Dec. 2, 1969 H. DLUHY 3,481,298

SECURING SYSTEM FOR DECK CONTAINER OR THE LIKE

Filed June 14, 1968 3 Sheets-Sheet 1

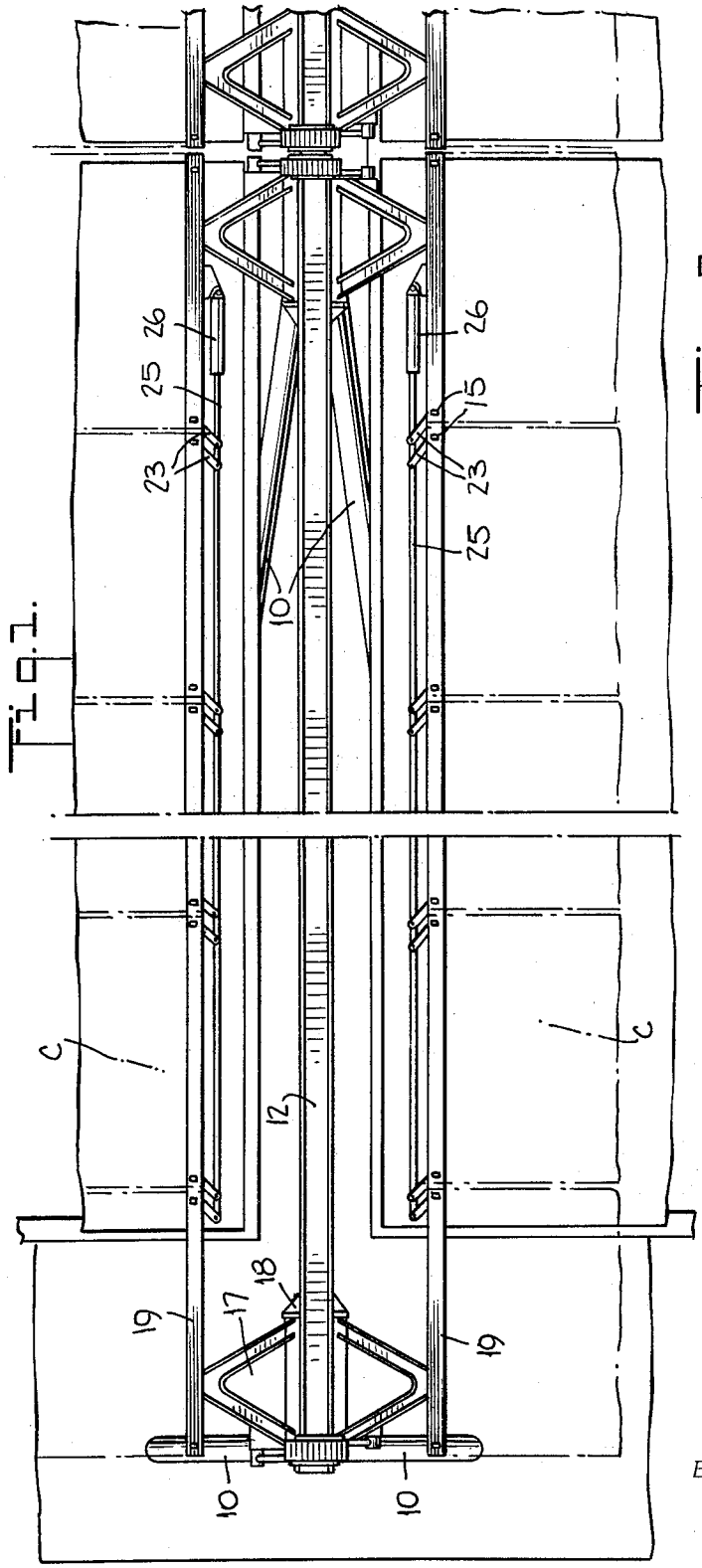



Fig. 1.

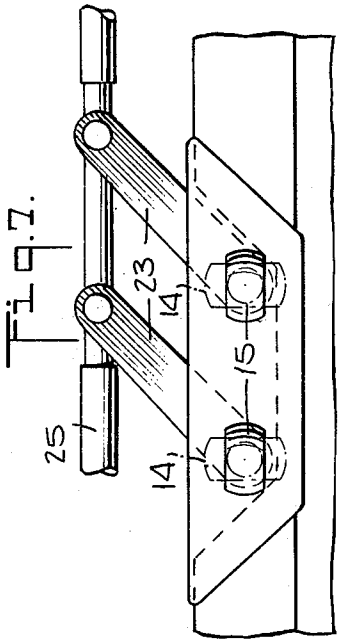



Fig. 7.

