

[54] **CONTAINER STOWING SYSTEM**

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[52] **U.S. Cl.**..... **114/72, 114/75, 214/10.5**

[51] **Int. Cl.**..... **B63b 25/00**

[58] **Field of Search**..... **114/72, 75; 214/10.5 R, 10.5 S; 105/380-382, 387, 389-391, 366 A, 366 B, 366 C, 367, 368 T, 369 A, 373; 248/119 R, 278, 361 R**

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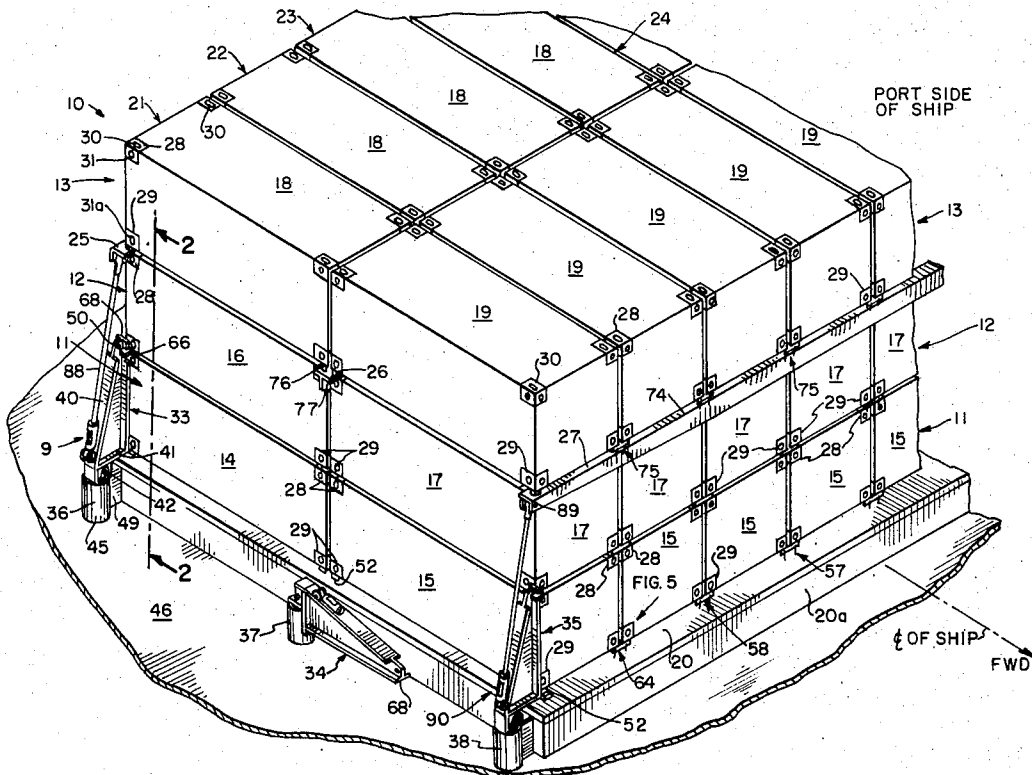
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[57] **ABSTRACT**

A freight container stowage system employing bracket member and post combinations secured to the ship and adjacent containers, and cross beams between specified tiers of the containers with their opposite ends lashed to the brackets, thereby reducing the number of connections required to secure the load, eliminating climbing along the face of the containers to position the lashings and reducing the number of men and the time required to secure an assemblage of containers arranged one, two or three tiers in height and placed either on a hatch cover or on the deck of the ship.

