# United States Patent [19]

**MacLean**

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[45] **Oct. 23, 1973**


[54] **OIL SPILLAGE ENCLOSURE SYSTEM FOR MARINE USE**


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[52] **U.S. Cl.** ..... **61/1 F,** 61/46, 61/48

[51] **Int. Cl.** ..... **E02b 3/22,** E02b 15/04

[58] **Field of Search** ..... 61/1 F, 48, 46; 114/219, 230; 160/290 R; 267/139



[56] **References Cited**

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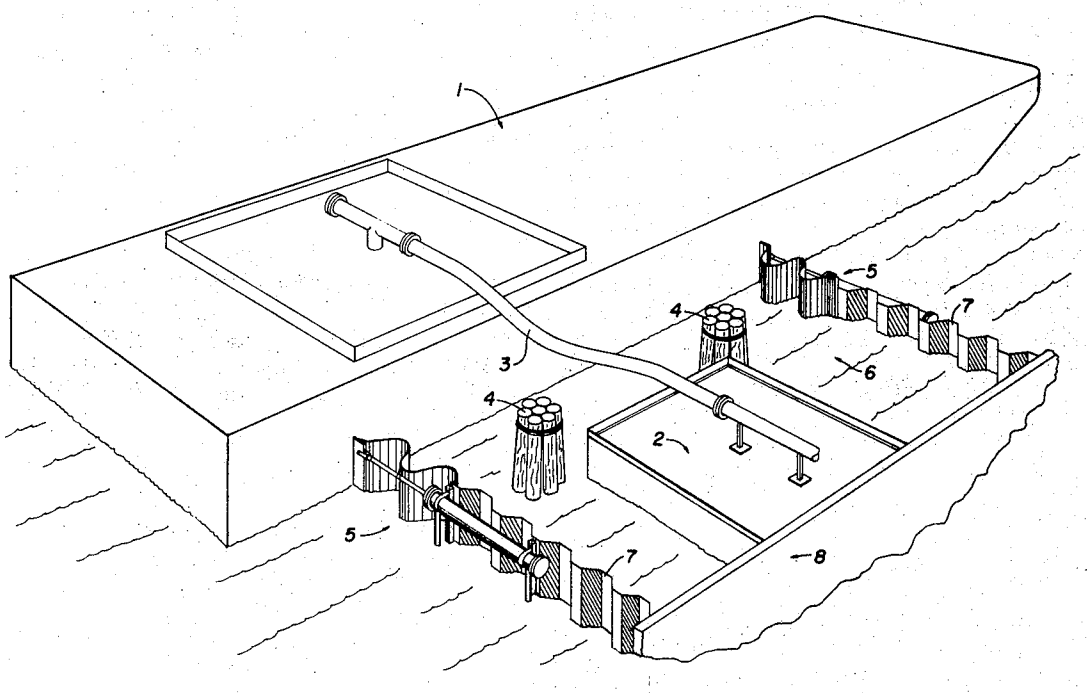
*Primary Examiner*—Mervin Stein
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[57] **ABSTRACT**

A system for containing oil that might be spilled in handling at a marine oil transfer facility where the floating vessel and the mooring are sides of the containment, two closure devices are provided, one on each side of the hose handling area, between the vessel and the mooring to enclose an area of the water's surface to locally contain a depth of floating oil, wherein the closure sides are movable to compensate for motion of the floating vessel while it's moored.