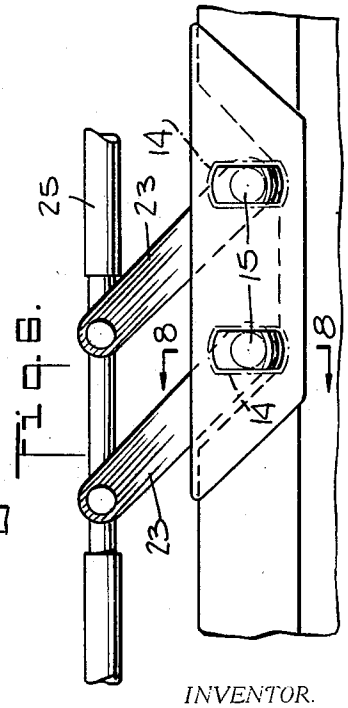



Fig. 8.

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SECURING SYSTEM FOR DECK CONTAINER OR THE LIKE

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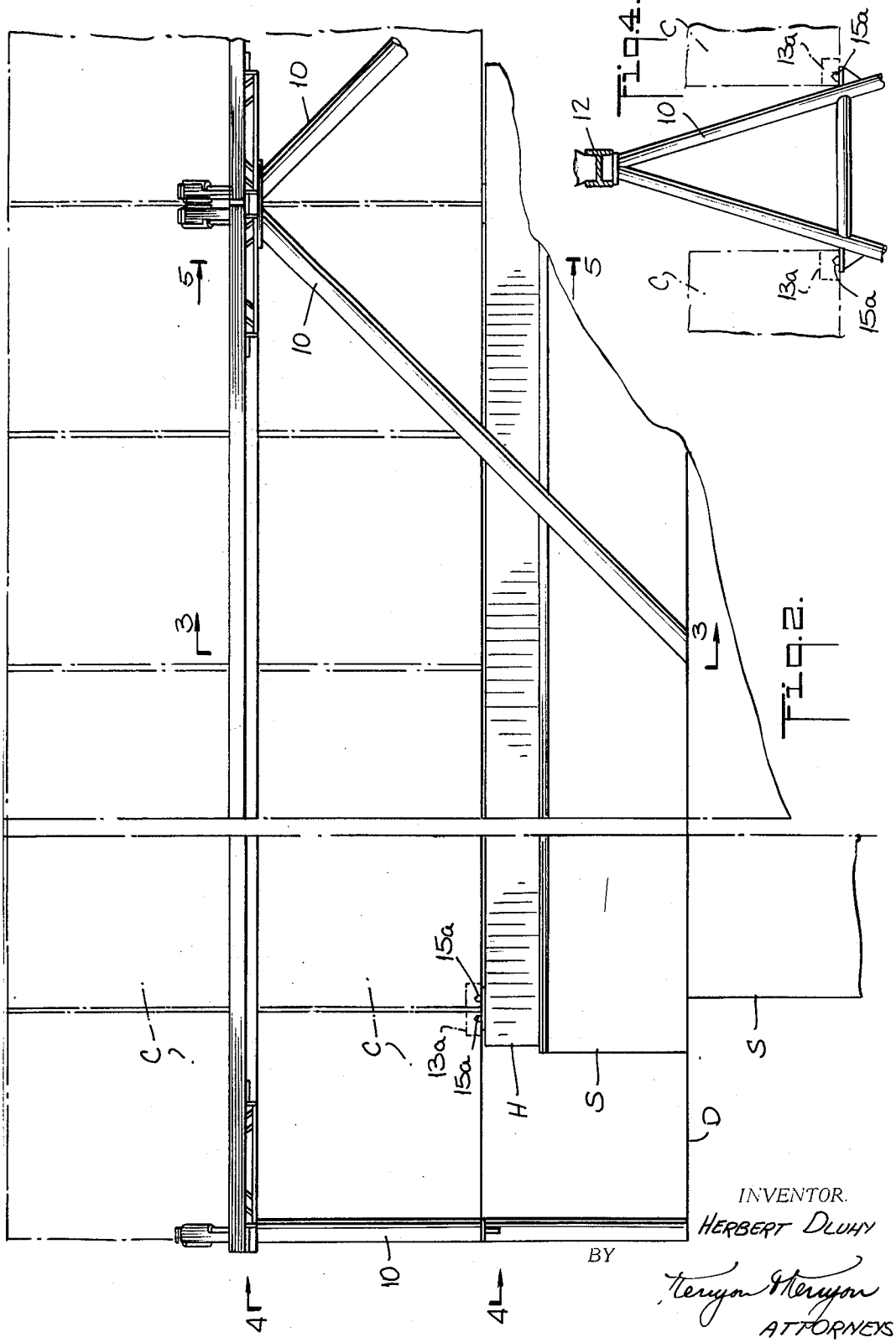