14 Claims, 9 Drawing Figures



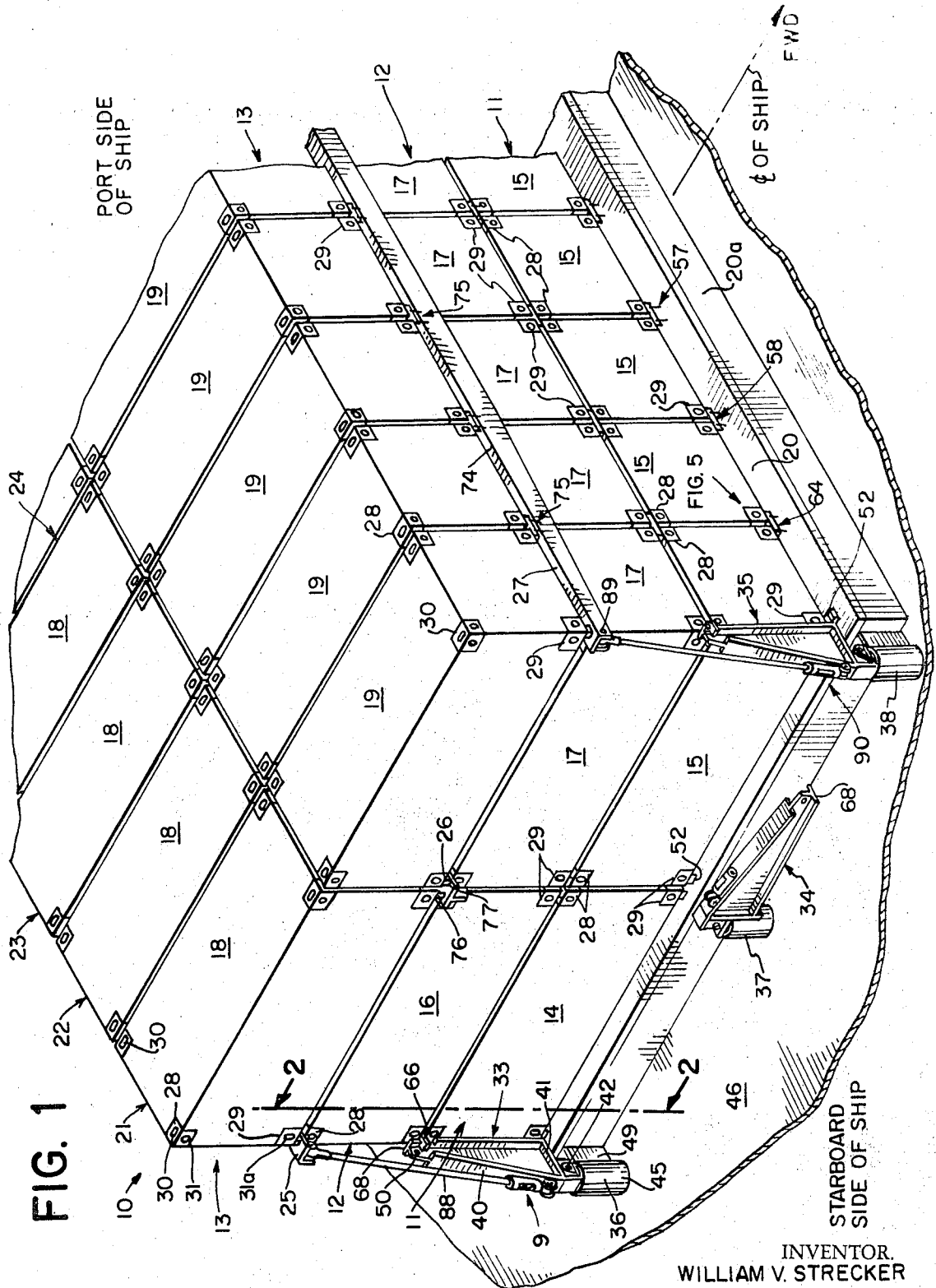


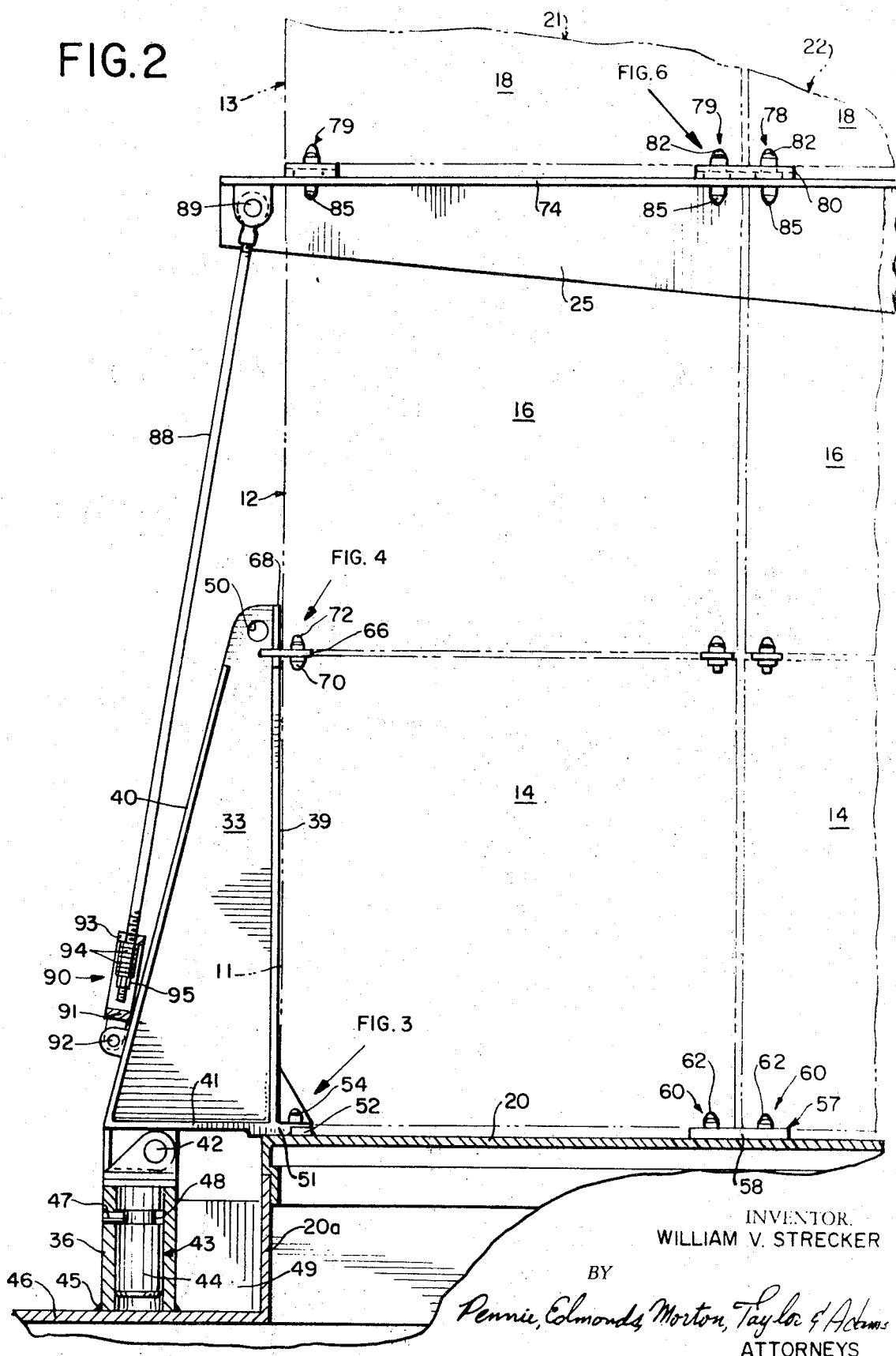
FIG. 1

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FIG. 2



