United States Patent [19]

Shields

[11] **3,796,404**

[45] **Mar. 12, 1974**

[54] **APPARATUS FOR ALTERNATIVELY SECURING IRREGULAR CARGO AND STANDARD SHIPPING CONTAINERS**

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[22] Filed: **Apr. 20, 1972**

[21] Appl. No.: **246,015**

[52] **U.S. Cl.**..... **248/361 R,** 248/119 R, 248/361 A

[51] **Int. Cl.**..... **B65j 1/22**

[58] **Field of Search**..... 248/361 R, 361 A, 119 R, 248/25; 105/369 A, 368 T; 280/179 A; 24/201 A

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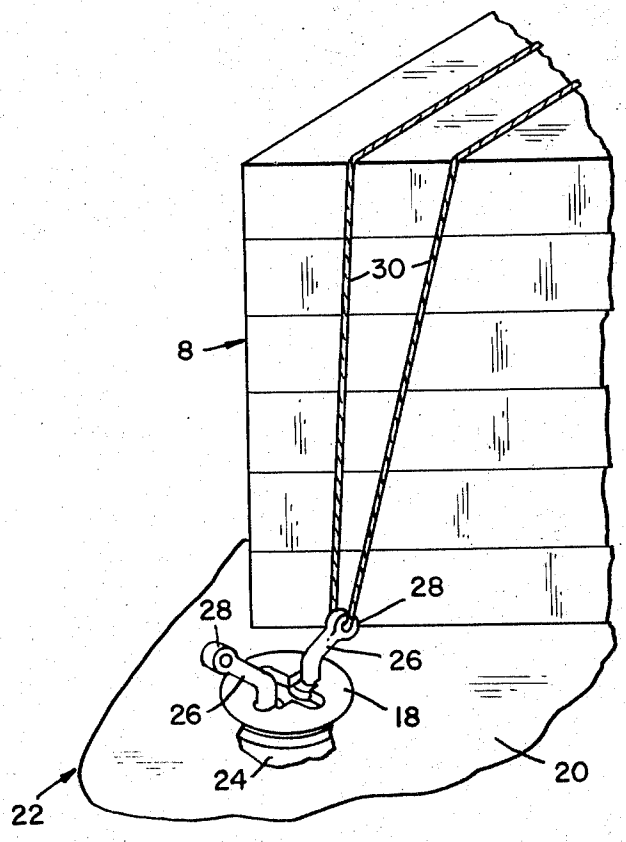
[57] **ABSTRACT**

Irregularly shaped and dimensioned cargo and standardized shipping containers are tied down to the deck of a vessel or the like by installing on deck a tie-down plate which has a first, cross-shaped cutout defined by opposing pairs of communicating cutout arms and a superimposed, substantially rectangular second cutout aligned with the first cutout. Irregular cargo is secured by placing a bulb hook in one of the cutout arms. The bulb hook has a cylindrical base of greater diameter than the width of the cutout arms, an integral shaft extending through the cutout arms and an angularly inclined arm that terminates in an eyelet to which tie-down rope, cable, chain, etc. is secured. For securing standard shipping containers a corner cone is inserted into the superimposed rectangular opening in the plate. An upwardly protruding portion of the cone engages a mating aperture in a corner fitting of the container. The corner cone can be locked to prevent vertical withdrawal of the cone while engaged with a container.