Fig. 4.




Fig. 2.

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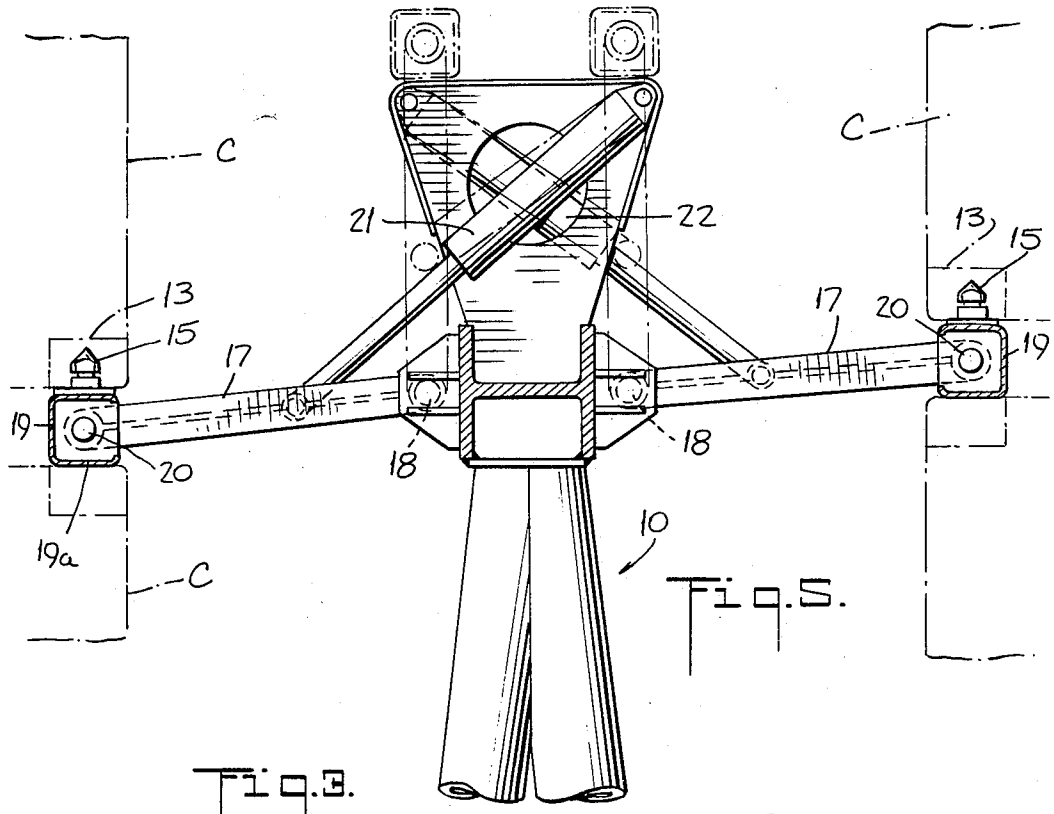



Fig. 5.

Fig. 3.