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FIG. 3

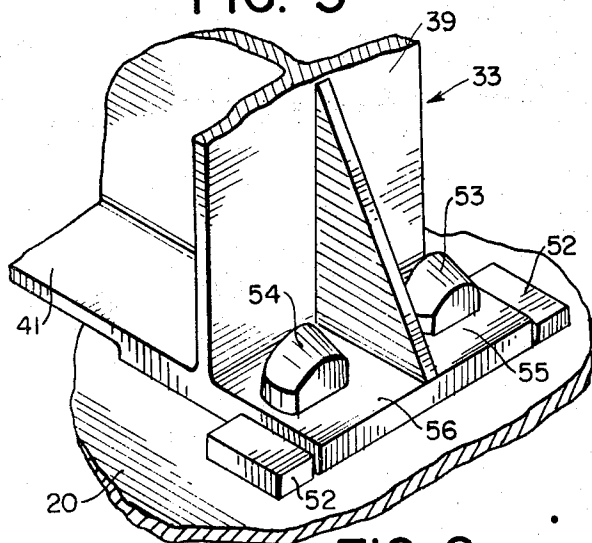


FIG. 4

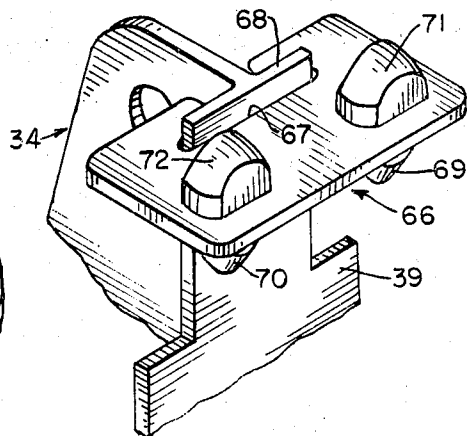


FIG. 6

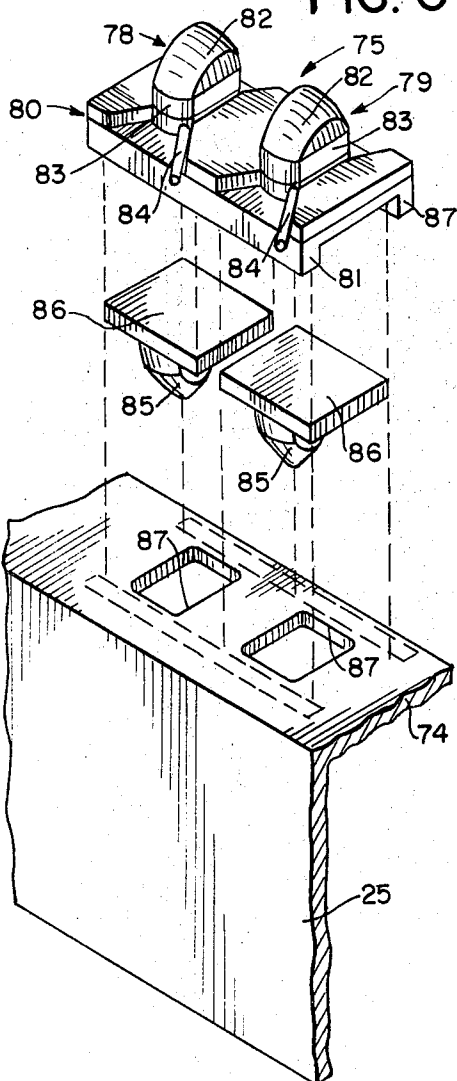
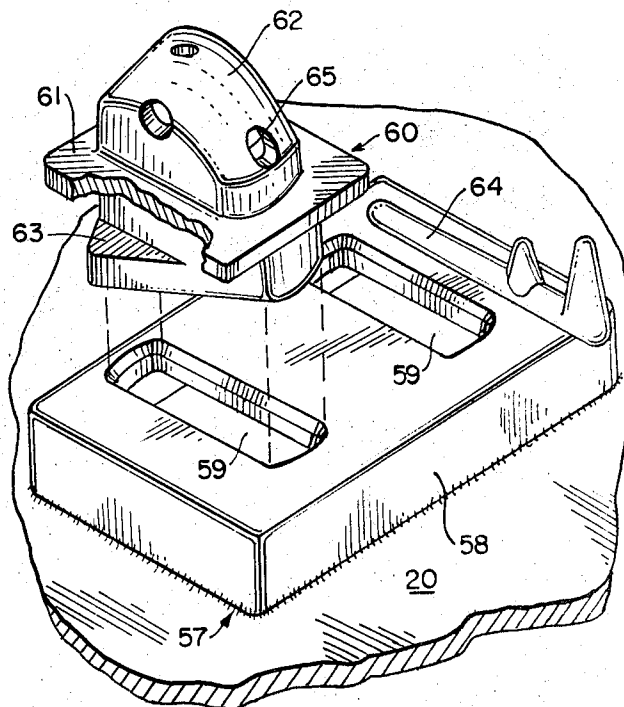