12 Claims, 6 Drawing Figures



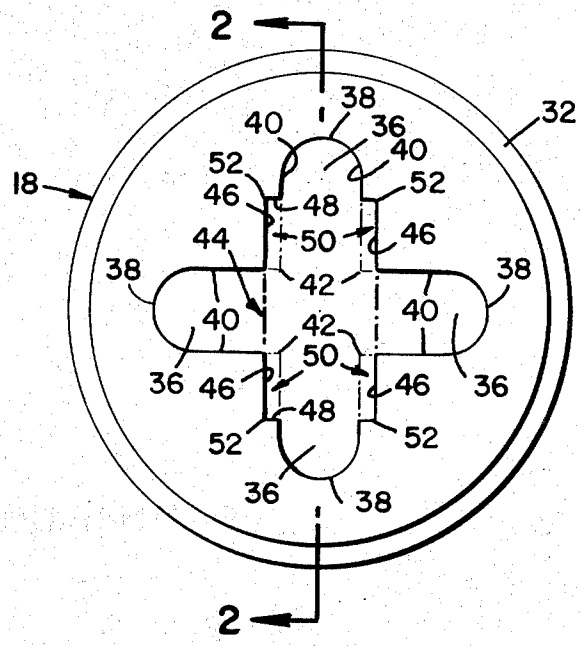


FIG_1

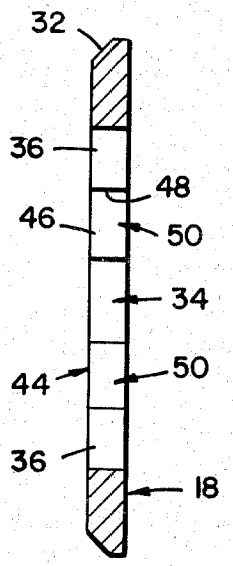


FIG_2

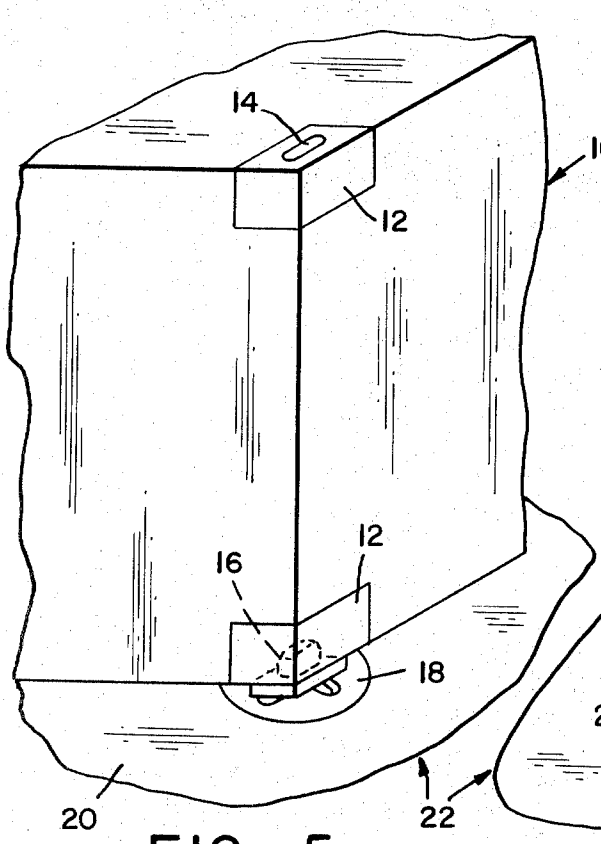


FIG_5

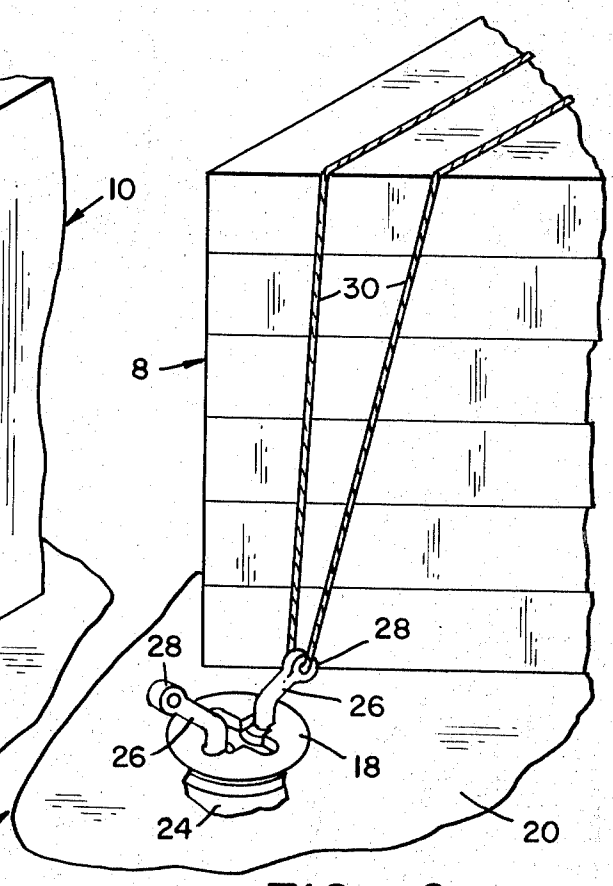


FIG_6

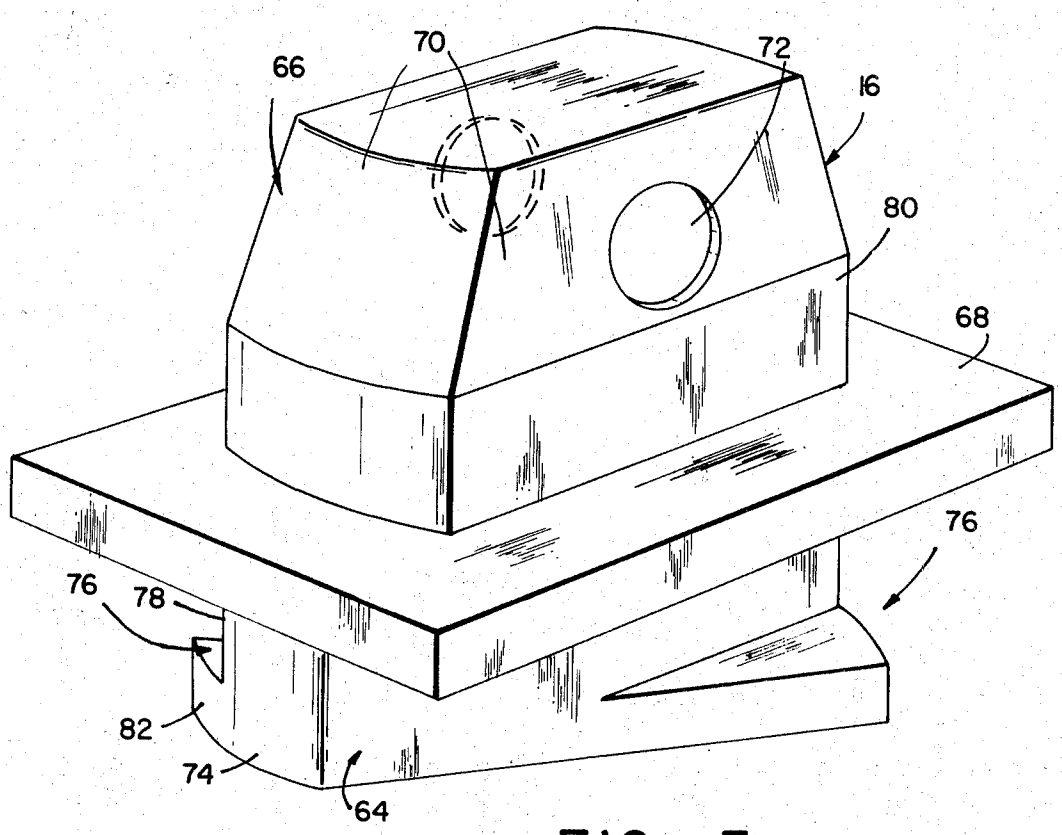


FIG_3

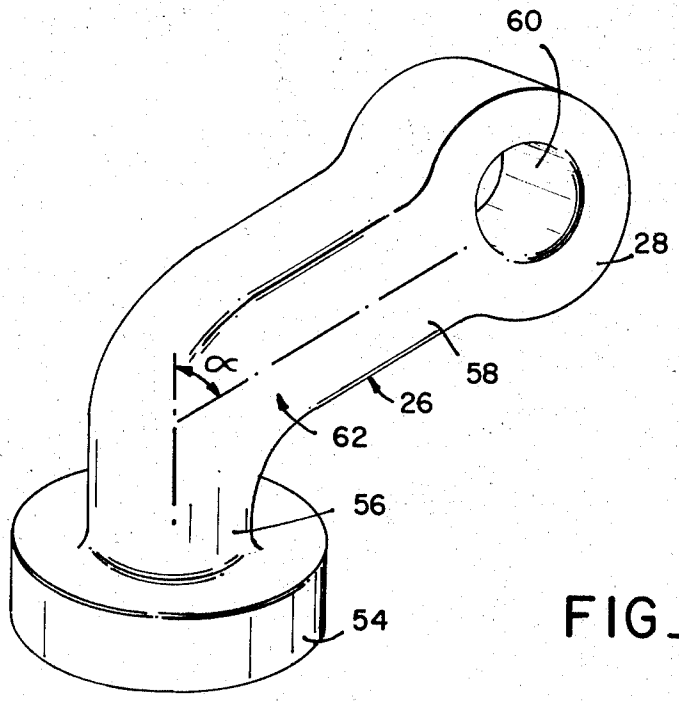


FIG_4

APPARATUS FOR ALTERNATIVELY SECURING IRREGULAR CARGO AND STANDARD SHIPPING CONTAINERS

BACKGROUND OF THE INVENTION

Today ocean freight moves increasingly in economical, standardized shipping containers. Nevertheless, for a combination of reasons such as the absence of container handling equipment in many ports, insufficient land transportion for the large containers in some parts of the world, a shortage of containers, etc., a substantial portion of all ocean freight is and will continue to be conventionally shipped, that is, in irregularly sized and shaped packages, boxes, bales and the like. For secure shipping both the container and the irregular cargo must be safely secured on deck.

Containers are secured by placing them on container cones, that is, relatively small upright steel cones anchored or removably mounted to the deck. Irregular cargo is secured with posts, braces, rope, cable and the like. An advantageous tie-down device for irregular cargo is a clover leaf plate installed on deck. Clover leaf plates have cross-shaped cutouts into which bulb hooks are placed. The bulb hook has an eyelet through which rope, cable and the like is threaded for tying down the cargo.

Many vessels carry both containers and irregular cargo. The prior art requires the installation of separate tie-down devices for the containers and for the cargo. On large vessels this can amount to thousands of such separate devices and is costly.

A further problem encountered with prior art conventional cargo tie-down devices is the construction of bulb hooks which usually have a cross bar of a greater length than the width of the cutout arms, an L-shaped member protruding through the cutout arms and connected with the cross bar, and an eyelet positioned at the free end of the member. These devices exhibit weakness when subjected to large loads as sometimes encountered when the vessel is in heavy waters. Moreover, there is a danger that the bulk hook rotates about the upright portion of the L-shaped member due to shifting cargo loads which can disengage the cross bar from the clover leaf plate. The cargo tie-down is thus lost permitting the cargo to move which is a serious safety hazard.

SUMMARY OF THE INVENTION

The present invention provides apparatus for alternatively securing conventional, irregular cargo or a standardized shipping container to a plate installed on the deck of the ship. Thus, the number of such plates on a ship can be greatly reduced to effect corresponding cost savings. The device is simple to use and substantially facilitates the loading and unloading of the ship as well as the ease with which the ship is converted for carrying one or the other type of cargo.

The invention employs the versatile clover leaf tie-down plates. A rectangualr cutout is concentrically superimposed over the conventional cross-shaped cutout. The rectangular cutout is dimensioned to receive shipping container positioning cones and is symmetric with respect to the sets of opposing pairs of cutout arms.

For purposes of this disclosure the term "rectangular cutout" means and includes both square cutouts, in which corners of the cutouts are equidistant, and rectangular cutouts in which the spacing between adjacent corners is unequal.

In use, the plate is installed on the deck of the vessel above a recessed space to provide access to the underside of the plate through the cutouts. For use with irregular cargo a bulb hook is inserted in one of the cutout arms. The bulb hook has a cylindrical base of a diameter greater than the width of the cutout arms, an integral, perpendicular shaft extending from the base which has a diameter less than the width of the cutout arms, and an arm that terminates in an eyelet. The arm is integral with and angularly inclined less than 90° with respect to the shaft. The cargo is secured by threading rope, cable, etc., through the eyelet and pulling it against the cargo. The cylindrical base prevents accidental disengagement of the bulb hook even if the bulb hook rotates about the shaft. Moreover, the angular inclination of less than 90° between the shaft axis and the axis of the arm substantially reduces the stress at the junction between them. Thus, the danger of breakage due to overstressing is substantially reduced or eliminated.

For use of the clover leaf plate with a standard shipping container, a container positioning cone which has a lower portion having a cross section that is smaller than the outline of the rectangular cutout is lowered into the rectangular cutout in the plate. An upper portion of the cone projects above the plate for engaging a mating aperture in a corner fitting of the container. The lower portion of the cone is undercut and includes a short flange which can be rotated about the axis of the cone to place the cone into a container receiving position and to thereby simultaneously lock the cone to the plate against removal from the rectangular cutout.

The rectangular cutout in the plate is formed by recessed, perpendicular wall sections located between sides of each contiguous pair of arms of the first cutout. The wall sections define corners of the rectangular cutout and they are aligned with the wall sections defining the adjacent corners of the rectangular cutout. The wall sections are preferably symmetric with respect to the arms of the cross-shaped cutout.

The construction of the clover leaf plate is simple and inexpensive. Moreover, existing and already installed clover leaf plates can be reworked so that such plates can be used for positioning standard shipping containers. To rework the plate the perpendicular wall recesses are simply cut into the plate. This operation is readily and inexpensively performed without the need for removal of the plate from the deck or its replacement with a new one.

BREIF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view of a clover leaf type tie-down plate constructed in accordance with the invention;

FIG. **2** is a cross-sectional view of the plate and is taken on line **2—2** of FIG. **1**;

FIG. **3** is a perspective, elevation view of a container-securing cone;

FIG. **4** is a perspective elevational view of a bulb hook constructed in accordance with the invention for use in the clover leaf plate shown in FIG. **1**;

FIG. **5** is a fragmentary, elevational view of the tie-down system of the present invention for securing shipping containers; and

FIG. **6** is a view similar to FIG. **5** but illustrates the system of the invention for securing irregular cargo.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGS. 5 and 6, two general types of cargo are nowadays carried by ocean-going vessels. First, conventional, irregular cargo **8** such as irregularly dimensioned and shaped boxes, crates, bales or individual items and, second, standardized shipping containers **10** which are of standardized dimensions and shapes. Each such shipping container includes standard corner fittings **12** which have elongate apertures **14** for engagement by container positioning cones **16.**

In accordance with the present invention, a clover leaf type tie-down plate **18** is installed on a deck **20** of a vessel **22** above a recessed space **24** in the deck. For securing irregular cargo **8,** bulb hooks **26** are attached to the tie-down plate in the manner more fully described hereinafter. The bulb hooks include eyelets **28** at their free ends through which rope **30,** cable or the like is threaded. The rope is tied against the irregular cargo to secure it on deck and prevent it from sliding when thhe vessel pitches or rolls in rough seas.

Container **10** is also secured with a cover leaf type tie-down plate **18** mounted to deck **20.** Instead of a bulb hook a container positioning cone **16** is demountably secured to the tie-down plate. The cone engages the elongate aperture (not shown) in the lower corner fitting and is locked against removal from the tie-down plate as long as it is engaged by the container. The positioning cone prevents the container from moving on the deck even if the ship is in rough seas.

Referring now to FIGS. **1** and **2,** tie-down plate **18** is circular and includes a bevel **32** for butt welding the plate into a floor member on deck of a vessel. A generally cross-shaped cutout **34** is located at the center of the plate and has pairs of opposing, contiguous cutout arms **36.** The arms terminate at semicircular ends **38** and are of a uniform length and width. In conventional prior art tie-down plates sides **40** of the cutout arms terminate in edges or corners **42** (illustrated in FIG. **1** in phantom lines).

A rectangular second cutout **44** (partially shown in phantom lines) is superimposed over the cross-shaped cutout, aligned therewith and symmetric with respect to the arm pairs of cutout **34.** The rectangular cutout is defined by perpendicular wall sections **46, 48** which form recesses **50** at each edge **42** between contiguous cutout arm sides **40.** The intersection of each perpendicular wall pair **46, 48** forms one of the four corners **52** of the rectangular cutout. For instances in which the rectangular cutout is rectangular, as contrasted with being square, wall **46** is longer than wall **48** so that the distance between opposing long walls **46** define the width of the rectangular cutout. That width must be greater than the width of cutout arms **36.**

Tie-down plate **18** for use with conventional shipping containers of length up to 40 feet has a thickness of 0.75 inch for adequate strength. Each arm of the cross-shaped cutout has a width of 1.5 inches with a combined length of each pair of opposing cutout arms of about 8.25 inches. A 2.5 inch wide by 5.25 inch long rectangular cutout **44** is superimposed over the cross-shaped cutout. With the given plate thickness and cutout dimensions, particularly the width of the rectangular cutout, and a plate diameter of about 12.5 inches the plate exhibits sufficient rigidity and strength to safely secure even the largest standard shipping containers on deck even if only two tie-down plates positioned at diagonal corners of the container are used instead of employing four positioning cones for securing the container.

Referring now to FIGS. **1, 2** and **4,** a bulb hook **26** constructed in accordance with the present invention generally comprises a cylindrical base **54** and a cylindrical shaft **56** that extends perpendicularly away from the base. The shaft has a diameter slightly less than the width of cutout arm **36** of tie plate **18.** For the plate illustrated in FIG. **1,** the shaft diameter is preferably about 1.5 to 1.625 inch. The cylindrical base, on the other hand, has a diameter greater that the width of the cutout arm, preferably about 3 inches.

An upwardly and outwardly directed arm **58** of the bulb hook extends from and is integrally constructed with shaft **56.** The arm terminates in eyelet **28** which includes an aperture **60** fo connecting ropes, cables and the like to the eyelet and the bulb hook. The angle α between the axis of shaft **56** and arm **58** is preferably between about 15° to about 45° from the vertical to reduce the stressing of transition **62** between the shaft and the arm and to facilitate the tie-down of irregular cargo. Optimal results have been obtained by making angle α 45°.

Referring to FIGS. **1–3,** container positioning cone **60** generally comprises a lower half or portion **64,** an upper half **66** and a generally rectangular central body plate **68.** The upper portion of the cone includes inclined sides **70** which facilitate the centering of the container on the cone and an aperture **72** for locking the cone to the container corner fitting with a suitable locking pin (not shown).

The lower half **64** of the container cone is a generally rectangular base **74** which is angularly offset with respect to the upper cone portion. A section **76** of the base disposed between body plate **68** and the lower end of the base is cut back along a plane **78** which is aligned with longitudinal sides **80** of the upper cone half to a point short of the lower base end to thereby define flanges **82** which are parallel to the body plate.

Turning now to the use of the tie-down system of the present invention and referring to FIGS. **1–6,** bulb hook **26** is used for the tie-down of irregular cargo by grasping its arm **58,** aligning base **54** with one of the pairs of cutout arms **36** and tilting the bulb hook so that the base can be slid through such arm pair while part of the shaft **56** enters one of the cutout arms. Once the base is completely beneath tie-down plate **80** the hook is returned to its upright position and moved into the desired cutout arm **36** until shaft **56** rests against the semicircular end **38** of such arm. Thereafter the cargo is secured in the above-mentioned manner with a rope, cable, etc., extending through aperture **60** in eyelet **28.** The tension on the rope biases the base against the underside of the tie-down plate and against the semicircular cutout arm ends and prevents any movement of both the bulb hook and the cargo.

To secure a standard shipping container **10** to the same tie-down plate the bulb hook is removed by reversing the steps outlined in the preceding paragraph and a positioning cone **60** is placed on top of the plate. The rectangular base **74** is aligned with rectangular cutout **44** in the tie-down plate and the cone is dropped downwardly until body plate **68** rests on the tie-down plate. In this position the upper cone half **66** is inclined relative to the rectangular cutout by the angle with

which rectangular base **74** is offset from the upper cone portion. The cone is now rotated about its vertical axis until recessed planes **78** engage the corresponding long walls **46** of the rectangular cutout. In that position flanges **82** on the lower cone half extend beneath the tie-down plate so that the cone cannot be vertically removed from the plate. The container is now placed on top of the cone and locks thereto with a locking pin (not shown). In this manner the container is safely and efficiently secured to the tie-down plate on deck.

I claim:

1. A system for securing cargo to a deck of a vessel or the like, the cargo including general, irregularly dimensioned cargo and standardized shipping containers having corner fittings, the system comprising a plurality of tie-down plates secured to the deck above a recessed space in the deck to provide access to an underside of the plate, the plate having a first cross-shaped cutout defined by communicating opposing pairs of cutout arms and a second cutout superimposed on and axially aligned with the first cutout having a generally rectangular configuration and a width greater than a width of the cutout arms, a bulb hook defined by a base having a transverse dimension greater than the width of the cutout arms, an integral, perpendicular shaft extending from the base and having a diameter less than the width of the cutout arms, and an arm terminating in an eyelet integral with and angularly inclined less than 90° with respect to the shaft, and a container cone having a lower portion with a cross section permitting insertion of the cone into the second cutout and an upper portion projecting above the plate for engaging an aperture in a container corner fitting, whereby irregular cargo such as boxes, bales and the like is secured by positioning the base of the bulb hook in the space beneath the plate, sliding the bulb hook to an end of one of the arms and tying such cargo to the eyelet of the hook, and a standard shipping container is secured to the plate by inserting the lower portion of the cone in the second cutout and engaging the corner fitting of the container with the upper cone portion.

2. A system according to claim **1** wherein the second cutout is symmetric with respect to the arm pairs of the first cutout.

3. A system according to claim **1** wherein the bulb hook base has a cylindrical configuration and a diameter greater than the width of the cutout arms, and wherein the base is concentric with the shaft.

4. A system according to claim **3** wherein the angle of inclination between the shaft and the bulb hook arm is between about 15° to about 45°.

5. A system according to claim **1** including means defined by the lower portion permitting a limited rotation of the cone about an axis which is perpendicular to the plate, and means defined by the lower portion preventing withdrawal of the cone from the second cutout when the cone is rotated into one of the terminal positions of its rotational movement.

6. A system according to claim **5** wherein the means preventing the cone withdrawal comprises a flange substantially parallel to the plate at an end of the lower portion.

7. A bulb hook for use with clover leaf type tie-down plates comprising a cylindrical base and a cylindrical shaft of a lesser diameter than the diameter of the base extending perpendicularly and concentrically from the base, an arm integrally constructed with the shaft and angularly inclined therefrom at an angle of less than 90°, and an eyelet integrally constructed with and disposed at a free end of the arm.

8. A bulb hook according to claim **7**, wherein the angular inclination between the shaft and the arm is between about 15° to about 45°.

9. A bulb hook according to claim **8** wherein the angle of inclination between the shaft and the arm is about 30°.

10. A clover leaf plate for installation in a floor of a shipping vehicle and for securing against movement irregular cargo and conventional shipping containers having corner fittings interengageable with container cones comprising a plate having a centrally located first cutout defined by at least two elongate cutout arms extending from a center of the plate in opposing directions and terminating in end portions of a given width, and a second, superimposed rectangular cutout impressed over the first cutout, the second cutout having a lesser length than the first cutout, the second cutout being defined by opposing, spaced apart sides of equal length which are parallel to the arms, the sides being further spaced apart at a distance greater than said given width so that the plate can be used alternatively with a bulb hook protruding through the end portion of one of the arms and engaging part of the plate defining the end portion or with a standard shipping container cone extending through the second, superimposed rectangular cutout and engaging a portion of the plate defining the sides.

11. Apparatus according to claim **10** wherein the arms have a width of about 1.75 inches and a length of about 8.25 inches, and wherein the rectangular cutout has a width of about 2.5 inches and a length of about 5.25 inches.

12. Apparatus according to claim **10** wherein the plate is round and has a diameter of at least about **12** inches, wherein the cutout arms have a width of about 1 ¾ inches, wherein the rectangular cutout width is about 2.5 inches, and wherein the plate has a thickness of at least about 0.75 inches.

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