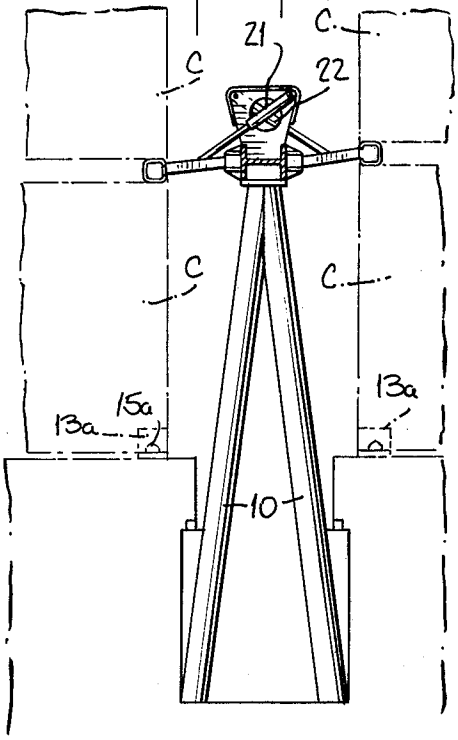
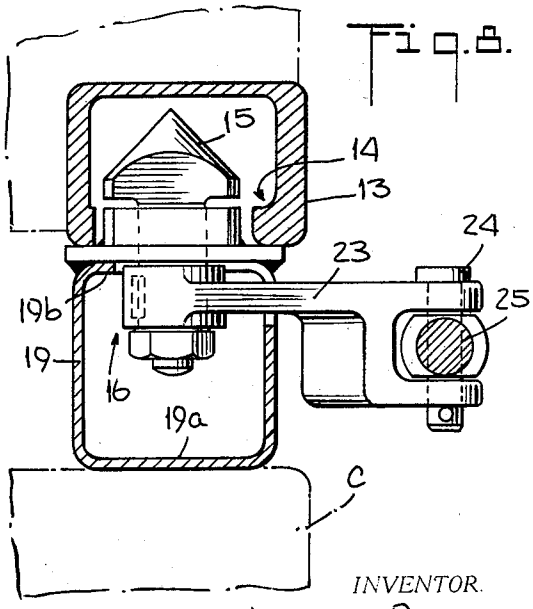



Fig. 4.




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3,481,298

# SECURING SYSTEM FOR DECK CONTAINER OR THE LIKE

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Int. Cl. B63b 25/28
U.S. Cl. 114—72 5 Claims

## ABSTRACT OF THE DISCLOSURE

A securing system for containers on a ship's deck or the like including deck mounted rigid supports adjacent hatch coamings supported on swinging beams movable from idle to horizontal positions overlying the upper surface of lower tier containers to support an upper tier of containers and twist locks having male fitting engageable in twist lock sockets of corner fittings of the containers operable in unison from unlocked to locked positions and vice versa, said beams being adjustable for containers of different heights. This securing structure may be mounted also in ship's holds or on flat cars and may also be arranged for securing containers in more than two tiers if desired.

## RELATED APPLICATIONS

No related applications of the invention are copending.

## BRIEF SUMMARY OF INVENTION

With the increasing use of containers for ocean transportation of cargo, it has become necessary to carry large amounts of the cargo containers on decks of ships to utilize their carrying capacity economically because of the low density of the containers as compared with conventional break bulk cargo.

Heretofore, to secure two or more tiers of deck containers, an elaborate system of wire or chain lashings have been used. These conventional lashing systems require considerable time and labor to rig them and safe storage of deck containers has been subject to human errors and negligence. Accidents whereby containers are lost overboard or considerably damaged have been frequent.

Principal objects and features of the present invention are to overcome these drawbacks of conventional lashing systems by providing a simple, safe arrangement that is time and labor saving to use, extremely simple to operate and that is not subject to human errors and may be used to lash two or more tiers of containers effectively.

Other objects and features of the invention are the provision of a simple operable securing arrangement that may be readily installed on existing as well as new ships and also on flat cars.

The novel system embodies a fixed truss type structure provided transversely between two adjacent stacks of containers. This structure is designed to withstand transverse and longitudinal forces on the second and/or higher tiers of containers caused by the ship's motion at sea. This structure is also designed to withstand moments in a horizontal plane which would be imposed when the weights of the forward and aft stacks are unequal. Beams are arranged transversely at the end of each stack under container corner fittings. These beams are provided with twist locks and male fittings which engage the lower corners of supported containers. All twist locks on one beam are connected to a common actuating rod motivated by an hydraulic or pneumatic cylinder.

The connections between beams and the fixed truss-type structure is effected by triangular links so that forces from the containers are transferred via twist locks and male



fittings into the transverse beam and from there over the triangular links into the fixed structure.