FIG. 5



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FIG. 7

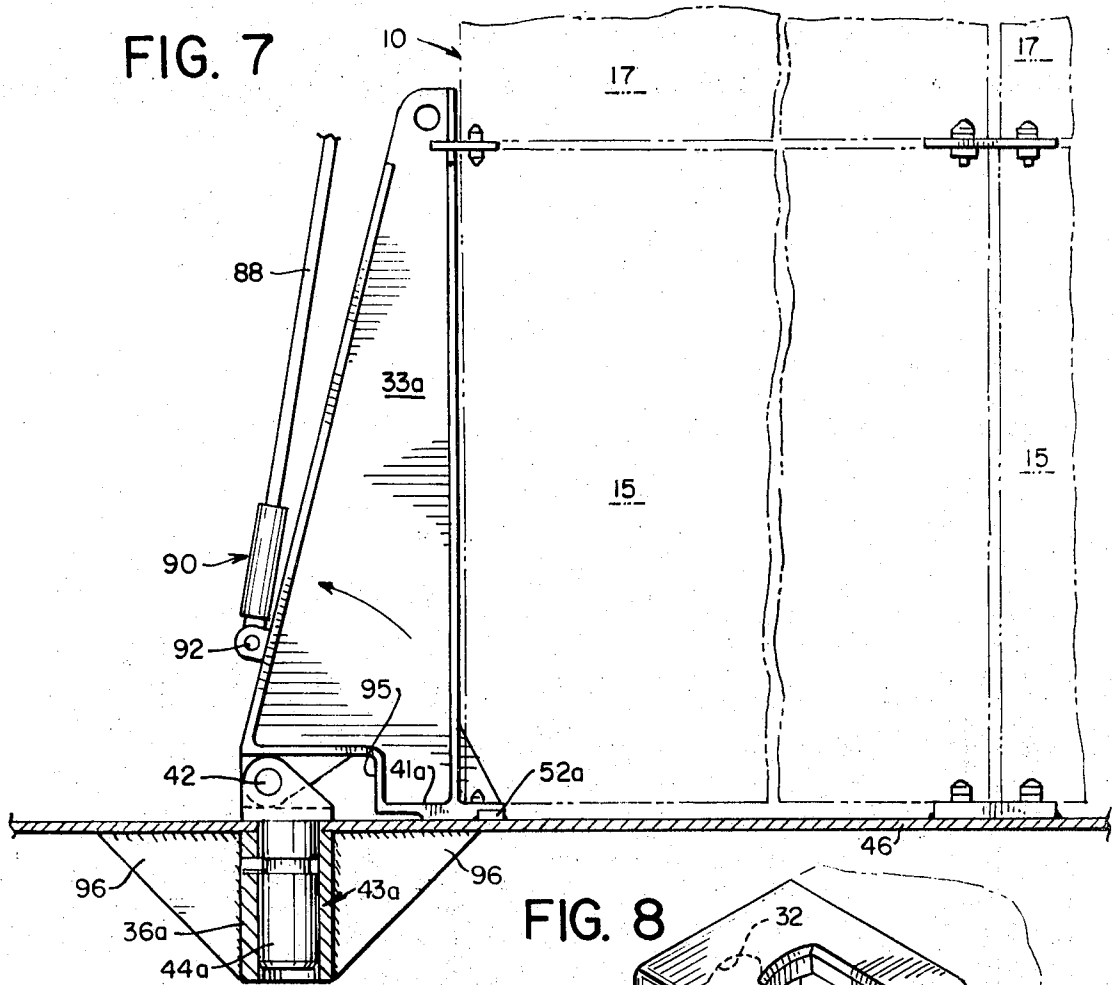


FIG. 8

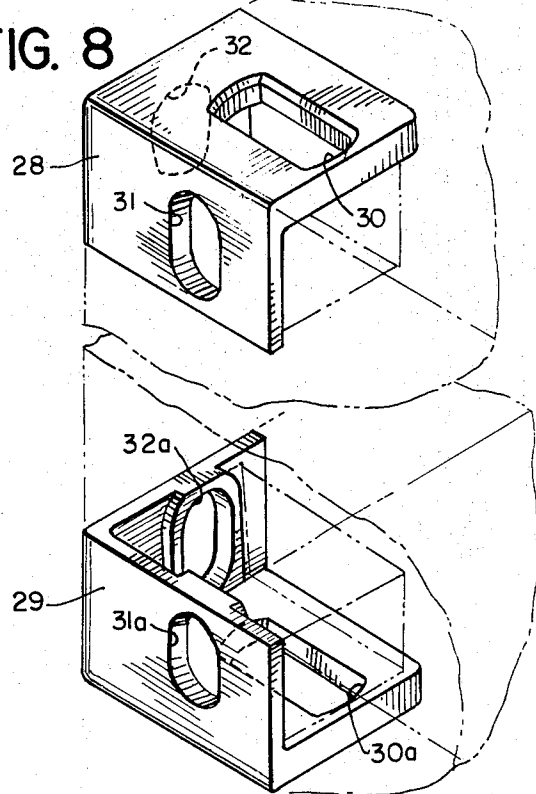
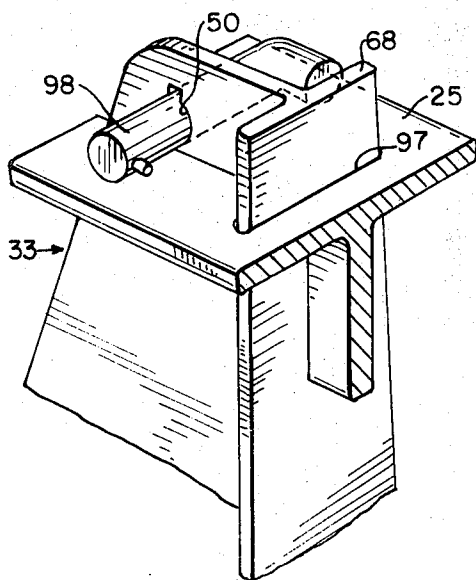


FIG. 9



CONTAINER STOWING SYSTEM

SUMMARY OF THE INVENTION

Posts permanently secured to the deck support bracket members pivoted thereto which may be folded against the surface of the deck when not in use, and when in use extend upwardly from the bottom of the lowest tier of containers to the bottom of the second tier, at which point the bracket members are mechanically connected both to the top of the adjacent first tier container and to the bottom of the adjacent container of the second tier.

