United States Patent [19]

Hetmanski

[11] 3,735,440

[45] May 29, 1973

[54] RAMP ENGAGEMENT DEVICE

[76] Inventor: **Casimir Hetmanski,** 421 Kimball Avenue, Westfield, N.J. 07090

[22] Filed: **July 21, 1971**

[21] Appl. No.: **164,629**

[52] **U.S. Cl.** **14/71**

[51] **Int. Cl.** **B65g 11/00**

[58] **Field of Search** 14/71, 1, 36, 72

[56] **References Cited**

UNITED STATES PATENTS

3,296,639	1/1967	Pawlus	14/71 X
2,828,497	4/1958	Matthews	14/71
2,750,609	6/1956	Jaseph	14/71
2,687,617	8/1954	Newell	14/1 X
2,585,695	2/1952	Snow	14/71
3,031,701	5/1962	Fenton	14/71
3,468,280	9/1969	Williams	14/71 X

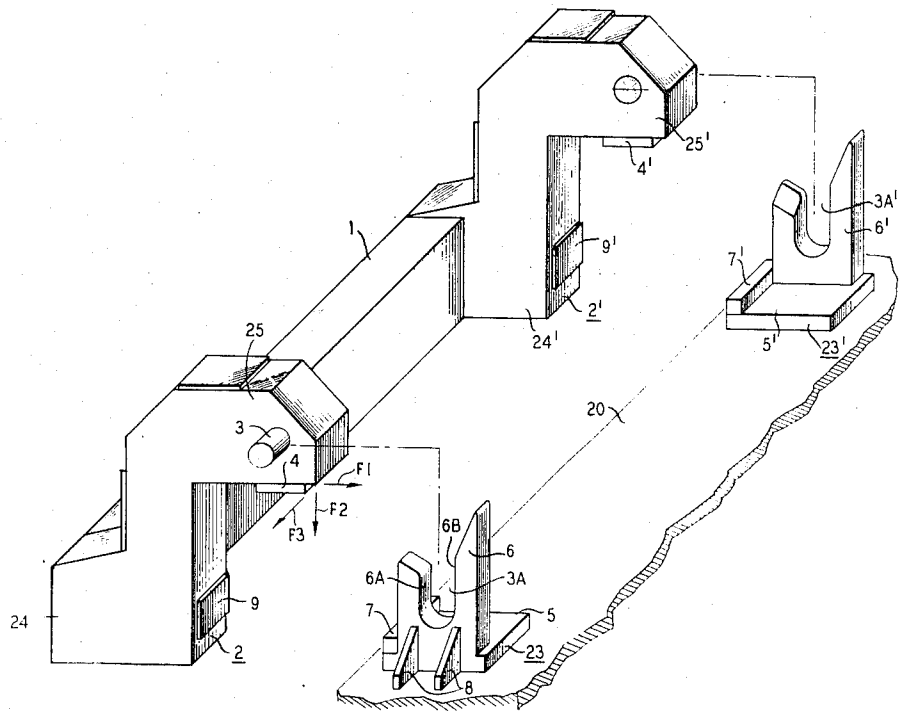
Primary Examiner—Nile O. Byers, Jr.

Attorney—David H. Tannenbaum

[57] **ABSTRACT**

An arrangement for releasably securing together heavy structures, such as a ramp and a ship, is taught utilizing a distributed engagement device. One portion of the device is carried on a free end of the ramp while the other portion of the device is mounted on the ship deck. The ramp portion of the device is constructed with a mating structure having a particular geometry, and the deck portion of the device is constructed with a mating surface having a negative geometry from that of the ramp mating structure. Bearing surfaces are positioned on the ramp portion of the device and on the ship deck in a manner substantially to eliminate the transmittal of loading forces through the mated device.

