Oct. 30, 1962 D. J. REYNOLDS 3,061,133

LADING CONTAINER

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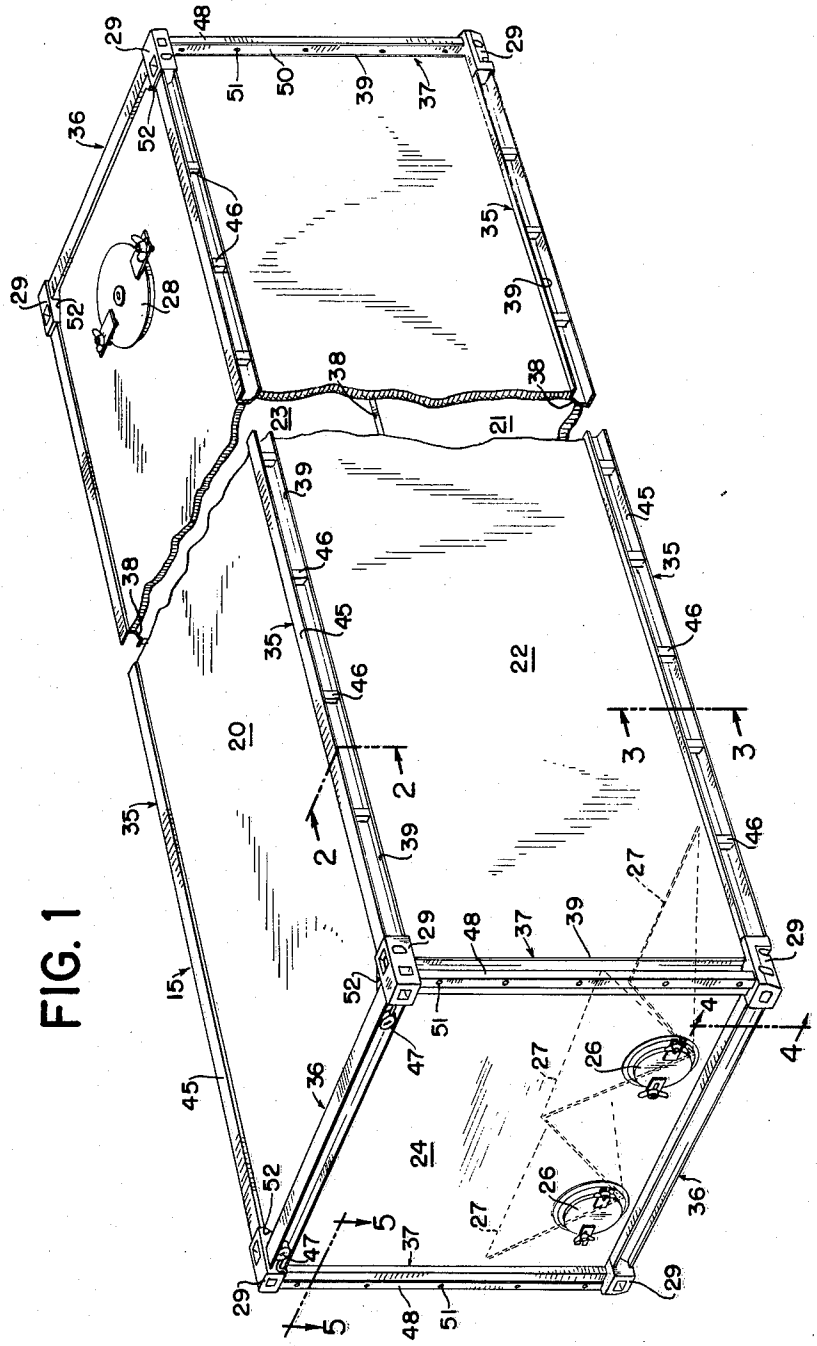