The containers may be either 20 ft. or 40 ft. in length. In one case two 20 ft. containers end-to-end will constitute a tier, and in the other case a tier will be formed by one 40 ft. container.

Three cross beams are arranged between the second and third tiers to extend from side to side of the assemblage of tiers of containers. One cross beam is at each end of the tier assemblage and one beam is disposed centrally. Rod lashes connected to the ends of these beams are joined at their lower ends through quick buckles to the lower portions of the bracket members.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. 1 is an isometric view showing somewhat more than half of an assemblage of containers stowed on a hatch cover.

FIG. 2 is a vertical sectional view taken on line 2—2 of FIG. 1 and drawn to a somewhat larger scale.

FIG. 3 is an enlarged fragmentary isometric view of part of the foot portion of a bracket member.

FIG. 4 is a similar fragmentary view of the upper end of a bracket member.

FIG. 5 is an exploded isometric view drawn to the same scale as FIGS. 3 and 4 and showing mechanism for restraining the lower corners of the containers.

FIG. 6 is another exploded view showing a fragmentary section of one of the cross beams and its associated mechanism for securing containers thereto.

FIG. 7 is a view similar to the lower portion of FIG. 2 to show stowage on the deck instead of on a hatch cover.

FIG. 8 is an isometric view illustrating corner fittings for a lower and an upper corner of a container, and

FIG. 9 is an isometric view of a beam and bracket arrangement for a two high stow.

DETAILED DESCRIPTION

In FIG. 1 an assemblage 10 of individual freight containers is shown with the containers arranged in tiers or layers. There are three tiers, a first as lowermost tier 11, a second tier 12 and a third tier 13. The individual containers are identical with one another and the first tier 11 is made up of two containers 14 and 15 in horizontal alignment with each other. The second tier 12 consists of containers 16 and 17, and the third tier 13 consists of containers 18 and 19. Each of these containers is 20' in length so that each tier is 40' long.

Each of the three tiers 11, 12 and 13 may be considered to form a stack which may be indicated by reference numeral 21, and assemblage 10 comprises a sufficient number of stacks to correspond with the dimensions of the hatch cover 20 which corresponds in dimensions to the hatch coaming 20a. As shown in FIG. 1 there are four stacks 21, 22, 23 and 24, and a portion

of a fifth stack is shown broken away. The total number of stacks in assemblage 10 is seven.

The steel beams 25, 26 and 27 which will be referred to in some detail later on are described as cross beams since they extend from one side to the opposite side of assemblage 20 and also athwartship, the ship center line being shown at the right in FIG. 1. The longer dimension of the hatch lies athwartship. The front side of assemblage 10 as illustrated in FIG. 1 is on the starboard side of the ship, and the opposite side of the assemblage is on the port side.

At the corners of the containers there are corner fittings such as shown at 28 and 29 in FIG. 8. They are made in rights and lefts according to their locations. These fittings are rigid with the metal of the container usually through welding. Each upper corner fitting 28 has an elongated opening 30 in its top and somewhat similar openings 31 and 32 in its side and end respectively, for the purpose of receiving stacker keys as will presently be described. The lower corner fittings 29 have similar openings therein except that opening 30a is in the bottom of the fitting, whereas openings 31a and 32a are respectively in the side and end of the fitting as before.

The stowage system of the invention includes bracket members 33, 34 and 35 which are supported on posts 36, 37 and 38, all three bracket member and post combinations being of similar construction. Bracket member 33 and post 36 are shown in detail in FIG. 2. The bracket is a right triangular structure that in upright position has a vertical inner face 39 which rests against the side of the adjacent container 14 when in stowing position, and an outer face 40 which is angular with respect to inner face 39. The lower ends of these two faces extend upwardly from a base 41 which is connected to post 36 by both a horizontal hinge 42 and a vertical hinge 43.

Vertical hinge 43 consists of a short cylindrical shaft 44 that fits within a cylindrical opening in post 36 which is hollow and which is welded at its bottom, as indicated at 45, to the deck 46. In order to retain shaft 44 in place a pin 47 extends through the wall of hollow post 36 and engages a circular groove 48 in the upper portion of the shaft. Post 36 in addition to being welded to the deck is further stabilized by a connection to the coaming 20a through a vertical steel plate 49 the side edges of which are welded to coaming 20a, deck 46 and post 36 respectively.

Because of their horizontal and vertical pivots the bracket members can be laid on the deck surface alongside of the coaming as shown for example by bracket 34 in FIG. 1, if, for example, no containers are to be carried on the hatch covers or the ship's deck. To fold a bracket from the positions of brackets 33 and 35, the several connections (to be described) between the bracket and adjacent containers are first removed. Then the bracket is swung about its vertical pivot through an angle of about 90° and folded by swinging about its horizontal hinge 42 to the deck position.

Bracket 34 is shown in folded position in FIG. 1 for illustrative purposes, and it can remain in this position when 40' containers are used. However with a double stack of 20' containers as in FIG. 1, bracket 34 is to be erected in the same position as brackets 33 and 35. It is important to have all three brackets in engagement with the adjacent containers as will be presently described.