Hydraulic or pneumatic actuators are provided for raising and lowering the beams and links to clear the area for loading cargo or handling hold containers and the first tier or lower layer of deck containers. During its motion, the beam describes an arc and there are two positions of different heights, but equal length in longitudinal direction of the ship to the other beam on the opposite end of the stack. Thus, the system is capable of accommodating for storage containers of two different heights, e.g. International and National Standard containers 8'-0" high and others used by several ship operators in this country 8'-6" high.

The transverse beam can swivel slightly in relationship to the triangular links so that the beam will be self-adjustable so as to always rest flat on top of the container stack. In the event that only one size container is intended to be carried, the swiveling feature can be omitted and the beam and links can then be integral or solidly connected.

When more than two tiers are to be lashed on deck, the securing structure herein described is duplicated at successive tier levels as needed.

Other objects and features of the invention will become apparent from the following detailed description and the accompanying drawings, wherein:

FIG. 1 is a plan view of the system of this invention located on the cargo deck of a ship;

FIG. 2 is a front elevational view of the system of FIG. 1.

FIG. 3 is a sectional view taken along the plane of line 3—3 of FIG. 2;

FIG. 4 is a side elevational view seen from the left of FIG. 2;

FIG. 5 is a sectional view taken along the plane of line 5—5 of FIG. 2;

FIG. 6 is an enlarged plan view of a detail of the twist-lock operating mechanism in unlocked position;

FIG. 7 is a similar view of the same in locked position; and

FIG. 8 is a sectional view taken along the plane of line 8—8 of FIG. 6.

## DETAILED DESCRIPTION

Referring to the drawing and first to FIGS. 1 and 2, D denotes the upper or cargo carrying deck of a ship that is equipped with the novel securing system of this invention for securing cargo containers C in tiers over the hatch covers H thereof which latter in turn are battened down over hatch coamings S.

Fixed truss-type support structures **10** are mounted and anchored securely to the deck D between stacks of containers C and adjacent transverse hatch coamings S. These truss-type support structures may be rigid tubular posts forming an inverted V whose lower ends are suitably anchored to the deck and whose upper ends are united as seen in FIG. 4. Horizontal support bars **12** extending transversely are joined to adjacent support structures **10** along their upper inverted V joints. The support structures **10** are designed to withstand transverse and longitudinal forces imposed on the second (higher) tier of the containers C by the ship's motion at sea. These structures also are designed to withstand moments in a horizontal plane which would be imposed on them when the weights of the forward and aft stacks of containers are unequal.

The respective containers C are provided with conventional corner fittings **13** (FIG. 8) including female sockets **14** intended to receive rotatable male fittings **15** of twist locks **16** which in non-locking position are insertable into the female sockets **14** of the respective container corner fittings **13** and thereafter rotatable into a locking position as will be described. Likewise, the hatch covers C are pro-

vided with male fittings **15***a* engageable in respective female sockets of the corner fittings **13***a* of the lower tier of containers C.

Triangular links **17** are secured pivotally at **18** along their bases to the bars **12**. Support beams **19** are secured pivotally at **20** to the apices of the respective links **17** and extend parallel to the bars **12** transversely of the widths of the containers C. The respective links **17** may be swung on pivots **18** from their horizontal support positions shown in FIGS. 2 and 5 to inactive vertical positions as by means of sets of hydraulic or pneumatic actuators **21** and **22** which sets are individually operable and individually controlled so that in the inactive position the links **17** and their attached beams **19** will be clear of the space above the hatch cover H to permit loading of the below deck holds prior to positioning of the deck carried containers C and also to permit unloading of such holds after the deck-carried tiers of containers C have been unloaded.

The beams **19** preferably are hollow and preferably of substantially rectilinear cross-section so that their lower faces **19***a* may rest upon the upper surfaces of the lowermost tier of deck carried containers located on the closed hatch covers H.

A plurality of twist locks **16** are positioned along the lengths of the beams **19** with their rotatable male fittings **15** projecting upwardly through the upper surfaces **19***h* so as to be insertable in the female sockets **14** of the respective container corner fittings **13** and rotated therein to a locking position and vice versa. The respective rotatable male fittings **15** of the twist locks **16** of each beam **19** are fixedly connected to respective levers **23** which in turn are pivotally connected at **24** to a common operating rod **25** which is movable reciprocally by an hydraulic or pneumatic cylinder **26** from an unlocked position shown in FIGURE 6 to a locking position as shown in FIG. 7 and vice versa.

The pivotal connection of the beams **19** to the links **17** permits their lower faces **19***a* to be self-adjustable so as to lie flat on the upper surfaces of the lower tier of containers, irrespective of the container height. Likewise, since the respective beams **19** respectively secured to respective links **17** are individually adjustable in height positions by the respective hydraulic or pneumatic actuators **21** and **22**, the container sets on which respective beams **19** rest may be of different heights. If only one size of containers is to be carried on a particular ship, the swivel or pivotal connection between beams **19** and links **17** can be omitted and rigid coupling between them provided instead.

In operation, the hydraulic actuators **21** and **22** are activated to swing the beams **19** clear of the open hatch openings to permit loading of the below deck holds. Thereafter, the hatch covers are battened down over the hatch openings defined by the hatch coamings. The lower tier of containers C are then deposited side by side on the hatch covers so that their lengths extend longitudinally of the ship's length and their respective corner fittings **13***a* overlie the hatch cover mounted male fittings **15***a* which then extend into the female sockets of said corner fittings **13***a*, thus precluding lower tier container shift during the ship's voyage. The hydraulic or pneumatic actuators **21** and **22** are then activated to swing the beams **19** down over the upper surfaces of the lower tier of containers until their lower surfaces **19***a* lie flat upon the upper containers of the lower tier surfaces.

Then, with the male fittings **15** of the beam twist locks **17** in their unlocked positions, the upper tier containers are deposited on the beams **19** so that their male fittings **15** extend into the twist lock sockets **14** of the corner fittings **13** of the upper tier containers. When all of the upper tier containers have been so loaded, the hydraulic or pneumatic actuators **26** are activated to rotate the male fittings **15** to locked position in their respective sockets,



thus simultaneously locking all the upper tier containers securely against any motion during the ship's voyage. At the end of the trip, the twist locks are operated to unlocking position and the upper tier containers removed. Then the lower tier containers are removed. Subsequently, the hydraulic or pneumatic actuators **21** and **22** are activated to swing the links **17** and beams **19** clear of the hatch covers H, the latter removed and cargo in the ship's hold below the deck unloaded.

If desired, the male fittings **15***a* on the hatch cover may be rotated to locking and unlocking positions by mechanism and hydraulic or pneumatic actuators similar to those that operate the male fittings **15**.

Although the cargo locking system has been described with respect to deck-carried containers, it may be used on flat cars or below ship's decks to lock containers carried on flat cars or in ship's holds as well, by providing similar structure on flat cars or below deck.

What is claimed is:

**1.** A securing structure for stacked containers on a ship or the like comprising supports rigidly secured to portions of the ship adjacent and between its transverse hatch coamings between which the stacked containers are positionable in tiers, beams supported pivotally by said supports at common levels and movable from an idle position to container-carrying positions of selectively different levels over the upper surfaces of the containers even of differing heights, of the under tier thereof, said containers having twist lock engaging means, a plurality of twist lock means commonly carried by each of said beams and engageable with said engaging means and activating means for operating said plurality of twist lock means of each beam simultaneously into locking position and vice versa to permit secure lashing of the containers in stacked condition on the ship.

**2.** A securing structure for stacked containers on a ship or the like according to claim **1**, including links pivotally secured to the said supports and wherein said beams are pivotally carried by said links, and hydraulic actuator means for swinging said links and beams from idle positions to said container carrying positions.

**3.** A securing structure for stacked containers on a ship's deck or the like according to claim **2**, wherein said links are triangular.

**4.** A securing structure for stacked containers on a ship or the like according to claim **2**, wherein sets of said links are carried by said transverse supports, each set of said links carrying one of said beams, and including an independent actuator for each of said sets.

**5.** A securing structure for stacked containers on a ship or the like according to claim **1**, wherein each container twist lock engaging means includes a corner fitting with a female socket and each twist lock means includes a male fitting engageable in a said socket and rotatable therein to a locking position and vice versa and said operating means includes common operating rod means connected to selected groups of said male fittings and activator means for moving said rod means to rotate the selected male fittings connected thereto in unison to a locking position in the corresponding female socket and vice versa.


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U.S. Cl. X.R.

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