11 Claims, 8 Drawing Figures



PATENTED MAY 29 1973

3,735,440

SHEET 1 OF 2

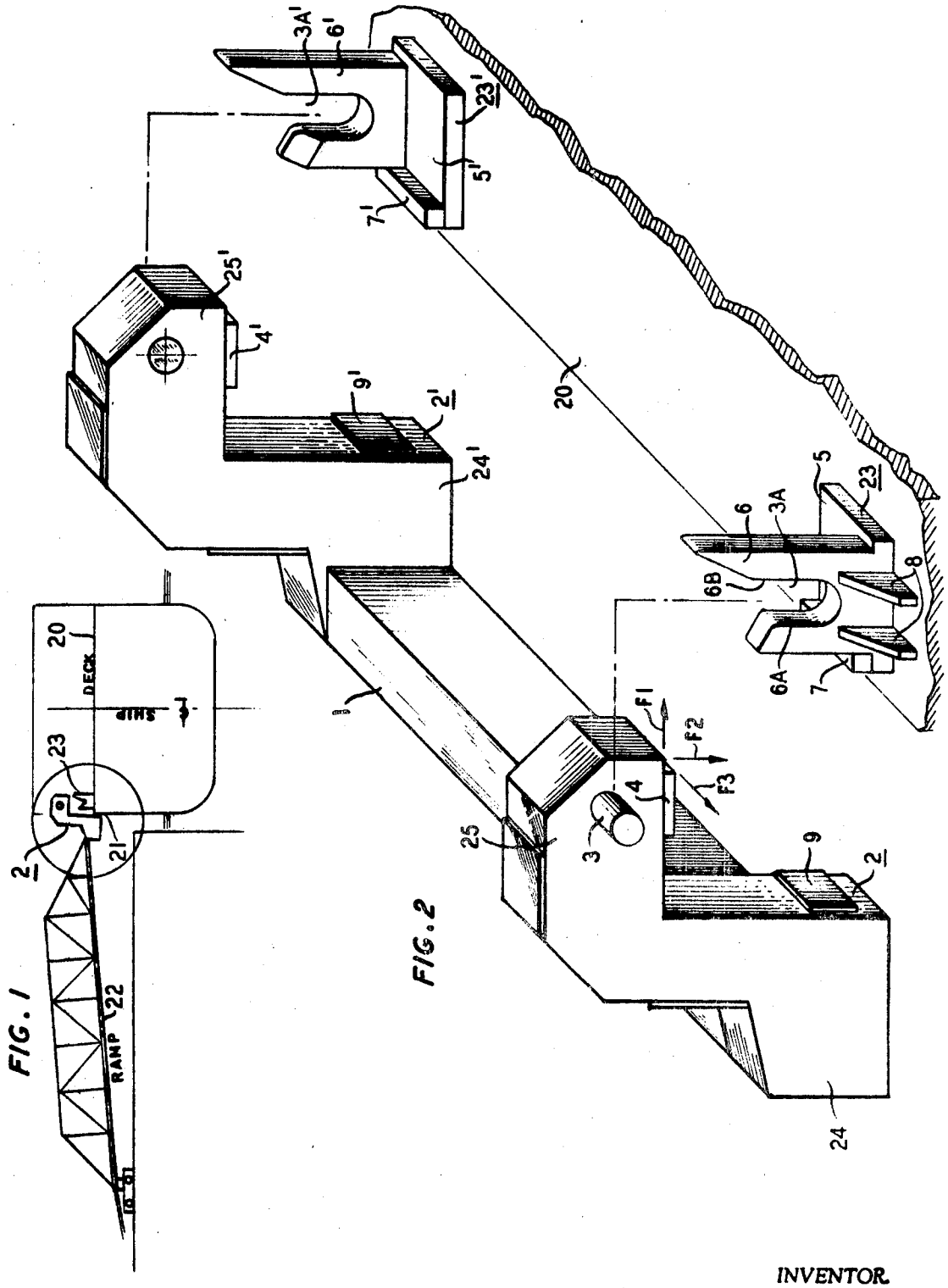


FIG. 2

FIG. 1

INVENTOR.
CASIMIR HETMANSKI
BY
David K. Tannenbaum

FIG. 4A

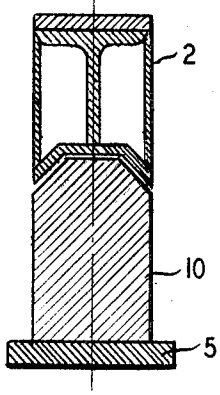
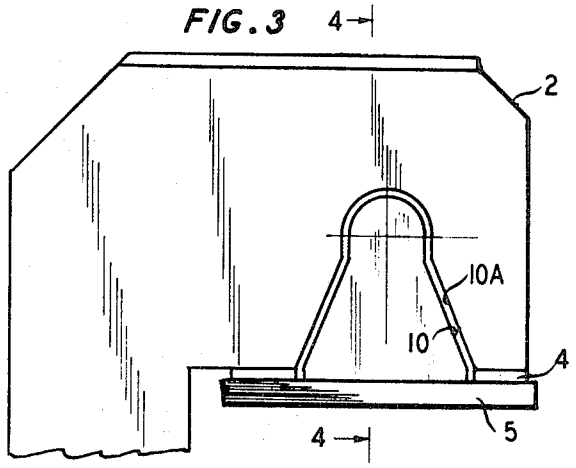


