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United States Patent**5,697,313****Horn , et al.****December 16, 1997******Please see images for: (Certificate of Correction) ****

Barge and walkway connection system

Abstract

A modular pump barge and walkway system having a modular subsystem of pump barges and a modular subsystem of walkways releasably attached thereto. Each of the pump barges has a top deck and four side walls, wherein each of two oppositely disposed side walls has a recess disposed therein with a bottom shelf and a pair of holes. Each of the barges has a link pin assembly for interconnecting with an adjacent barge, comprising a support plate and a pair of vertically disposed pins, the support plate arranged so as to be removably attachable to the top deck so as to cover the recess, the pins being disposed so as to be mated with and removably inserted into the pair of holes disposed within the bottom shelf of the recess when the support plate is attached to the top deck. A link plate has a pair of parallel slots juxtaposed so as to allow placement therethrough of the pins of the link pin assembly, the link plate being removably and slidably inserted between the support plate and the bottom shelf of the recess when the link pin assembly is attached to the barge. Thus, the link plate provides interconnection of adjacent barges with independent vertical translational movement therebetween. The modular subsystem of walkways also has a plurality of floating walkways interconnected to each other in serial fashion at each of two oppositely disposed ends thereof in pivotable hinged relationship therebetween.

Inventors: **Horn; Dennis W.** (Glendale, AZ), **Sheperd; Matthew** (Vancouver, WA)**Assignee:** **Laird Plastics, Inc.** (Seattle, WA)**Family ID:** 24102784**Appl. No.:** 08/527,752**Filed:** September 13, 1995**Current U.S. Class:** 114/77R; 114/266**Current CPC Class:** B63B 3/08 (20130101); B63B 35/28 (20130101); B63B 35/34 (20130101); B63B 35/44 (20130101)**Current International Class:** B63B 35/28 (20060101); B63B 3/08 (20060101); B63B 3/00 (20060101); B63B 35/44 (20060101); B63B 35/00 (20060101); B63B 35/34 (20060101); B63B 003/08 ()**Field of Search:** ;114/77R,266,26,263,44,45 ;405/219,220 ;14/27**References Cited** [\[Referenced By\]](#)**U.S. Patent Documents**[2518091](#)

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3. The modular system of claim 2 in which each of said two oppositely disposed side walls comprise a pair of said engagement means.

4. A floating barge comprising:

(a) a top deck;

(b) four side walls, wherein each of two oppositely disposed side walls have a pair of recesses disposed therein, each recess having a bottom shelf with a pair of holes disposed therein:

(c) a link pin assembly associated with each recess, said link pin assembly comprising a support plate and a pair of pins disposed perpendicularly thereto, said support plate arranged so as to be removably attachable to said top deck so as to cover said recess, said pins being disposed so as to be mated with and removably inserted into the pair of holes disposed within the bottom shelf of said recess when said support plate is attached to said top deck; said barge further comprising in association therewith a link plate comprising a pair of parallel slots juxtaposed so as to allow placement therethrough of said pins of said link pin assembly, said link plate being removably and slidably inserted between said link pin assembly and said bottom shelf of said recess when said link pin assembly is attached to said barge so as to provide independent vertical translational movement between said link plate and said barge.

Description

BACKGROUND OF THE INVENTION

The present invention relates generally to floating pump barges and walkways and in particular to a modular barge and walkway system with improved interconnection devices.

Pump barges are floating platforms typically used in the mining industry to support large pump and motor assemblies which transport solvent from a leaching pond to a processing plant. Walkways are platforms used to transport personnel between the shore and the barges as desired. In the past, pump barges were often constructed in a custom manner depending upon the requirements of a particular user; i.e. active sites having multiple pump requirements often necessitated large custom made barges to house the pumps. In addition, walkways were constructed to suit the layout of a particular job site and the designs were often not reusable.

When multiple barges and walkways were implemented in the past, most were interconnected by means of rope and cleat arrangements. Tying barges together with rope did not allow the barges to list, heel, or vertically translate independent of each other, which types of relative motion is often desirable in multiple barge environments. Tying walkways together with rope did not provide proper weight distribution amongst the various sections and led to unstable operating conditions.

It is therefore an object of the present invention to provide a pump barge and walkway system which overcomes these and other disadvantages of the prior art.

In particular, it is an object of the present invention to provide a modular pump barge and walkway system which is easily configured to the requirements of a particular setting and which can be configured and installed from a combination of readily available modular units as required.