**4 Claims, 8 Drawing Figures**



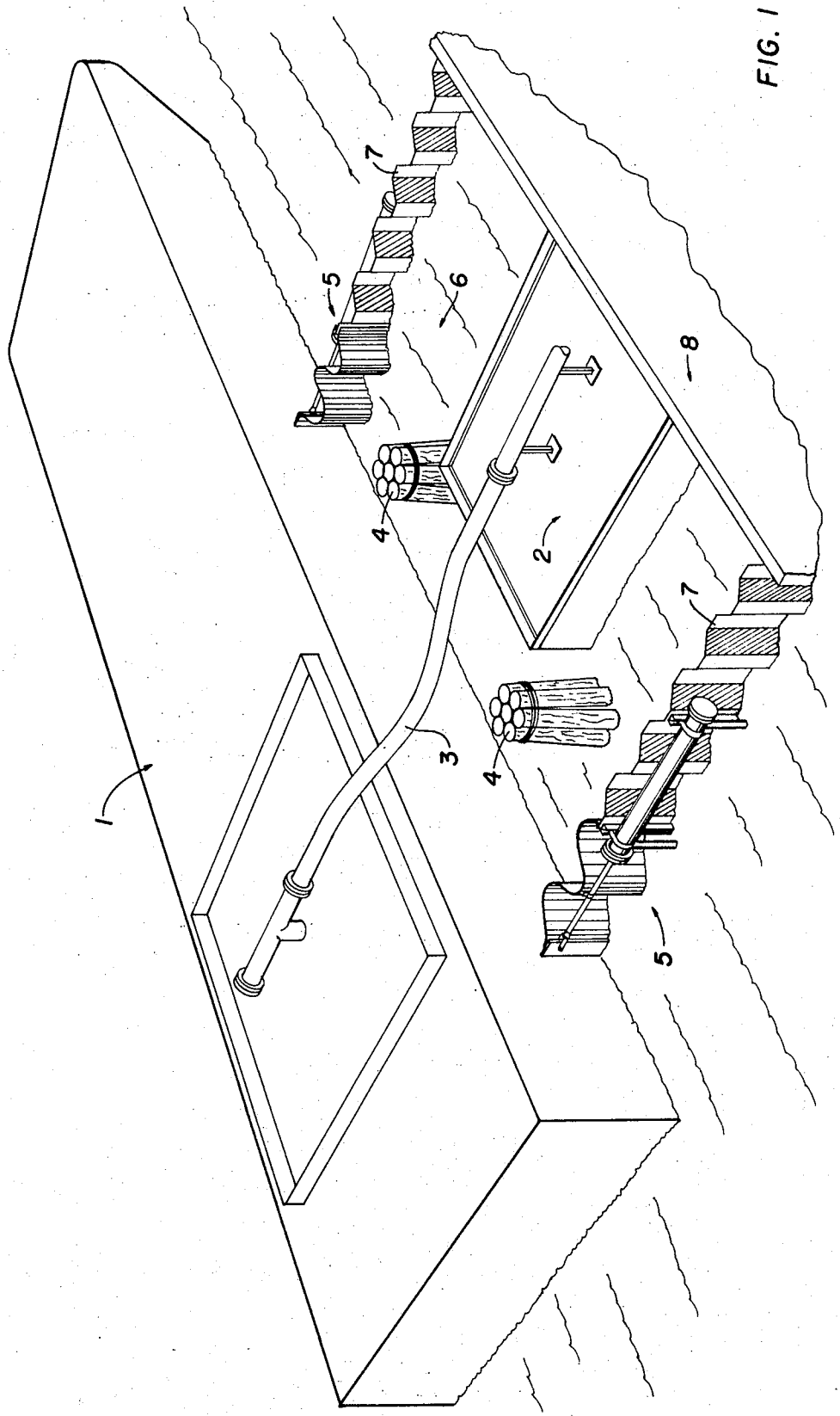



FIG. 1

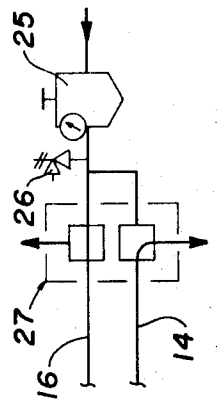



FIG. 6

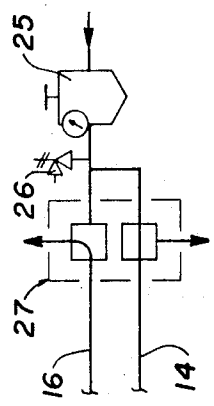



FIG. 5

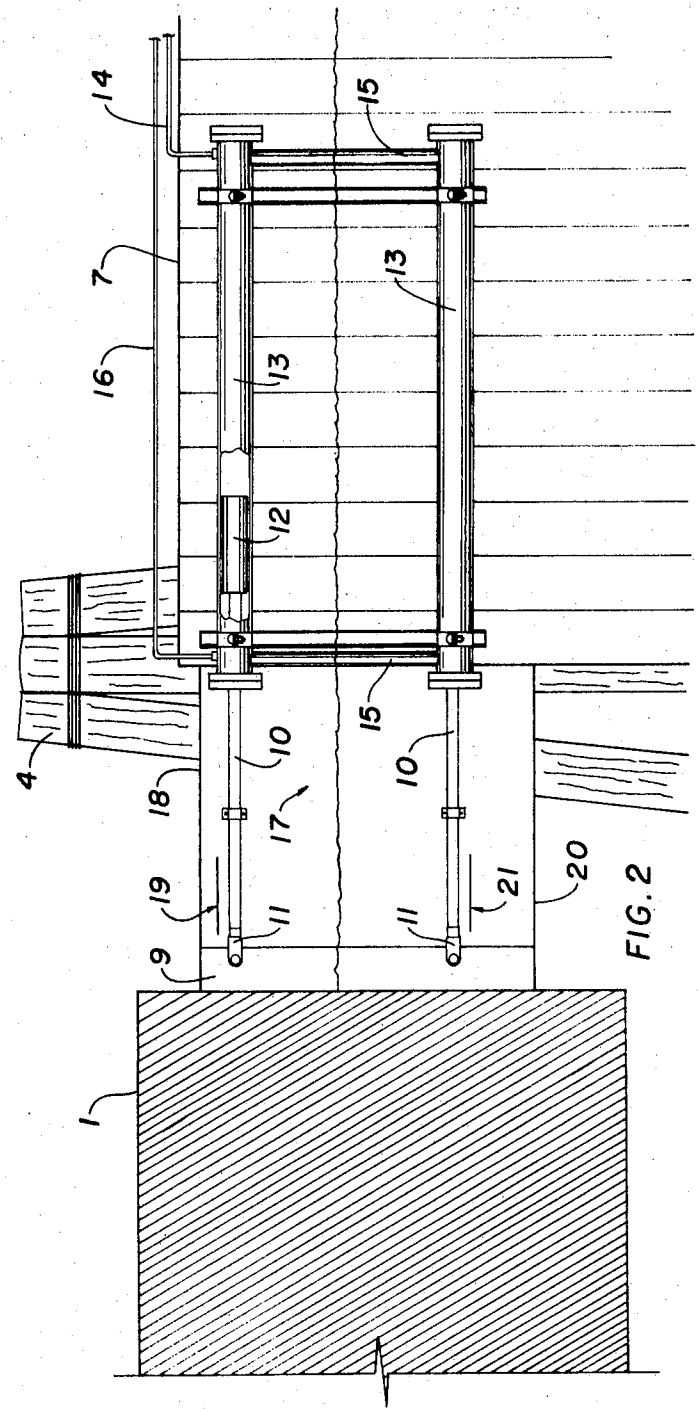



FIG. 2

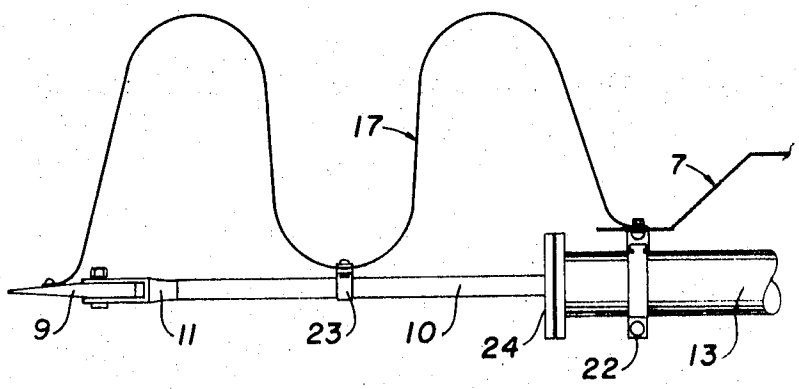



FIG. 4

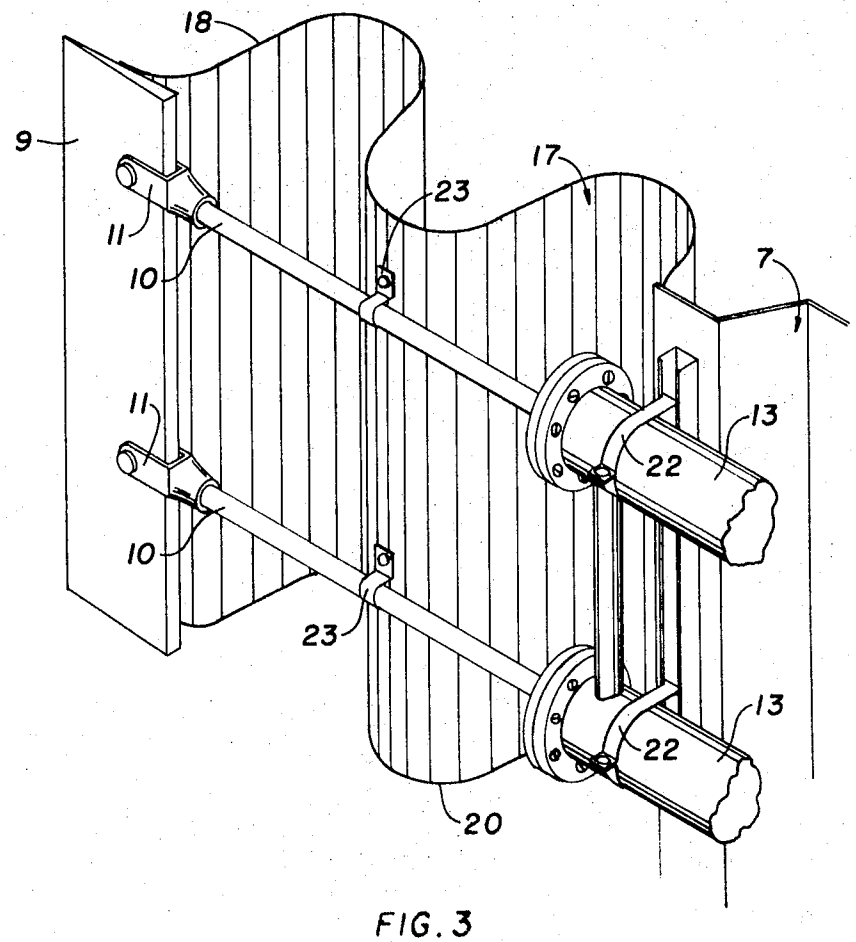



FIG. 3

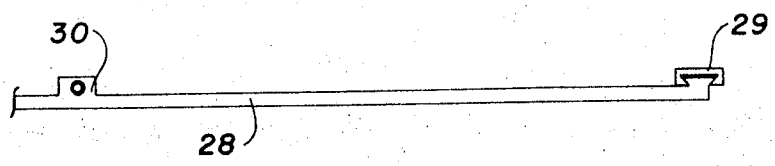



FIG. 8

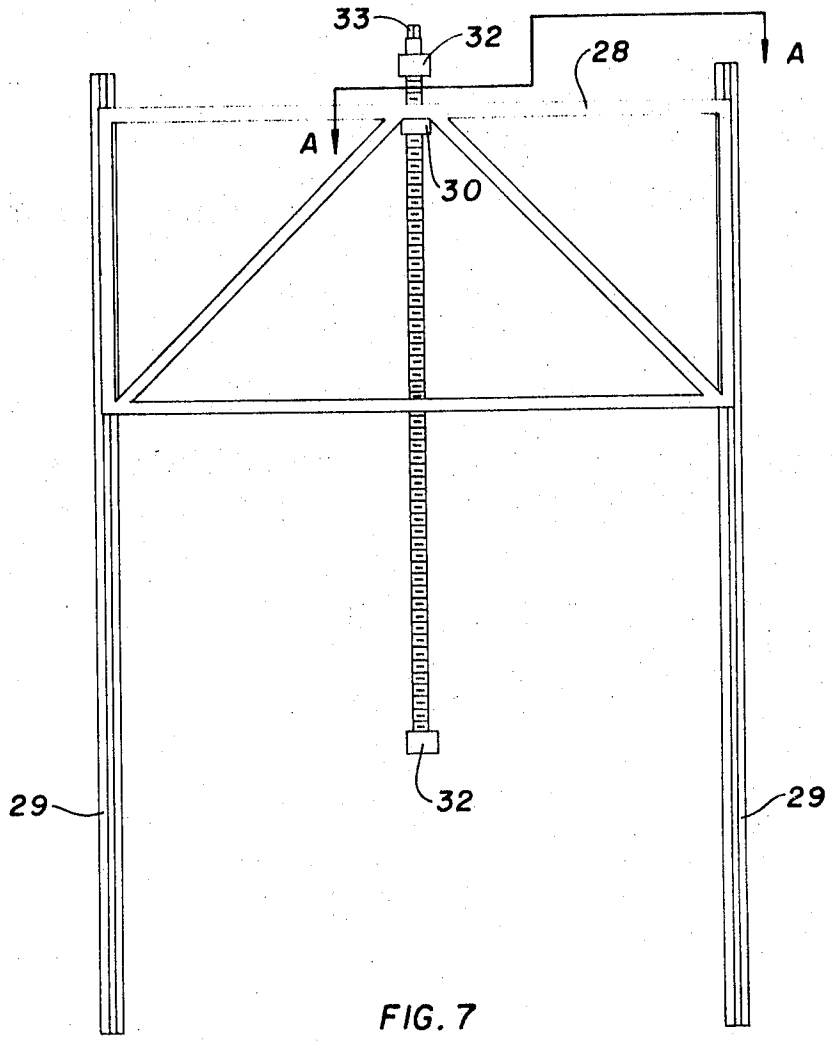



FIG. 7

# OIL SPILLAGE ENCLOSURE SYSTEM FOR MARINE USE

## BACKGROUND OF THE INVENTION

One known means of containing oil about an oil transfer facility utilizes an elongated floating boom structure to surround the vessel.

Floating booms generally comprise of a curtain suspended in the water by surface floats in end-to-end relation, these booms being connected along one edge of the curtain and ballasts being connected along the opposite edge to hold the curtain in a generally upright position with portions of the curtain extending below the water's surface.

The most pertinent prior art is U.S. Pat. No. 3,146,598. This patent discloses buoyant floats connected in spaced relation to a flexible sheet for surrounding a moored vessel and subsequently storing the boom pleated in side-by-side sectional relation.

This type of boom was quite long and clumsy to handle, and required a powerboat and a crew of men to position the boom prior to transferring the oil and again after transferring the oil.

## BRIEF DESCRIPTION OF THE INVENTION

An enclosure system for containing floating material on a body of water between one side of a ship's hull and an adjacent mooring barrier comprising a pair of barriers expandable along the length and extending in height below and above the surface of said body of water, each barrier laterally separated from each other and connected at one end to said mooring barrier. Each barrier at one end has a bumper means which engages with the hull of the vessel preventing oil from escaping between bumpers and the ship's hull. A retractable and extendible tensioning support means support barrier above and in the water while providing tension to retain the bumper in contact with the ship's hull regardless of the lateral motion of the ship.

It is the object of this invention to provide an oil containment system that is permanently attached to the transfer facility that can be positioned by a single man utilizing a power assist.

Another object is to provide a closure device that maintains a seal between the vessel and the transfer facility as the vessel ascends, descends, and moves laterally during the transfer of oil and as the vessel moves about its restraints.

It is a further object to provide a closure device with means to conform to the tidal elevation either by manual positioning or automatic control.

A still further object is to provide means to raise the closure device to minimize corrosion and marine growth on the portion of the closure device that necessarily must be submerged during operation.

And yet, still another object of this invention, is to provide an enclosure device that may be utilized in a marine environment for the containment of floating waste material.

In accordance with these and other objects which will be apparent hereinafter, the instant invention will now be described with particular reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an angular perspective of a barge at a transfer facility.



FIG. 2 is a partial elevation of the closure device.

FIG. 3 is a fragmentary pictorial of the closure device.

FIG. 4 is a plan view of the closure device.

FIG. 5 is a pneumatic control diagram showing the control valve in the extended position.

FIG. 6 is a pneumatic control diagram showing the control valve in the retracted position.

FIG. 7 is an elevation of a vertically adjustable mounting bracket.

FIG. 8 is a view of section A-A.

## Preferred Embodiment of the Invention

Referring to FIG. 1, the barge 1 is shown in position to transfer oil to the unloading dock 2 through a hose 3. Restraints are attached to bumper dolphins 4 to secure the barge. Applicant's invention, closure device 5 is provided on each side of the hose handling area 6. Sheet piling 7 supports the closure devices and extends to the sea wall or shoreline 8 to enclose the hose handling area.

Referring to FIG. 2, bumper means such as blade 9 contacts the barge 1 vertically. The area of the blade 9 in contact with the barge is minimized to reduce the force on the arms 10 generated when the barge moves. The blade is attached to each arm by clevis 11. Each arm is attached to a piston 12 which slides within a cylinder 13. Air is introduced through the air-to-extend inlet 14 and applies pressure on the piston 12 which extends the arms until the blade contacts the barge, sealing the containment. Air pressure is equalized between the cylinders through an interconnecting pipe 15 on each end. Air is introduced through the air-to-retract 16 to retract the blade to its stored position. A flexible curtain 17 is attached to the blade 9 on one end and to the sheet piling 7 on the other. The upper edge of the curtain 18 is above the high tide level 19. The lower edge of the curtain 20 is below the elevation of the bottom of the unloaded barge at low tide 21 minus the depth of oil to be contained.

Referring to FIG. 3, the cylinders 13 are supported by pipe clamps 22 bolted to the sheet piling 7. Sliding loops 23 are attached at the midspan of the curtain 18 and slide along the arms 10 to secure the curtain against wave action and to ensure the curtain remains upright.

Referring to FIG. 4, the blade 9 is attached to each arm 10 by clevis 11 which is pinned to allow the barge to roll while maintaining the blade parallel and in contact with the side of the barge. The curtain 17 is attached to the blade 9 on one end and the sheet piling 7 on the other. A flange 24 is provided to support the arm 10 and to seal the air within the cylinder 13.

Referring to FIG. 5, air is supplied to an adjustable pressure regulator 25. A pressure relief valve 26 is provided to relieve pressure in the event the barge moves in such a manner as to cause a pressure increase in the cylinders. A two-gang three-way valve 27 is provided to control air to the cylinders. The control valve 27 is shown in position to introduce air to the cylinders through the air-to-extend inlet 14 and exhaust air from the air-to-retract inlet 16.

Referring to FIG. 6, the control valve 27 is shown in position to introduce air to the cylinders 13 through the air-to-retract inlet 16 and exhaust air from the air-to-extend inlet 14.

In operation, the curtain and the bumper blade effectively seal the area between the ship, the barriers, and the mooring by keeping the blade tensioned against the ship's hull. This is accomplished by a rectractable and extendible force created on the pistons in the air cylinder chamber. The air pressure is regulated by a control device which may be of any suitable means to properly control the air pressure in the cylinder to maintain sufficient force on the pistons to keep the arm, and therefore the blades, and resiliently against the ship's hull. Although a pneumatic tensioning device has been utilized, any suitable equivalent could be used that would hold the curtain and barrier against the ship's hull. It is also possible that the device could be used between two ships having the supporting means which include the arms and the pneumatic tubes coupled to one ship rigidly while flexibly engaged to the hull of the adjacent ship.

Referring to FIG. **7**, a vertically adjustable mounting bracket **28** is shown in the raised position. Tracks **29** are provided on each end of the bracket. A follower **30** is attached to the mounting bracket **28** and engages a jackscrew **31** held in place by pillow blocks **32** at each end. A driver connection **33** at the end of the jackscrew **31** provides suitable attachment for either a handwheel or motor operator.

It is contemplated that the mounting bracket could be positioned manually utilizing a handwheel. The mounting bracket could also be positioned automatically utilizing a level transmitter switch sensing the tide level, or a remote control switch, to signal a motor operator on the jackscrew driver.

The instant invention has been shown and described herein in what is considered to be the most practical and preferred embodiment. It is recognized, however, that departures may be made therefrom within the scope of the invention and that obvious modifications will occur to a person skilled in the art.

What I claim is:

**1.** An enclosure system for containing floating material on a body of water between one side of a ship's hull and an adjacent mooring barrier comprising:

a pair of partitions expandable in length and extending in height below and above the surface of said body of water, each partition laterally separated from each other and connected at one end to said mooring barrier;

a pair of bumpers, one of said bumpers coupled to the free end of each partition engageable with said ship's hull;

a pair of partition support means, one of said support means coupled at one end adjacent the bumper end of a different partition; and

a pair of tensioning means coupled to said mooring barrier each connected to a different one of said support means for holding each bumper in engagement with said ship's hull regardless of the motions of said ship whereby floating material is contained between said hull, said partitions and said mooring barrier.

**2.** An enclosure system, as in claim **1**, wherein:

each tensioning means includes an arm rigidly coupled to one support means, of said a piston attached at one end of said arm, an air cylinder chamber, a source of air coupled to said air cylinder chamber, and a control means for regulating pressure of air in said chamber acting on said piston in accordance with movement of said piston.

**3.** An enclosure system as in claim **2**, wherein: said bumper is blade shaped.

**4.** An enclosure system, as in claim **1**, including:

means for adjusting said partitions and said bumpers vertically in height, whereby tidal variations in said body of water may be compensated relative to said partitions and said bumpers to position said partitions and said bumpers below and above the surface of said body of water.

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