Each of the bracket members is conveniently made as a steel casting and comprises a triangular web section with the faces 39 and 40 and base 41 formed as flanges as indicated in the drawings, base 41 having an extension forming a foot portion 51 (FIG. 3).

The setting up of bracket 33 shown in FIGS. 2 and 1 will be described in some detail, it being understood that the other two brackets 34 and 35 are set up in the same way. Starting with bracket 33 in the folded position corresponding to that of bracket 34 in FIG. 1, it is first swung to upright position by rotation about horizontal hinge 42. This may conveniently be done by means of the crane which is used to handle the containers, an eye 50 being provided at the upper end of each bracket member (FIG. 2) for the connection to a hook on the end of the crane hoist line. The bracket is then swung on its vertical axis 43 until its foot 51 is received between a pair of spaced stop blocks 52 (FIG. 3) which are welded to hatch cover 20. These blocks prevent the bracket from swinging horizontally in either direction.

On each side of foot member 51 on each of the brackets 33, 34 and 35 there are keys 53 and 54 as shown in FIG. 3. Each of these keys is in the form of a lug or nose extending upwardly from the surface of foot portion 51 for a distance of about 2 inches and usually having flat parallel front and rear surfaces and a curved upper surface sloping outwardly with respect to the bracket member. Such surface may be in the form of a segment of a cone. The purpose of a key formation of this sort is to cooperate with the openings previously described in connection with the container corner fittings such as fittings 28 and 29 shown in FIG. 8.

After bracket members 33, 34 and 35 have been erected as above described the first two containers 14 and 15 may be lowered into position by the crane. In so doing the corner fittings 29 on the respective inner corners of these containers 14 and 15 will engage the respective opposite side portions 55 and 56 of foot member 51 of the central bracket member 34 (FIG. 3), the opening 30a in each of these bracket members engaging the corresponding key 53 or 54.

In addition corner fitting 29 at the farther end of container 15 (FIG. 1) will engage and rest upon side 56 of the foot portion 51 of bracket member 33. Also the corner fitting 29 at the right end of container 15 will similarly engage and rest upon side 55 of the foot member 51 of bracket 35.

Deck sockets 57 (FIG. 5) are arranged in spaced relation along the surface of hatch cover 30 both at the right of container assemblage 10 and also at the left which is the rear as shown in FIG. 1, as well as along the center line or midstack of the assemblage. Each of these deck sockets 57 includes a base portion 58 which is welded to the steel plate forming hatch cover 20. These bases contain a pair of elongated apertures 59.

A stacker key 60 is mounted in one or both apertures 59, only one of these being shown in FIG. 5. Each of these stacker keys includes a plate 61 having a key 62 similar to keys 53 and 54 extending upwardly therefrom, and a formation spaced below plate 61 having laterally projecting toe portion 63.

The stowing equipment includes a supply of these stacker keys and before any container of assemblage 10 is placed in position stacker keys 60 are mounted in the apertures 59 of base portions 58 at all locations of the deck sockets 57. This is done by rotating stacker key

60 clockwise from the position of FIG. 5 by means of a pin 64 (placed in hole 65) to a position where a toe portion 63 on key 60 will enter aperture 59. Then the stacker key is rotated counterclockwise slightly until toe 63 engages beneath a chamfered lip which extends around the rim of each of the apertures 59.

This holds stacker key 60 in position for its nose 62 to be received within the bottom aperture 30a of a bottom corner fitting 29 of any of the first tier containers 15. Once the container is in position the stacker key is prevented from rotative movement by engagement of its nose 62 with aperture 30a, and this holds the toe 63 in locked position with respect to its aperture 59. Pin 64 extends through opening 32a in the corner fitting 29 and serves to provide vertical restraint for the container. Pin 64 is prevented from displacement by turning its lateral fingers down into engagement with the wall containing opening 32a.

Stacker keys 60 are installed in all of the deck sockets 57, that is, those which have been welded to the hatch cover plate 20 at the two ends of the container assemblage 10 and at the midstack row. All of the lower tier containers 14 and 15 are then loaded with their corner fittings engaging the stacker keys 60 of the various deck sockets 57 as above described.

The next operation is the loading of all the containers 16 and 17 which form the second tier of assemblage 10. The first step is the securing of the top portions of bracket members 33, 34 and 35 to the upper portions of the side containers 14 and 15 of the first tier.

Referring to FIG. 4 a double stacker plate 66 has been placed at the top of center bracket 34. This plate has a T-shaped recess 67 at its outer edge to receive the upper end portion 68 of the bracket face 39 which has been made slightly narrower in width. Narrowed portion 68 extends downward from the top of the bracket to allow plate 66 to be shifted up or down to accommodate containers of somewhat different height, for example, 8 ft. or 8 ft. 6 in. containers. Plate 66 has two spaced keys 69 and 70 projecting downwardly from its lower face, and two similar keys 71 and 72 projecting upwardly from its top face. When plate 66 is placed in position the keys 69 and 70 enter the upper apertures 30 of the adjacent upper corner fittings 28 of containers 14 and 15. Thus bracket 34 is secured to the upper portions of the two lowest tier containers 14 and 15.

The upper end portions of the end brackets 33 and 35 are connected to the respective containers 14 and 15 in a similar manner, it being understood that the key on only one half of each of the plates 66 receives a container corner fitting.

With the upper portions of containers 14 and 15 of lower tier 11 connected to the three bracket members 33, 34 and 35, containers 16 and 17 of the second tier 12 are to be loaded. However before this is done stacker keys 60 are applied to all of the corner fittings 28 of all of the first tier containers of assemblage 10. The toe portions 63 of the stacker keys are received in openings 30 of corner fittings 28 instead of the openings 59 of deck sockets 57.