It is a further object of the present invention to provide an improved means for interconnecting pump barges which allows for quick and simple interconnection of multiple barges.

It is a still further object of the present invention to provide an improved means for interconnecting floating walkways which allows for quick and simple interconnection of multiple walkway modules.

SUMMARY OF THE INVENTION

barge 4 may be removed and another one inserted in its place. In addition, the links of the present invention allow the barges to be maintained in relation to each other yet allow independent vertical movement of any barge. This is particularly useful when less than the full set of pumps are operated at one particular time. For example, if one pump is turned on and the other pumps are left in the off state, the barge which is operational will tend to sink in relation to the other barges. The vertical freedom obtained by the present link connection allows this independent vertical translation to occur.

Turning to the walkway subsystem 5, the hinge connectors 10 used to interconnect adjacent walkways 6 are common to the walkway configurations and are shown in detail in FIGS. 5 through 8. As used herein, the designation "walkway 6" refers to a typical walkway with elements common to all walkways 6a, 6b, 6c, 6d and 6e. Except where noted below, each walkway 6 is provided with interlocking pivoting hinge type assemblies at opposite ends for interconnection with other walkways in a serial manner. Walkway 6 has at one end a pair of semicircular hinge members 58 disposed with three gaps 56 as shown in the Figures. At the other end of the walkway 6 are three semicircular hinge members 54 spaced by two gaps 60. The hinge members 58 are disposed to mate with the opposing gaps 60, and the hinge members 54 are disposed to mate with the opposing gaps 56 to form a hinge-like configuration.

Each hinge member 54 and 58 has bored therethrough a circular opening 62. When the hinge members are aligned properly, a hinge pin 50 may be inserted through the entire assembly along with spacing washers 52. The hinge pin 50 is kept in place by means of a pair of bolts 64 and nuts 66.

The walkway hinge members 54 and 58 are of integral construction with the walkway 6. This allows for quick and simple interconnection of walkways as required. By using the interconnecting hinge members as shown, loads on any one walkway are distributed throughout the walkway subsystem, leading to increased stability.

Of critical importance in the present invention is the use of a material which is resistant to corrosion in solvents typically found in leaching ponds. Thus, the integration of the hinge members 54 and 58 with the body of the walkway in the unitary construction of the present invention allows the hinge members 54 and 58 to be constructed of the preferred FRP material shown to have such advantageous anti-corrosive properties heretofore unachieved by platform or walkway interconnection methods of the prior art.

In order to enhance further the stability of the walkway system, outriggers 70 are used at each corner of walkways 6b and 6c. These outriggers 70 are integral with the shell of the walkways to provide the same anti-corrosive properties obtained thereby.

FIGS. 9(A) and 9(B) show the shore walkway 6a used in the present invention. This walkway is comprised of a body 72 with an upwardly sloping top 74 to allow easy transport between the shore and the span walkways 6b. A removable railing section 76 is attached on each side of the walkway 6a. The shore walkway 6a is hinged at only one end as shown in the Figures.

Common to all walkways 6 is the use of cable struts 78, which are generally laid across the width of the walkway 6 as shown for example in FIGS. 10(A) and 10(B) to provide support for the electrical cables (not shown) which run from the pumps mounted on the barges 4 onto the shore. A grating 80 is laid atop a pair of oppositely disposed shoulders 57, leaving a rectangular cross-sectional gap between the bottom of the grating 80 and the cable struts 78 for placement therethrough of the cables. The grating 80 is of open lattice construction to allow for the passage therethrough of air for cooling of the cables.

FIGS. 10(A) and 10(B) show the span walkway 6b used in the present invention. Outriggers 70 are located at each corner of the walkway in order to provide floating stability. The span walkway 6b has hinge members at both ends in order to allow interconnection of as many such walkways in serial fashion, as required by the location of the pump barges in the leaching pond relative to the shore.

FIGS. 11(A) and 11(B) show the span interconnecting walkway 6c. At one end of the span interconnecting walkway 6c are hinge members 58 for interconnection with a mating span walkway 6b. At the opposite end are a pair of bumpers 16 and a pair of cleats 18, which allow interconnection by rope with an adjacent barge interconnecting walkway 6d at a right angle as shown in FIG. 1. Outriggers 70 are also located at each corner for floating stability in the same manner as the span walkways 6b.

