

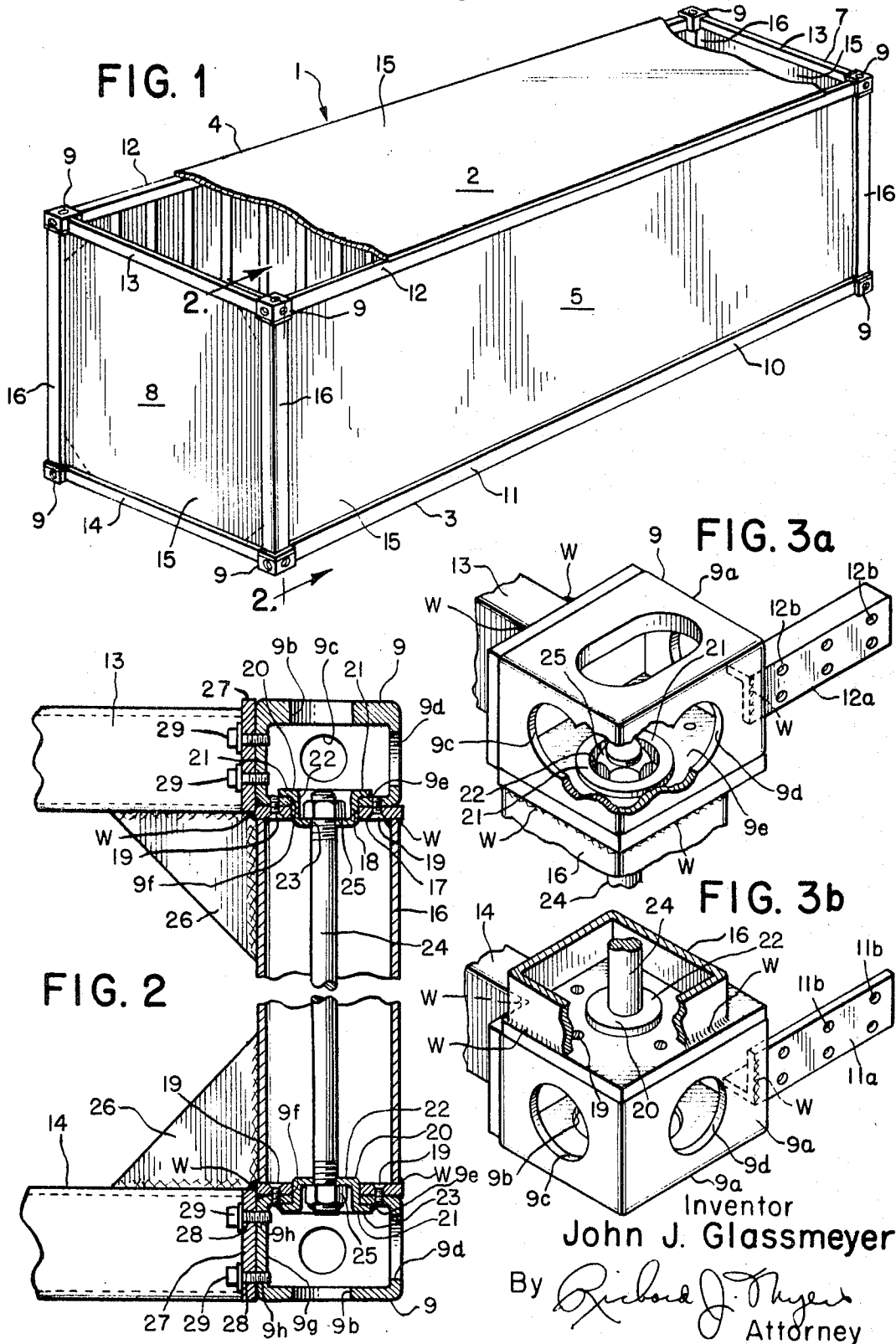
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CONTAINER FRAME STRUCTURE

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CONTAINER FRAME STRUCTURE

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11 Claims

ABSTRACT OF THE DISCLOSURE

A trailer or container frame construction wherein the end frame structure comprises a pair of upright hollow lighter weight aluminum corner posts, each of the posts having extending vertically therethrough tension tie-rod means secured to a pair of top and bottom steel corner fittings on opposite ends of the post, the steel tie-rod means being placed in tension and the aluminum corner posts being placed in compression whereby the design provides a weight saving in using the aluminum posts, aluminum headers and aluminum sills with a stronger over-all structure having steel corner fittings and a steel tension member which will relieve the aluminum welds of the aluminum plates fixed to the corner fittings attaching the plates to the posts, headers and sills, the aluminum welds being relieved from tensile loading.