The containers forming the second tier 12 are secured in position by the stacker keys 60 projecting upward from the corner fittings 28 of the lower tier into apertures in corner fittings 29 of the second tier containers 16 and 17. The second tier containers 16 and 17 are also held at their outer corners by keys 71 and 72 on plate 66 on center beam 26. To provide vertical re-

straint for the second tier containers pins 64 are inserted in the apertures 65 of the respective stacker keys and the lateral fingers at the outer end of each of these pins are turned downwardly as before thereby engaging the outer wall with its opening 32a of each of the corner fittings 29 and holding the pins against displacement.

In order to prepare for the loading of the third tier 13 of containers the cross beams 25, 26 and 27 are replaced in position with the aid of the hoist line of the crane. The horizontal flange of beam 25 and a similar flange 74 of beam 27 rest upon the outer corner portions of the containers and their upper corner fittings 28.

Beams 25, 26 and 27 are provided with twist-locks for securing to them the containers 18 and 19 of the third tier 13 of assemblage 10. Twin twist-locks 75 such as shown in FIG. 6 are arranged in spaced relation corresponding to the width of the containers along each of these beams. An array of these twist-locks is indicated on beam 27 in FIG. 1 and as will be seen from FIG. 6 they are mounted on the horizontal flange 74 of this beam. A similar array of twist-locks is arranged on cross beam 25, and inasmuch as the midstack beam 26 is T-shaped having two horizontal flanges 76 and 77, a set of twist-locks is provided on each of these flanges.

It will be understood that a single twist-lock such as indicated at 78 or 79 in FIG. 6, and including a support similar to support 80 but of only about half the length, is used at the end positions of each of the cross beams 25, 26 and 27, central cross beam 26 having two of these single twist-locks arranged side by side on its two flanges.

Referring to FIG. 6 for the details of construction, these twin twist-locks 75 comprise two twist-locks 78 and 79 mounted on a common support 80 in the form of a steel plate having downwardly extending flanges 81 at its front and rear and forming between them a U-shaped recess.

Each of the twist-locks 78 and 79 comprises a key or nose 82 similar in form to nose member 62 of the stacker key 60 and to members 69-71 of double stacker plate 66, as well as to members 53 and 54 on the feet 51 of brackets 33, 34 and 35. The nose members 82 extend upwardly from a somewhat similar shaped formation 83 which is fixed in position and made integral with support 80. Nose members 82 can be turned through an angle of approximately 90° with respect to their lower formations 83 by means of handles 84.

Vertically below each of the nose pieces 82 there is a loosely mounted key member 85 of generally similar formation to the key members previously referred to. To provide a loose mounting each key member 85 is fixed to a small steel plate 86, and these plates are received loosely within the U-shaped recess between flanges 81, the various parts being assembled on the upper surface of one of the flanges of the cross beams such as flange 74.

Key members 85 project through openings 87 of larger dimensions than the keys to permit the keys to be movable or shiftable so as to be readily received within the opening 30 of corner fittings 28 of containers 16 and 17 of the second tier 12 of assemblage 10. By providing a loose mounting for the keys 85 an allowance is made for the warping or wracking of the containers. It will be understood that the bottoms of

flanges 81 are welded to the upper surface of flange 74.

When the uppermost tier 13 of containers is placed in position the noses 82 of the twist-lock mechanisms enter the openings 30a of corner fittings 29 on the bottoms of the containers 18 and 19 forming tier 13. Thereupon the handles 84 of the twist-locks are swung to turn the nose pieces 82 at right angles and thus are in locked position and provide vertical and horizontal restraint for the containers. In this manner the tier 13 containers 18 and 19 are secured to the three beams 25, 26, and 27.

Any suitable means may be employed for the purpose of simultaneously adjusting the position of the handles 84 of the twist-lock mechanisms in the three rows, the midstack row and the two end rows.

The cross beams 25, 26 and 27 are connected to the deck, or advantageously to the lower portions of the respective bracket members 33, 34 and 35 by rod lashes 88. Only two of these can be shown because in FIG. 1, bracket 34 is in folded position against the deck. Each of the rod lashes 88 is connected at its upper end by a pivot joint 89 to its cross beam. At its lower end it is connected to the lower portion of its bracket, bracket 33, 34 or 35 by means of a quick buckle 90.

This device includes a body member 91 which is pivoted at 92 to the bracket member and which at its upper end has a laterally open slot 93. With this construction a series of washer-like spacers 94 may be threaded on to the lower end portion of rod 88 to produce the particular length of rod lash necessary for the particular installation. In fact, a surplus of these washers may be carried on rod 88 and only the required number of them placed below the slot 93. Thereupon a nut 95 threaded on to the lower end of rod 88 is tightened by means of a hand wrench to apply the desired stress to the cross beam.

Referring now to FIG. 7 the arrangement of the several containers forming the assemblage 10 is the same as previously described except that the assemblage is supported on the deck 46 of the ship instead of on a hatch cover. For this reason the horizontal hinge 42 for each of the bracket members, for example bracket 33a is located somewhat above the deck surface instead of being at the same elevation as the hatch cover. Its base portion 41a engages the surface of deck 46 so that it may be confined between the two stop members 52a which are welded to the deck instead of to the hatch cover as before. Consequently base portion 41a includes an upright step section 95 in order properly to connect with hinge 42.

Because of the lower position of the bracket member its post 36a is mounted below deck 46 instead of above. The upper end of this hollow post is welded to the lower surface of the deck, and angular supporting plates 96 are welded both to the lower surface of the deck and to the sides of the post member. The vertical shaft 44a extends through an opening in the deck in order to support its portion of hinge 42. Otherwise the parts constituting the vertical hinge 43a are the same as described in connection with FIG. 2.