FIG. 3



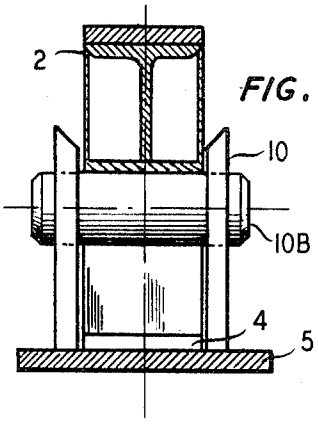


FIG. 4C

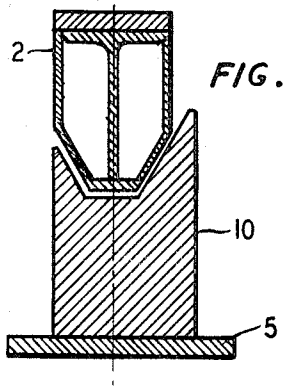


FIG. 4B

FIG. 6

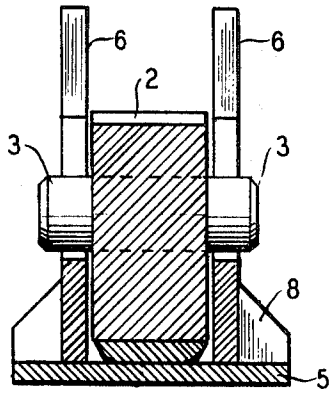
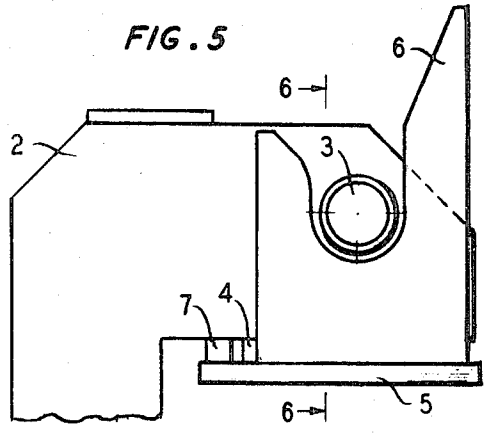
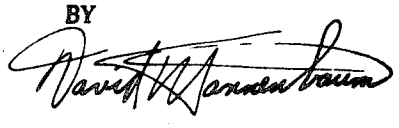


FIG. 5



INVENTOR
CASIMIR HETMANSKI

BY



RAMP ENGAGEMENT DEVICE

FIELD OF THE INVENTION

This invention relates generally to an arrangement for releasably securing heavy movable structures to other structures for temporary periods of time and more particularly to a device arranged to achieve a reliably mated connection between two objects having wide positional tolerances therebetween.

BACKGROUND OF THE INVENTION

A number of years back a person walking along a pier could observe large numbers of men moving in all directions carrying heavy loads up and down gangplanks between the decks of ships and the pier. Mechanical advantage, in the form of derricks mounted either on the pier or on the ship, was applied only to the heaviest of tasks. Over the years it has become the practice to use motive power in the form of highway trailers or other rolling equipment to move heavy loads of cargo over ramps, or bridges positioned between the pier and the ship deck.

Thus it is necessary when a ship reaches a pier to attach one or more ramps to the deck of the ship. These ramps, of course, are massive structures capable of supporting the combined weight of several highway trailers. Once attached to the ship, the ramp must be securely held thereto while still allowing relative motion to occur between the ship and the pier. Account must also be taken of the effect of the ebb and flow of the tides if loading is to continue uninterrupted for long periods of time. Of course, positive engagement is essential if safe working conditions and safe delivery of the cargo is to be expected.

Prior art engaging devices, of which there have been numerous designs and attempts at designs in the course of the years, have failed to achieve all of the objectives required of such devices. These devices have failed, not so much because of a lack of design, but primarily because the designer overlooked or did not take into account all of the very complex variables involved in maritime activities. For example, one such prior engaging arrangement utilizes a plurality of locking mechanisms each weighing some tons and each mounted over the side of the ship so as to maintain the deck clear for the movement of cargo. When the vessel is underway waves catch on the overhanging structures and throw large amounts of spray up over the deck, damaging the cargo and seriously affecting the navigability of the vessel. In addition, such over-the-side arrangements must, of necessity, be connected to the ship's superstructure and thus are costly to repair and install. In those devices using complicated moving parts or latching mechanisms, corrosion soon interferes with the operation of the device, thereby decreasing reliability and increasing the effort required to effect a positive engagement.

Accordingly, it is an object of my invention to provide an arrangement for positively securing a movable ramp to another object, such as a ship, barge, or pier, quickly and with a minimum of positioning effort required between the ramp and the connecting object.

It is a further object of my invention to teach the use of an engaging device for releasably connecting a ship to a pier mounted ramp, the device being of simple construction, having minimum weight and bulk, easily accessible for inspection, and having minimum susceptability to corrosion damage and which does not interfere with navigation, or with the ship's internal structure.

SUMMARY OF THE INVENTION

These and other objects are obtained in accordance with one aspect of my invention wherein a ramp is pivotally attached to a pier at one end, the other end swinging free. The free end of the ramp is fitted with one or more shaped mating ends, such as a large pin, or pins, each extending outward from a side of the ramp end. The ship deck or other object to be attached to the ramp is arranged to carry a mating receptacle for receiving the ramp mating end supplied thereto in a downward manner. Once engaged, the mating parts can not become disengaged until the ramp end is lifted away from the ship deck, an operation which requires the application of positive upward force on the ramp to over come the weight of the ramp.

DESCRIPTION OF THE DRAWING

The operation and utilization of my invention will be more fully apparent in the following description of the drawing in which:

FIG. 1 is a schematic representation showing a ramp positioned over the deck of a ship;

FIG. 2 is a prospective view of a crossbeam for attachment to the free end of the ramp, the crossbeam carrying two arms each with a mating structure in mated relationship with a separate deck receiving mating structure; and

FIGS. 3 through 6 show the geometries of other possible mating structures.

DETAILED DESCRIPTION

As shown in FIG. 1, the free end of ramp 22 is attached to an arm 2 of my inventive device, the whole structure being positioned directly above the deck receiving block 23 and perpendicular to the deck surface 20 to which that block is secured. As will be seen from that which follows, the position and relationship in which the elements 2 and 23 are shown in FIG. 1 is the only positional relationship between the elements which will effect a mated relationship between the mating structures of my device.

FIG. 2 shows the two distributed portions of my device in more detail. In one embodiment, the crossbeam 1 is adapted for connection to the free end of a ramp and adapted for carrying at a side thereof at least one arm 2. Arm 2 has a lower portion 24 having a force bearing surface 9 attached thereto and an upper portion 25 having another force bearing surface 4 attached thereto. Portion 25 of arm 2 carries a first mating structure, such as structure 3, having a particular peripheral or circumferential geometry, the particular circumferential geometry of mating structure 3 being round. Portion 25 of arm 2 is positioned above and in front of crossarm 1 so that when the free end of the ramp 22 is positioned against the ship, force bearing surface 9 contacts the side 21 of the ship while force bearing surface 4 is positioned over the deck and directly over mating structure 23.

In one embodiment of my invention, another similar arm 2' (the mirror image of arm 2) is positioned at the other end of the crossbeam 1, the area between the respective arms being maintained free for the passage of cargo therebetween. The exact distance between the bottom of the force bearing surface 4 or 4' and the top

of the crossbeam 1 is determined by the geometry of the ramp to which the beam is to be connected and is determined so that the top surface of the fully mated ramp is flush with the deck surface. In a typical example, the crossbeam would be 22 feet wide and the arm would extend 3 feet above the top of the crossbeam.

Also, as shown in FIG. 2, receiving block 23 is positioned for attachment to the ship deck at a point under which force bearing surface 4 of arm 2 would contact the ship deck, while receiving block 23' is attached to the ship deck at a point under which force bearing surface 4' of arm 2' would contact the ship deck. Receiving block 23 carries a vertical structure 6 adapted for receiving the mating structure 3 of arm 2. In the situation shown, where the first mating structure 3 is a round pin, the second mating structure 6 defines a slot 3A having an open end perpendicular to the deck of the ship for receiving pin 3 only when that pin is positioned almost directly above the deck and approaches the deck at that point with a substantially downward motion. Pin 3 is carried by arm 2 such that force bearing surface 4 strikes the surface of block 5 before the bottom portion of pin 3 strikes the bottom portion of slot 3A. Thus, as will be seen, when the pin is positioned within the slot in mated relationship therewith, no loading forces are transmitted between the pin and the slot walls. Accordingly, the size of the mating parts can be maintained relatively small compared to the size and weight of the load while still maintaining the entire structure operationally safe.

When the ramp is in the engaged position, the forces present can be thought of as being in roughly three directions as shown by force vectors $f1$, $f2$, and $f3$. I have taken advantage of these force vectors by positioning force bearing surfaces 4 and 9 for contact with the ship such that these surfaces insure than the components of these force vectors are not transmitted to the ship through pin 3 and slot 3A. For example, force vector $f2$ is controlled by force bearing surface 4 and thus this force vector is not transmitted to the ship deck through pin 3 and slot 3A. Similarly, force vector $f1$ is controlled by surface 9 in conjunction with the ship side 21 and in conjunction with pin 3 moving against the front wall of slot 3A while force vector $f3$ is controlled by arm 2 in conjunction with slot structure 6. It should be noted that when surface 9 moves against the ship side a force moment is created and pin 3 tends to move back against the front wall 6A of slot 3A. Part of this force is relieved by friction forces generated between surfaces 4 and 5 and also relieved by surface 4 moving against block 7. Thus slot 3A and pin 3, when in mated relationship, only must withstand the forces generated when the ship rocks away from or moves closer to the pier or when the ship moves laterally with respect to the pier. These forces are easily controllable since they are transient in nature and not nearly as great as the load bearing forces encountered in such an environment. Stiffeners 8 are provided for added support if necessary and may be positioned where local conditions dictate. A typical receiving block for use with the typical crossbeam structure discussed above would weigh 1 ton and would have slot dimensions of 7 inches in width and 3 feet in length.

Base plate 5 can be omitted when the deck plating is sufficiently strong to withstand the loading forces transmitted thereto, however, such operation is not recommended. Bearing surface 4 may be tapered or adjusted to provide sufficient bearing area for each arm. Sheer blocks 7 are pieces of square bars welded to base plate 5 and act as stoppers to prevent the bearing pads 4 from sliding off the ship. This constitutes a second or standby hooking arrangement in addition to the engagement of structure 3 into slot 3A of structure 6. The forward wall 6A of structure 6 is lower than the rear wall of that structure so as to facilitate positioning and to allow a mating positional relationship slightly less perpendicular than would be required when both walls are of equal size. In addition, the lower front wall 6A of structure 6 allows arm 2 mating surface 3 to be moved horizontal until surface 3 hits the rear wall 6B of structure 6. The ramp is then dropped into place. A tapered portion of structure 6, shown on the front wall of structure 6', assists in the mating operation. In addition, ramp entrance guides having 35° gathering slopes can be attached to the ship side to accomplish a preliminary alignment for the ramp. The guides would be positioned outward of each arm and would serve to move the arm into mating relationship.

Although the present invention has been described and illustrated with preferred embodiments, it is to be understood that modifications and variations based on a variety of operating and engineering criteria may be resorted to without departing from the spirit of my invention, as those skilled in this art will readily understand. For example, the embodiments of FIG. 3, 4A, 4B, and 4C show an inverted type of engagement. The hooking block 10 has a trapezoidal shape with a rounded top. It is welded to the base plate 5 to fit the matching engagement slot 10A cut into arm 2. FIG. 4A shows one solution to section 4 — 4 of FIG. 3 and includes the inside tapering from off center-down, which should facilitate the alignment or the gathering of the ramp.

FIG. 4B is an alternate solution to section 4 — 4 of FIG. 3 showing a tapering from off center-up. FIG. 4C indicates, that the block 10 of FIG. 3 can also be made out of a pin 10B supported by two trapezoidal brackets on both ends. This solution may be more economical for smaller and lighter ramps.

The embodiment of FIG. 5 and 6 shows the same type of engagement as shown in FIG. 2, except that pin 3 extends on both sides of arm 2. Two engagement structures 6 separated by an area sufficient to receive surface 4 are required. This type of engagement has the advantage of being symmetrical about the center axis of each arm for increased reliability, especially from lateral movement. Also, note that the surface 4 has been shown with rounded sides thus more easily maintaining a friction and force bearing contact with surface 5 during any rocking or trim motion of the vessel.

One very important feature of my invention is that the portion of my device which is mounted on the ship is not of substantial size or weight and has a minimum cost. This is important because of the relatively large number of ships as compared to ramps. Also, since maritime vessels move around the world from one port to the next, it is essential that any pier locking device be constructed for easy adaption to any ship locking device. I have achieved this result.

What is claimed is:

1. An arrangement for releasably connecting a first structure to a second structure comprising

a first arm extending from a free end of said first structure, said arm having attached thereto a first

mating structure having a particular circumferential geometry, said first mating structure maintained in a position forward and above said free end of said first structure,

said arm also having a first load bearing surface attached thereto, said first load bearing surface being separate from said first mating structure,

a first receiving block attachable to said second structure, said first receiving block defining a second mating structure, having a geometry adapted to receive in mated relationship therewith said first mating structure only when said first and said second mating structures are brought into mating relationship from a position substantially perpendicular to the point where said block is attachable to said second structure,

said first receiving block defining a second load bearing surface positioned such that when said first mating structure is in mated relationship with said first receiving block said first and second load bearing surfaces are in contact with one another thereby substantially eliminating the transmission of loading forces through said mating structures.

2. The invention set forth in claim **1** wherein said first mating structure is a pin having a round shaped geometry and wherein

said second mating structure defines a slot having its open end facing the direction from which said mating relationship is achieved.

3. The invention set forth in claim **1** wherein said first structure is a ramp having a top surface and wherein said second structure is a ship having a deck,

said first receiving block attachable to said deck at a point of said deck relatively near a side of said ship so that said second mating structure receives said first mating structure at a point where said ramp free end is substantially against said ship side and said ramp top surface is at a level flush with said deck.

4. The invention set forth in claim **3** further comprising a third load bearing surface and wherein said third load bearing surface is positioned at a leading end of said arm and in a position below said ramp end for contact with said ship side when said first mating structure is in mated relationship with said second mating structure, said third load bearing surface operative in conjunction with said first and said second load bearing surfaces for creating a force moment between said load bearing surfaces.

5. The invention set forth in claim **1** further comprising

a second arm extending from said free end of said first structure and spaced apart from said first arm a distance determined by the width of said free end of said first structure, said second arm having attached thereto a third mating structure having a particular geometry,

said arm having a fourth load bearing surface attached thereto, said fourth load bearing surface being separate from said third mating structure,

a second receiving block attached to said second structure at a point separated from said first receiving block a distance determined by the width of said free end of said first structure, said second block defining a fourth mating structure having a geometry adapted to receive in mated relationship therewith said third mating structure only when said third and fourth mating structures are brought into mating relationship from said direction from which said mating relationship is achieved, said second receiving block defining a fifth load bearing surface positioned such that when said third mating structure is in mated relationship with said second receiving block said fourth and fifth load bearing surfaces are in contact with one another thereby substantially eliminating the transmission of loading forces through said mating structures.

6. A device for temporarily connecting a free end of a ramp to the deck of a ship for the passage between a pier and the ship deck of heavy rolling machinery, said device comprising

a crossbeam adapted for rigid attachment to the free end of said ramp,

an arm affixed to an end of said crossbeam, said arm having a first section extending upward from said crossbeam and a second section extending forward from said crossbeam,

said second section having affixed thereto a first mating surface adapted for insertion into a mating block attached to the ship deck only when said mating surface and said mating deck block are brought together in a certain positional relationship, and

a load bearing surface mounted under said second section of said arm in a manner such that when said mated surface is in a mated relationship with said mating block, said load bearing surface is supported by said ship deck thereby relieving said mating surface of substantially all loading forces.

7. The invention set forth in claim **6** wherein said crossbeam has a length substantially equal to the width of the free end of said ramp

a second arm affixed to said crossbeam on the other end of said crossbeam from a first affixed arm, said second arm having a first section extending upward from said crossbeam and a second section extending forward from said crossbeam,

said second section of said second arm having a second mating surface adapted for insertion into a second mating block attached to the ship deck at a point separated from the attachment of said first block by a distance determined by the length of said crossbeam.

8. The invention set forth in claim **7** wherein each said second section of said arm has affixed thereto a second mating surface adapted for insertion into said mating block and displaced from said first mating surface a distance determined by said load bearing surface of each said arm.

9. The invention set forth in claim **8** wherein said first mating surface consists of a round pin rigidly affixed to a side of said second section of said arm.

10. The invention set forth in claim **9** wherein said pin mating deck block defines a slot for receiving said pin only when said pin is presented thereto in a first manner and for releasing said pin only when said pin is removed therefrom in a second manner.

11. The invention set forth in claim **10** where said first manner presentment comprises the movement of said pin perpendicular to and toward said deck, and

said second manner presentment comprises the movement of said pin perpendicular to and away from said deck.

* * * * *