BACKGROUND OF THE INVENTION

Field of invention

The field of art to which this invention pertains is container construction and in particular to cargo containers which may be transferred from one mode of transportation to another as between over-the-highway trailers to railroad cars, aircraft or ships, or vice versa. The invention particularly relates to an improved container construction which is of light weight and yet of sufficient strength to withstand failure due to transferring, stacking, etc. of the containers when in transit or when in storage.

Description of the prior art

In the construction of cargo containers, in particular those built to United States of American Standards Institutes (USASI) or International Standards Organization (ISO) standards, it is highly desirable to build the end frames of the container out of aluminum rather than steel in order to reduce the tare weight of the container. However, a field trouble is the unreliability of the structural welds which attach the corner posts of the containers and the corner fittings of the containers together, when the assembly is subjected to tensile loading, as during hoisting of a container by means of a crane. Another problem is the inherent weakness of aluminum corner fittings which results in breakage in service. Therefore, there exists a need for a design which will combine a substantial weight savings by using aluminum posts, aluminum headers and aluminum sills of a container with a stronger structure having steel corner fittings and a steel tension member which relieves the aluminum welds from tensile loading. In a broader sense there is required a tension member or tension means which will relieve loads on the corner posts as well as relieving loads on the weldings holding the corner posts and the corner fittings together. The invention herein described solves these problems.

SUMMARY

The invention provides for an improved cargo container construction and in particular provides for a container frame having tension means extendable through the corner posts and pre-loaded to provide a compressive

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force on the post to prevent separation of the corner fitting from the corner post when the container construction is subject to tensile loading as during hoisting of the container by means of a crane. Further, the inventive container construction reduces or prevents the application of tensile forces to the structural welds between the corner post and corner fittings. Also, the inventive container construction provides for a container frame having corner fittings and posts of either similar or dissimilar materials using a tension member extending through the post and between the corner fittings, the tension member being pre-loaded at installation or the corner post being compressed before installation of the tension member. Also, the inventive container construction provides for a container frame of like or unlike materials with a tension member pre-loaded to provide a compressive force on the post equal to the maximum USASI stacking load, such that the result would be a pre-stressed post in which the compressive stress would remain constant whether a container had none, one, two, three, four or five containers stacked on top of it. Further, the invention comprehends a novel post construction which will provide a substantial weight savings by using aluminum posts, aluminum headers and aluminum sills with a stronger structure having steel corner fittings and a steel tension member which will relieve the aluminum welds holding the cap plate to the corner post from tensile loading. These and other objects and advantages will become apparent from reference to the following description, attached drawings, and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the novel trailer cargo container;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1; and

FIG. 3a and FIG. 3b are enlarged perspective views, partially in section, of the corner fittings, corner post and tension means therefor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the drawings, there is shown the novel cargo container 1 being provided with top 2, bottom 3 and sides 4 and 5 and ends 7 and 8. At each of the corners of the container 1 there is provided the usual corner fitting or corner casting 9. Each corner fitting 9 is similar in construction to every other corner fitting and is provided with holes 9b, 9c and 9d that are in the hollow box construction 9a. The corner fittings form part of the framework 10 which also includes bottom side frames 11, top side frames 12, top end frames or headers 13 and bottom end frames or sills 14 and corner posts 16. The top side frames are provided with an angle plate 11a having holes 11b therein for attachment of the top side frames 12, and also the bottom side frames are provided with angle plates 12a having holes 12b for attachment of the bottom side frames 11. With the exception of the corner post construction the design of the container 1 so far described is of conventional construction for use on a highway vehicle such as a semi-trailer or for use in aircraft, ships or railroad cars attendant to transportation of the container on one or more of such modes of transportation.

Attention is now directed to the novel features of the invention, to wit:

There is provided within each of the hollow corner posts tension means such as the tension member or bolt 24 and each of the nuts 25 attached thereto. Each corner fitting has its inside plate 9e provided with a hole or aperture 9f for reception of the tension bolt 24 there-

through. Against the inside plate 9e of the corner fitting 9 and in vertical alignment therewith is the outer cap plate 17 of the corner post 16, one such cap plate 17 being at the top and one at the bottom of each of the corner posts 16. Each cap plate 17 is provided with an aperture 18 in alignment with the aperture 9f and extending through each of these apertures 9f and 18, is a flanged cup 20 having flange 21 seating against the inside of the inside plate 9e and having a cup portion 22 extending inwardly into the corner post 16, the cup portion 22 on the inside thereof being provided with a hole 23 for reception of the tension rod or bolt 24 therethrough. The screws 19 hold the cap plates 17 to the corner fitting plate portions 9e. As shown in particularly FIGS. 2 and 3, in the assembled condition the tension rod with its nuts 25 and cups 20 are so arranged that the corner fittings 9 are tied to the corner posts 16 to prevent their separation. The corner fittings 9 are further each provided, on their inwardly facing container plates 9g, with holes 9h which receive therethrough screws 29 which also extend through holes 28 in the header and sill side plates 27 whereby the bottom sill 14 and top header 13 are held to the posts 16. Gusset plates 26, 26 are located at the upper and lower portions of the juncture of the front header 13, with corner posts 16 to reinforce the juncture of the header with each corner post.

The upper and lower members 13 and 14 are held to the corner post by welds W. The side sill structures 11 and 12 are held to the corner fittings by bolts or rivets extending through angles 11a and 12a.

In the embodiment disclosed herein, the posts, headers and sills are constructed of aluminum metal as are the cap plates 17 and the side plates 27, both of which are held by aluminum welds W to the corner fittings or castings 9. The tensile means or tensile tie rod 24 and the nuts 25 are constructed of steel. In assembly, the steel tension rod 24 is inserted through each of steel cups 20, 20 of the corner fittings 9, 9 on either end of each corner post 16, and each of the nuts 25, 25 is placed on the tension rod. The lower or bottom nut 25 is welded to the lower portion of the tension rod 24 and the top nut 25 is torqued, placing the tension rod or tie rod 24 in tension until a force of, for example, 22,400 lbs. for 20 foot containers is exerted on the tie rod 24 and this places the aluminum corner post 16 under 22,400 lbs. of compression. Thus, you must place upon each of the corner fittings 9 and 9 tensile force in excess of 22,400 lbs. in order to place the corner posts 16 in tension. Consequently, until the tensile force of 22,400 lbs. is exceeded there is no tensile load placed upon each of the corner posts 16. This provides an advantage when you are stacking one container upon another such that when you lift a plurality of containers that are attached together the tensile force on any one container at the corner post must exceed 22,400 lbs. before the corner posts are affected and the aluminum welds 17 are placed in tension. Thus there is a built-in safety factor on the aluminum welds W between the corner posts and the cap plates in excess of 22,400 lbs.

Under such an arrangement you end with a light weight constructed container frame arrangement of light weight aluminum corner posts, sills and headers but with a relatively strongly constructed tensile force resistant container and frame construction by using steel tie rods under tension. Further, such an arrangement provides for a pre-stressed post in which the compressive stress of the post would remain constant whether a container had none, one, two, three, four or five containers stacked on top of it so long as you had pre-loaded the tie rod with sufficient tensile force.

A container frame may also have corner fittings and posts of similar or dissimilar material using a tension member other than a threaded rod, for example, pre-loaded by heating or stretching of the tension member

before installation or compressing the post before installation of the tension member.

The foregoing description and drawings merely explain and illustrate the invention and the invention is not limited thereto, as those skilled in the art who have the disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

What is claimed is:

1. A trailer cargo container means or the like comprising:

a container construction comprising a frame arrangement having a hollow corner post with upper and lower apertured ends and including upper and lower corner fittings disposed outwardly and about the respective upper and lower ends of the corner post, each corner fitting having an inner wall having an outside engaging a respective end of the corner post and having an aperture,

tension means within and extending through said corner post and the aperture of each of said corner fittings, and means for tying each end of the post with a respective fitting comprising a cup for each end of the corner post each engaging the inside of the inner wall of a respective fitting, each cup having a recessed apertured portion extending into the aperture of each corner fitting and receiving a respective end of said tension means therethrough, and locking means for each cup being in each recessed portion whereby each corner fitting interior is substantially unobstructed, each locking means being engageable with each respective cup and with each end of the tension means for drawing a respective corner fitting against a respective corner post,

said tension means being placed in tension and said corner post being placed in compression with said corner fittings being drawn against said corner post.

2. The invention according to claim 1, and welding attaching each cup to the inner wall of each corner post, said welding being relieved of tensile forces.

3. The invention according to claim 1, and welding said locking means to said tension means.

4. The invention according to claim 1, and said tension being a rod,

said locking means for placing said post in compression comprising nut means threadable on said tension means against said corner fittings for drawing said corner fittings against said corner posts and placing the latter in compression.

5. The invention according to claim 1, and said corner fittings being of one metal and said post being of a lower strength metal.

6. The invention according to claim 1, and said tension means comprising a tension rod of a high tensile strength material and said post being comprised of a material of lower tensile strength than said corner fittings.

7. A trailer cargo container means or the like comprising:

a container construction comprising a frame arrangement having a corner post and the corner post including upper and lower corner fittings disposed outwardly and about respective upper and lower ends of the corner post,

tension means extendable through said corner post and attached with each of said corner fittings,

said tension rod being placed in tension and said corner post being placed in compression whereby said corner fittings are drawn against said corner post,

said corner fittings being of a higher strength material, and said posts being of a lower strength material,

plate means of the same material as said corner posts being welded to said corner posts, and

means extendable through said plate means and cou-

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plable with said corner fittings and said post, and receiving said tension means for applying tension to said corner fittings and compression to said corner posts.

8. A trailer cargo container means or the like comprising: 5
 a container construction comprising a frame arrangement having a corner post and the corner post including upper and lower corner fittings disposed outwardly and about respective upper and lower ends of the corner post, 10
 tension means extendable through said corner post and attached with each of said corner fittings, 15
 said tension rod being placed in tension and said corner post being placed in compression whereby said corner fittings are drawn against said corner post, said corner fittings being of a higher strength material, and said posts being of a lower strength material, 20
 plate means of the same material as said corner posts being welded to said corner posts, and 25
 means extendable through said plate means and couplable with said corner fittings and said post, and receiving said tension means for applying tension to said corner fittings and compression to said corner posts, 30
 weld means attaching said corner posts to said plate means of the same material as said corner posts, said plate means being couplable with said corner fittings of different material, and 35
 said tension means placing said corner post in compression while placing said tension means in tension, thereby relieving said welds from tensile forces up to a pre-determined limit.
9. The invention according to claim 1, and 40
 each end of said corner post having a plate closing the end thereof and having an aperture therein defining a respective apertured end.
10. The invention according to claim 9, and 45
 welding each post plate to each end of the tubular post.
11. A trailer cargo end container construction comprising: 40
 a frame having a pair of upright spaced apart corner posts and a pair of vertically spaced horizontal top and bottom frame members, 45
 corner fittings at the top and bottom of each post connecting each of the ends of the upper and lower

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frames with the upper and lower ends of each of the corner posts,
 each corner post being hollow and being provided with upper and lower apertured ends and having disposed outwardly thereof an upper and lower corner fitting,
 each corner fitting having an inner wall having an outside engaging a respective end of the corner post and having an aperture,
 tension means within and extending through each of said corner posts and through each of the apertures of the corner fittings associated with a respective corner post,
 and means for tying each end of the post with a respective fitting comprising a cup for each end of the corner post each engaging the inside of the inner wall of a respective fitting, each cup having a recessed apertured portion extending into the aperture of each corner fitting and receiving a respective end of said tension means therethrough, and locking means for each cup being in each recessed portion whereby each corner fitting interior is substantially unobstructed, each locking means being engageable with each respective cup and with each end of the tension means for drawing a respective corner fitting against a respective corner post,
 each upper corner fitting being connected with the other by said upper frame member and each of said lower corner fittings being connected with the other by said lower frame member,
 each of said tension means being placed in tension and each of said corner posts being placed in compression with each of said corner fittings being drawn against its respective corner post.

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