Referring to FIG. 9, in order to provide a very rigid two-tier, or two high, stow of containers, the beams 25, 26 and 27 are arranged at their ends to fit the tops of bracket members 33, 34 and 35 respectively. This may be accomplished by providing a T-shaped recess 97 near the end of each beam similar to recess 67 in plate

66 of FIG. 4. A locking device is used to retain each beam in place, such, for example, as a pin 98 mounted in aperture 50 in the associated bracket member.

It will be understood that the same arrangement of bracket and post members which has been illustrated and described for the starboard side of assemblage 10 is also provided on the port side of the assemblage. It will be further understood that whereas each of the bracket members is restrained against horizontal swinging movement by means of the stops 52, the movement of the bracket member against vertical movement, i.e., turning on its horizontal axis, is restrained by the described connections with the containers of the lowest tier 11 and second tier 12, these containers in turn being restrained against both horizontal and vertical movement by the corner fittings and the members cooperating therewith as described.

I claim:

1. In a system for stowing multiple tiers of containers as deck cargo, wherein,

- a. the containers have at each corner thereof a corner fitting rigidly attached thereto and formed with an outward opening on each face of the container; and
- b. means are provided for engaging said corner fittings through said openings for interconnecting adjacent containers both vertically in tiers and horizontally,

the improvement in combination therewith which comprises:

- c. bracket members mounted to a base and capable of engaging a side portion of at least one of the containers forming at least part of a first tier, said bracket members extending in engaging relation at least with said first tier container from the lower portion thereof to the lower portion of a container forming at least part of a second tier;
- d. means for securing each of said bracket members to said base in a manner which permits pivotal movement thereof about vertical and horizontal axes;
- e. means for securing the upper portion of each bracket member to the corner fittings of the containers forming part of the first and second tiers such that the containers are restrained from substantial horizontal movements; and
- f. means for restraining each of said bracket members from rotation thereof about either said vertical or said horizontal axes.

2. A system for stowing multiple tiers of containers as deck cargo according to claim 1 in which beams extend crosswise of the containers between the second and third tiers at the center of said tiers and at the opposite ends thereof, and deck lash means is connected at its upper end to each of said beams.

3. A system for stowing multiple tiers of containers as deck cargo according to claim 2 wherein said lash means is connected at its lower end to the lower portion of the adjacent bracket member.

4. A system for stowing multiple tiers of containers as deck cargo according to claim 3 in which the lower end of said lash means is connected to the adjacent bracket member by a quick buckle.

5. A system for stowing multiple tiers of containers as deck cargo according to claim 1 in which posts for supporting bracket members are mounted on the deck and each bracket member is connected to its associated

post by a double hinge, said hinge being adapted to permit vertical and horizontal pivotal movement for the bracket about vertical and horizontal axes.

6. A system for stowing multiple tiers of containers as deck cargo according to claim 5 in which the lower ends of the posts are welded to the deck, and the tops of the posts are located at an elevation near that of the top of the hatch.

7. A system for stowing multiple tiers of containers as deck cargo according to claim 5 in which each of the posts is hollow and has a short vertical shaft therein affording the vertical pivot for the bracket member, said shaft having at its upper end a horizontal joint pivotally connecting the bracket member with the post so as to permit rotation of the bracket member about a horizontal axis.

8. A system for stowing multiple tiers of containers as deck cargo according to claim 5 in which the posts project below the deck and are welded to its lower surface thereby supporting the bracket at substantially the upper surface of the deck.

9. A system for stowing multiple tiers of containers as deck cargo according to claim 1 further comprising means for securing the upper end portion of each bracket member to the upper portion of the container of the first tier and to the lower portion of the container of the second tier.

10. A system for stowing multiple tiers of containers as deck cargo according to claim 1 in which each bracket member has a foot portion projecting from its base, said foot portion having two spaced stacker keys projecting vertically therefrom, the corner of the adjacent first tier container resting on said foot portion and having an opening therein for receiving one of said stacker keys.

11. A system for stowing multiple tiers of containers as deck cargo according to claim 9 in which the upper end portion of the bracket member is connected to said adjacent containers by a double stacker plate having upwardly and downwardly projecting key members engaging corner fittings on the second and first tier containers respectively.

12. A system for stowing multiple tiers of containers as deck cargo according to claim 1 in which each of said bracket members has a foot member extending horizontally beyond its inner face, said foot member having a central division plate interconnecting its upper surface with the surface of said inner face, and also having a key member extending upwardly on at least one side of said plate for receiving the opening in the corner fitting of a container, said division plate serving to guide the corner of said container into position on said foot member.

13. A system for stowing containers as deck cargo according to claim 1 but including only two tiers of containers, and in which beams extend crosswise of the containers between said tiers at the center of said tiers and at the opposite end thereof, and said system further including means for releasably securing the opposite ends of said beams to said bracket members.

14. A system for stowing containers as deck cargo according to claim 13 wherein said securing means includes a crosswise slot near each end of each of said beams in which is received the upper end portion of the adjacent bracket member.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,776,169 Dated December 4, 1973

Inventor(s) Strecker

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

1. Column 2, line 6, "assemblage 20" should read
-- assemblage 10 --.
4. Column 3, lines 43 and 44, "container 15" should read
-- container 14 --.
5. Column 3, line 50, "cover 30" should read
-- cover 20 --.
6. Column 5, lines 9 and 10, "replaced" should read
-- placed --.
10. Column 8, line 25 in claim 9, "megber" should read
-- member --.

Signed and sealed this 17th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents