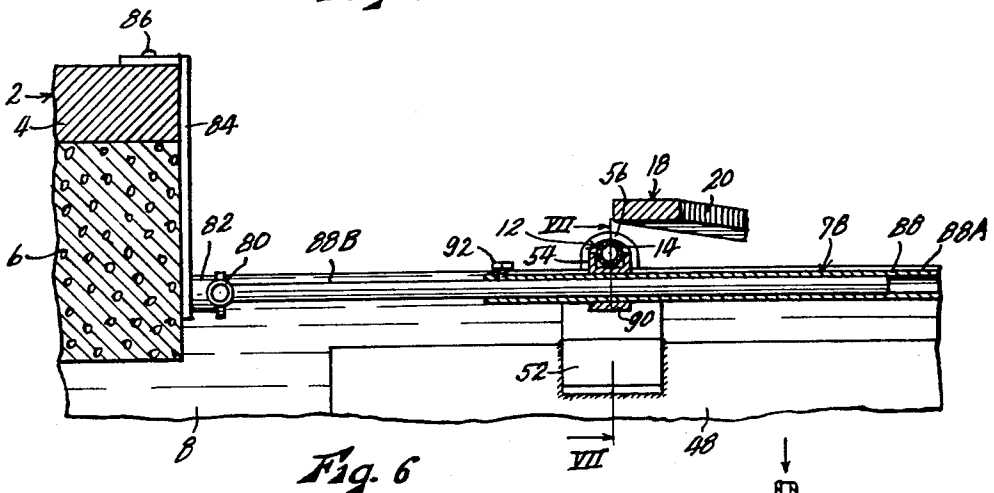


Fig. 6

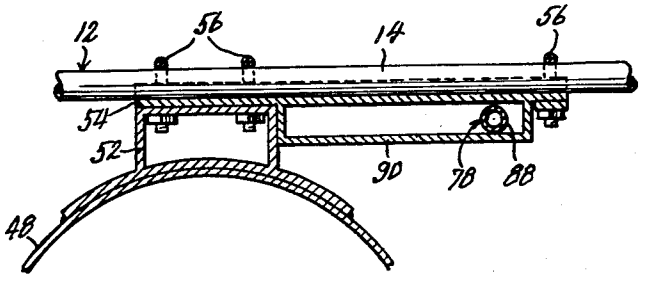


Fig. 7

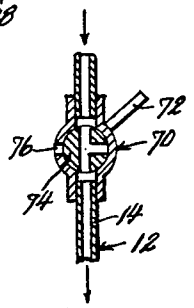


Fig. 8

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BOAT DRY DOCKING DEVICE

This invention relates to new and useful improvements in boat docks for small craft, and has as its principal object the provision of an attachment for a boat dock by means of which a boat moored at said dock may easily and conveniently be elevated and maintained out of the water and dry when not in use. Obviously, such a device provides great savings to boat owners in the reduction of rust, corrosion, marine growths, and other water damage, and in the reduction of resulting repair and maintenance costs. Many boat owners provide for dry storage of their boats in the winter off-season when their boats are not used for extended periods of time, but not usually in day-to-day periods of non-use during the summer season, due to the trouble and expense of such storage.

Accordingly, it is also an object of the present invention to provide a device of the character described constituting a simple, inexpensive attachment adapted to be affixed to nearly any common boat dock, and which may be operated with no more powerful equipment than a small electric motor, or even manually. To this end, the device consists of an elongated boat supporting frame adapted to be arranged longitudinally in the boat well of a dock, and pivoted to said dock on a horizontal transverse axis at the forward or closed end of the well. A flotation tank secured to said frame beneath the rearward end portion thereof, and means for selectively delivering air to or exhausting it from said tank, provide that the rearward end of the frame may be dropped below water level, whereby a boat may be positioned thereon while still floating and self-powered, and raised to elevate said boat free of the water.

Another object is the provision of a device of the character described having novel means for bracing said frame with respect to the dock, whereby a lighter construction may be used with no danger that the boat will shift or move with respect to the dock when the water is rough. Such movement causes possible damage to the frame, the dock, and the boat itself.

A further object is the provision of a dry-docking device of the character described which is readily adjustable to handle boats of different lengths, and to be applied to boat docks having boat wells of different widths, and different degrees of freeboard clearance.

Other objects are simplicity and economy of construction, and efficiency and dependability of operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

FIG. 1 is a top plan view of a boat dock, partially broken away, showing a dry docking device embodying the present invention mounted operatively thereon,

FIG. 2 is a sectional view taken on line II—II of FIG. 1,

FIG. 3 is a fragmentary view similar to FIG. 2, but showing the boat-supporting frame lowered to a position for receiving a boat thereon,

FIG. 4 is an enlarged, fragmentary sectional view taken on line IV—IV of FIG. 1,

FIG. 5 is an enlarged, fragmentary sectional view taken on line V—V of FIG. 1,

FIG. 6 is an enlarged, fragmentary sectional view taken on line VI—VI of FIG. 1,

FIG. 7 is a fragmentary sectional view taken on line VII—VII of FIG. 6, and

FIG. 8 is an enlarged fragmentary sectional view taken on line VIII—VIII of FIG. 2.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies generally to a boat dock consisting of a horizontal platform 4 supported by flotation blocks 6 in the water 8, and having a notch 10 constituting a boat well formed therein. Said boat well has generally parallel sides, as shown in FIG. 1, is closed at its forward end, and opens at its rearward end through an edge of the dock, for receiving a boat therein. The detailed construction of the dock is not pertinent to the present invention, and is not shown.

The dry docking device forming the subject matter of the present invention includes an elongated frame indicated generally by the numeral 12 and extending longitudinally in boat well 10, midway between the sides of said well. Said frame includes a pair of longitudinally extending parallel side rails 14, formed of tubular stock, and rigidly interconnected at intervals along their length by cross bars 16, said cross bars being of V-shape as shown in FIG. 5. A boat cradle indicated generally by the numeral 18 is carried by said frame. As shown, said cradle consists of a pair of wooden planks 20 with their rearward ends disposed respectively over the rearward ends of frame side rails 14, and converging forwardly, being supported in slightly spaced relation above the frame by brackets 22 affixed to said frame. However, said cradle may take many forms, all considered to be within the scope of the present invention.

The forward end portions of frame side rails 14 are angled upwardly, as shown in FIG. 2. A plate 24 is mounted for adjustable movement along the upwardly angled portion of each side rail, by means of a pair of U-bolts 26. A tubular sleeve 28 is welded to each of plates 24, said sleeves being coaxial and rotatably engaged on a horizontal transverse shaft 30. One end of said shaft is welded to a plate 32 affixed to dock platform 4, and the other end portion of said shaft is axially slidable in a bracket 34 also affixed to platform 4. This permits the shaft to be mounted on the dock when the boat well 10 is of different widths, and the frame to be transversely centered in the well by sliding sleeves 28 along the shaft. When thus centered, further movement of said sleeves along the shaft is prevented by a pair of collars 36 mounted on said shaft and secured thereon by set screws 38. The vertical adjustment of the frame provided by U-bolts 26 permits adjustment of the device to docks wherein the top surface of platform 4 is disposed at different distances above the water level. Preferably, the adjustment is such that when frame 12 is horizontal, as in FIG. 2, it is disposed just above the water level.

A V-shaped buffer 40, adapted to engage the prow of a boat supported on cradle 18, is disposed adjacent the forward end of the frame. Said buffer is carried by a forwardly extending bar 42 which is adjustably secured by a U-bolt 44 to a cross bar 46 extending between and affixed to the upwardly angled portions of side rails 14. The bow line of the boat may be tied to the forwardmost cross bar 16 of the frame, to hold its bow firmly against buffer 40.

A cylindrical flotation tank **48** is disposed beneath the rearward end portion of frame **12**, the axis of said tank being horizontal and transverse to said frame. Said tank is provided at its lowermost part with one or more water holes **50** (see FIG. **2**) and has affixed to the top thereof a pair of brackets **52**. Each of said brackets is affixed to a channel iron slide **54** which is engaged slidably on one of side rails **14**. Said slides may be moved adjustably along said side rails, whereby to move tank **48** forwardly or rearwardly with respect to the frame, and are releasably secured thereon by U-bolts **56**. This adjustment permits adaptation of the device to longer or shorter boats, it being preferable that the tank be disposed so that a major portion of the weight of the boat be supported by the tank, not the dock, to relieve strains on the dock. Air is delivered to tank **48** by a flexible hose **58**, one end of said hose being connected into the upper portion of said tank by an elbow fitting **60**, and its opposite end being interconnected into one of the tubular side rails **14** of the frame, just forwardly of the tank, by means of a blind T-fitting **62** inserted in said side rail, all as best shown in FIG. **4**. The hose of course permits forward and rearward adjustment of the tank as described above.

Air is delivered through side rail **14** and hose **58** to tank **48** by an air pump **64** affixed to the extreme forward and upper end of the associated frame side rail, said pump being operated by an electric motor **66**, which may conveniently be structurally integrated with the pump as shown, and to which electric current is supplied by a flexible cable **68**. Connected into the associated side rail **14**, adjacent pump **64** is a valve **70** having an operating handle **72** which manipulates an interior gated plug **74** of said valve (see FIG. **8**) whereby the valve may be set to connect pump **64** with tank **48**, as shown by the arrows in FIG. **8**, or to seal off all connection to the tank, or to vent the tank to atmosphere through a side outlet **76** of the valve.

To prevent or minimize torsional twisting of frame **12** about its longitudinal axis, which can occur as a result of wave action when the water is rough, there is provided a stabilizer crank **78** of U-shape, said crank including a pair of parallel side arms **80**, each pivoted on a horizontal axis transverse to the frame, as at **82**, to a bracket **84** secured at **86** to dock platform **4**, at one side of boat well **10**, and a rigid connecting rod **88** joining the free ends of said side arms and extending horizontally and transversely beneath channel iron slides **54**, just rearwardly of tank brackets **52**. Said rod is secured slidably against said slides by keeper bars **90** which are elongated longitudinally of the frame and affixed at their ends to slides **54**, whereby to permit connecting rod **88** to move forwardly and rearwardly along said slides. The crank prevents either of frame side rails **14** from rising or falling more than the other, and thus greatly inhibits any tendency of the frame to twist about its longitudinal axis. Connecting rod **88**, as best shown in FIGS. **1** and **6**, is adjustable in length to accommodate the crank to boat wells of different widths, consisting of a tubular section **88A** and a section **88B** telescoped slidably in said tubular section. Once adjusted, sections **88A** and **88B** are secured non-rotatably together by set screw **92**, in order that the crank may better perform its anti-torsion function. Crank brackets **84** should preferably be affixed to the dock platform after slides **54** have been adjusted to determine the position of tank **48**.

To prevent lateral sidesway of the rearward end of frame **12**, relative to the dock, there is provided a strut bar **94** extending horizontally and transversely beneath said frame at the rearward end thereof. As best shown in FIGS. **1** and **5**, said strut includes a tubular central section **96** rigidly welded or otherwise affixed to the rearmost cross bar of the frame, and a pair of end sections **98** mounted telescopingly and slidably in the respective ends of said central section and projecting outwardly therefrom, said end sections being adjustably affixed in said central section by set screws **100**, whereby the length of the strut may be adjusted. When properly adjusted, said strut engages snugly but slidably between a pair of vertical plates **102** affixed at their upper ends to dock platform **4** at respectively opposite sides of boat well **10**. Said plates extend well below the water level, and are curved arcuately outwardly at their lower ends, as indicated at **104**. The bracing and reinforcing of frame **12** by stabilizer crank **78** and strut **94** permits said frame to be built of much lighter, and hence less expensive, materials than would otherwise be required. Affixed to the strut adjacent each end thereof is an eye **106** into which one end of a linked chain **108** is connected. As will appear, each of said chains may be extended upwardly, and engaged non-slidably in a notch **110** provided therefor in the top end of the associated plate.

In operation, a boat is dry docked by releasing chains **108** from notches **110** and setting valve **70** to exhaust air from tank **48** through outlet **76** of the valve. As air leaves the tank and is replaced by water therein, the buoyancy thereof decreases and it sinks deeper into the water, causing frame **12** to pivot downwardly at its rearward end about shaft **30**, as shown in FIG. **3**, to a position well below the water level. Stabilizer crank **78** limits the downward pivoting of the frame. A boat may then be piloted into boat well **10**, floating and under its own power, to position it above said frame and boat cradle **18**, until the boat prow engages buffer **40** and is secured thereagainst by tying its bow line to the forwardmost frame cross bar **16**. Valve **70** is then set as shown in FIG. **8** to connect air pump **64** to tank **48**, and said pump is actuated to force air into the tank. As air enters the tank and displaces water therefrom through holes **50**, the buoyancy of the tank increases and it rises to pivot frame **12** upwardly, first causing cradle **18** to engage the boat bottom, and then raising the boat itself. As the frame rises, strut **94** engages and is centered between plates **102**. The tank of course does not "-float" freely in a stabilized condition until at least a portion thereof is raised above the water level, and at this time the boat hull has been lifted completely above the water, and it may be elevated still further, by pumping more air into the tank, to elevate even the propellor screw above the water. Valve **70** is then set to seal the tank, and the docking may if desired be viewed as completed. However, at this time the boat is supported partially by shaft **30**, but the major portion of its weight is supported in the water by the buoyancy of tank **48**. Thus rough weather can cause vertical bobbing of frame **12** and the boat due to wave action in the water. This bobbing is accompanied by violent strains of many types and can result in damage both to the docking

device and to the boat. Moreover the continued support of the boat is dependent on the maintenance of full air pressure in the tank, which requires a perfect sealing of the air system. Such a perfect seal is difficult if not impossible to maintain over long periods of time, so that the air gradually leaks away and the boat is lowered into the water. For these reasons, it is preferred that once the boat has been elevated fully as already described, the latch means constituting chains **108** is brought into play, chains **108** being engaged in notches **110**, and valve **70** operated to vent at least some of the air pressure from tank **48**. In this manner, all or any desired part of the boat weight previously supported by tank **48** is transferred to chains **108**, and hence directly to the dock. The boat and the dock are thus effectively joined into a single unit, with no relative movement therebetween, even in rough water, and together they can ride out a violent storm with little danger of damage. Also, the continued support of the boat is no longer dependent on the maintenance of air pressure in the tank. However, it is still preferable, in order to relieve strains on the dock, that as much of the boat weight as possible be carried by the flotation tank, and therefore air is preferably exhausted from the tank, and boat weight thereby transferred to chains **108**, only in sufficient degree to prevent bobbing of the boat.

Thus it will be apparent that a dry docking device having several advantages has been produced. It elevates a boat completely out of the water, providing all of the advantages of dry storage, but is sufficiently simple and economical to be available even to individual small boat owners. For power operation, it requires only a small, inexpensive motor to operate the air pump, and the air pump could even be manually operated if desired. It may be freely adapted to handle boats of different weights and lengths, and to be applied to docks having wells of different widths, and different amounts of freeboard clearance.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention.

What I claim as new and desire to protect by Letters Patent is:

1. A boat dry docking device comprising:

a. an elongated frame adapted to be disposed longitudinally in the boat well of a boat dock,

b. means for mounting said frame on said dock for pivotal movement on a horizontal transverse axis at the end thereof remote from the open end of said boat well,

c. a boat-supporting cradle mounted on said frame,

d. a flotation tank open at its bottom,

e. means mounting said flotation tank on said frame beneath the vertically movable end portion thereof, said means being adjustable to move said tank longitudinally along said frame, whereby said device may better accommodate boats of different lengths, and

f. an air system operable to selectively deliver air under pressure to, or to exhaust said air frame, said tank whereby to selectively raise the vertically movable end of said frame above, or to lower it below, the level of the water in which said tank is supported.

2. A device as recited in claim **1** wherein said means mounting said flotation tank on said frame comprises:

a. a slide member mounted on said frame for movement longitudinally therealong, said tank being affixed to said slide, and

b. means operable to secure said slide immovably on said frame at any pre-determined position.

3. A boat dry docking device comprising:

a. an elongated frame adapted to be disposed longitudinally in the boat well of a boat dock,

b. means for mounting said frame on said dock for pivotal movement on a horizontal transverse axis at the end thereof remote from the open end of said boat well,

c. a boat-supporting cradle mounted on said frame,

d. a flotation tank open at its bottom,

e. means mounting said flotation tank on said frame beneath the vertically movable end portion thereof,

f. an air system operable to selectively deliver air under pressure to, or to exhaust said air from, said tank whereby to selectively raise the vertically movable end of said frame above, or to lower it below, the level of the water in which said tank is supported, and

g. stabilizing means comprising a U-shaped crank having parallel side arms disposed respectively at opposite sides of said frame, within said well, and extending parallel to the plane of vertical movement of said frame, and a connecting rod extending horizontally and transversely beneath said frame, and rigidly interconnecting a pair of corresponding ends of said side arms; means for pivoting the opposite ends of said side arms to said dock on a horizontal transverse axis; and keeper means carried by said frame and engaging said connecting rod whereby to prevent vertical movement of said connecting rod relative to said frame, but to permit movement of said connecting rod longitudinally of said frame.

4. A device as recited in claim **3** with the addition of anti-sidesway means comprising:

a. an elongated rigid strut affixed to the vertically movable end of said frame and extending horizontally and transversely outwardly from the sides thereof to points adjacent the sides of said boat well, and

b. a pair of vertical plates adapted to be affixed to said dock respectively at opposite sides of said well, and to extend below the water level, the ends of said strut engaging snugly but slidably between said plates.

5. A device as recited in claim **4** wherein said frame mounting means, said stabilizing crank connecting rod and said strut are all adjustable in length transversely of said frame, whereby to render said device adaptable for use in connection with boat docks having boat wells of different widths.

6. A boat dry docking device comprising:

a. a elongated frame adapted to be disposed longitudinally in the boat well of a boat dock,

b. means for mounting said frame on said dock for pivotal movement on a horizontal transverse axis at the end thereof remote from the open end of said boat well,

c. a boat-supporting cradle mounted on said frame,

d. a flotation tank open at its bottom,

e. means mounting said flotation tank on said frame beneath the vertically movable end portion thereof,

f. an air system operable to selectively deliver air under pressure to, or to exhaust said air from, said tank whereby to selectively raise the vertically movable end of said frame above, or to lower it below, the level of the water in which said tank is supported, and

g. latch means operable to secure the vertically movable end of said frame releasably to said dock, whereby to support said frame independently of the buoyancy of said flotation tank.

7. A device as recited in claim 4 with the addition of a pair of chains secured to said strut respectively adjacent the opposite ends thereof, said chains being extendable upwardly from said strut and any link of each being releasably but securely engageable in a notch provided therefor in the upper end of the associated plate, whereby to support said frame from said dock independently of said flotation tank.

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