FIG. 1

INVENTOR
DAVID J. REYNOLDS

BY
Robert A. Shields
ATTORNEY

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FIG. 4

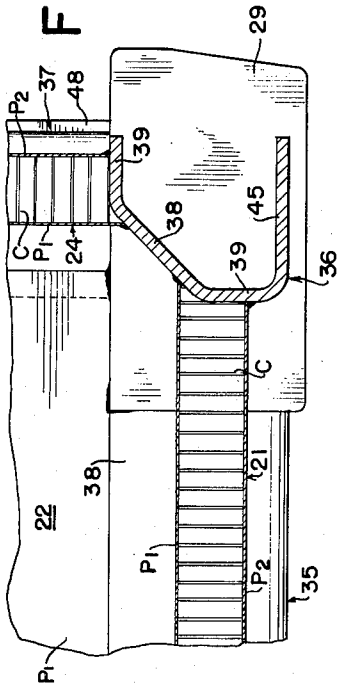


FIG. 5

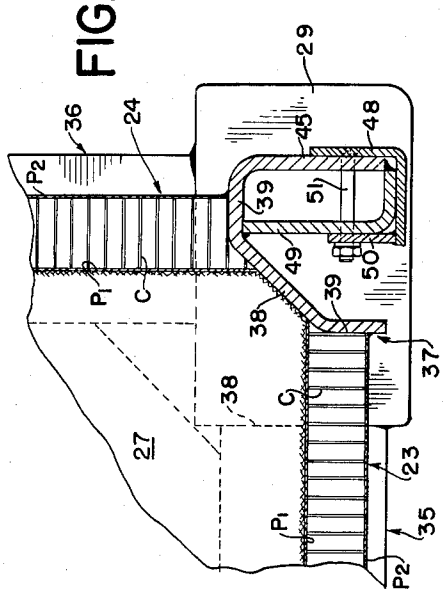


FIG. 2

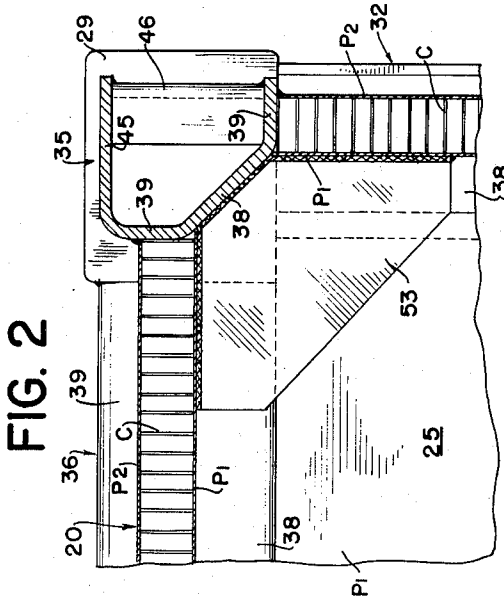
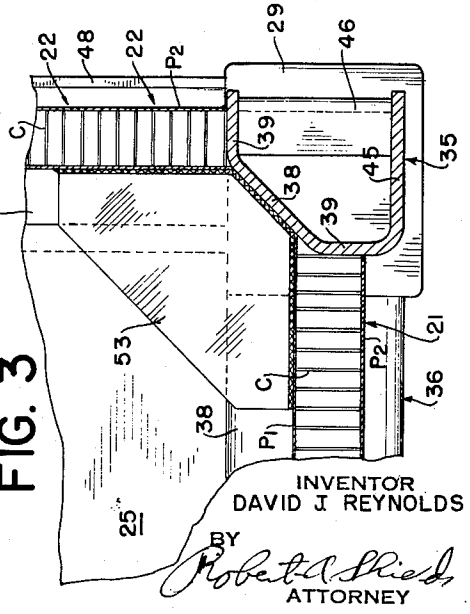


FIG. 3



INVENTOR
DAVID J REYNOLDS
BY
Robert A. Shield
ATTORNEY

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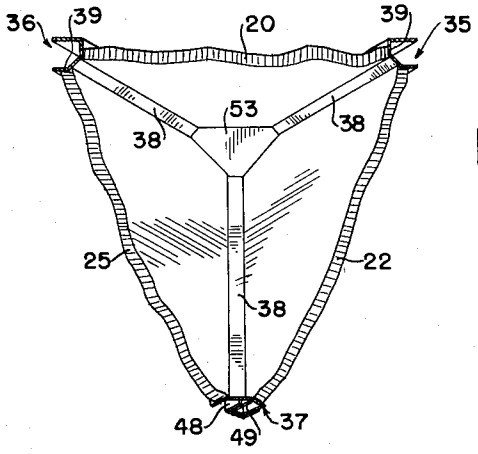


FIG. 6

FIG. 7

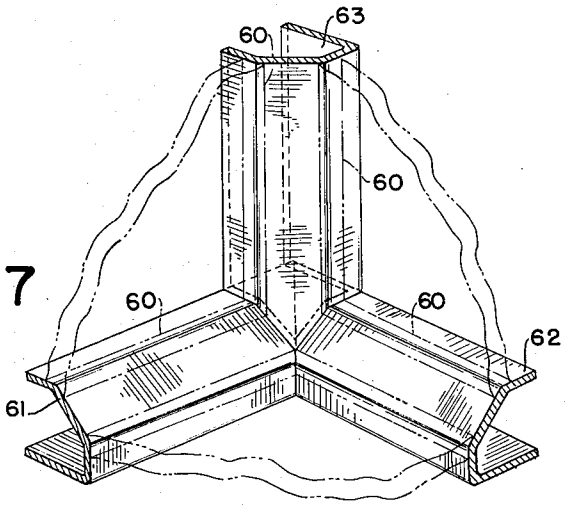
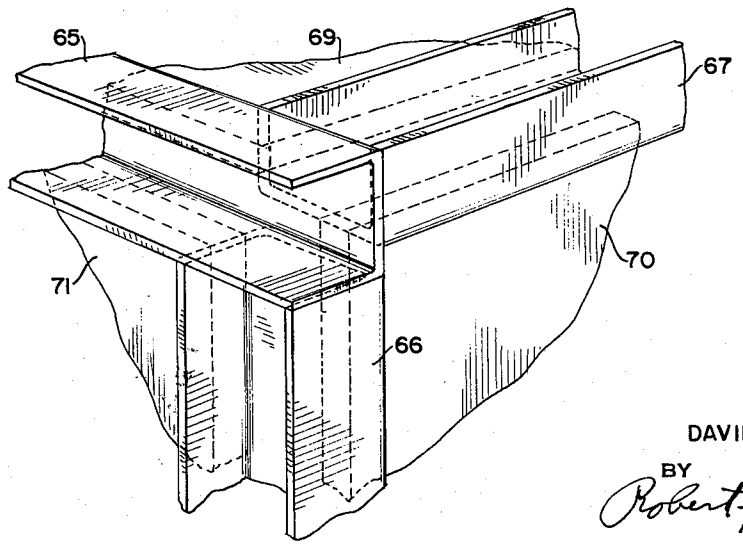


FIG. 8



INVENTOR
DAVID J. REYNOLDS

BY
Robert A. Shields
ATTORNEY

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LADING CONTAINER

David J. Reynolds, Berwick, Pa., assignor to ACF Industries, Incorporated, New York, N.Y., a corporation of New Jersey

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7 Claims. (Cl. 220—1.5)

The present invention relates generally to lading containers, and particularly to containers for transporting bulk materials. More particularly, the invention has to do with the use of lightweight sandwich paneling for such containers and with the framing therefor.

The objects of this invention include the provision of a container having identically formed wall, roof and floor sections and identically formed frame members, whereby simplicity of construction and economy of manufacture is achieved.

It is a further object of the invention to provide such a container having side and end wall sections, a roof section and a floor section formed of sandwich paneling, such as honeycomb structural material, each section having an inner and an outer panel secured by their opposing surfaces against a suitable core material.

It is a further object to provide framing for the container of the invention with identically formed longitudinal, transverse and vertical frame members, each connecting the edges of adjacent walls, roof and floor sections along a common surface, thereby eliminating the necessity of joining plural frame elements in the corners of the container and the attendant possibility of frame joinder crevasses, a condition which is most undesirable in lading containers intended to carry bulk materials where smooth inner surfaces are required.

It is another object of the invention to provide the frame members with skid elements extending in planes outwardly of and parallel with the container wall, roof and floor sections along the edges thereof and providing means at their inner surfaces for receiving container moving means, such as the prongs of a fork lift, along the entire length of each frame member. Thus the container of the invention is readily transferrable from one carrier to another without having to attach lift anchors and the like to the sandwich panel sections. Also, piercing the panels of a section to attach bracing means by bolts or the like which weakens the section as well as interrupts the smooth surfaces of the inner panels of the container is eliminated.

An understanding of the invention and its further objects and advantages will be had upon a reading of the following description with reference to the accompanying drawings of which:

FIGURE 1 is a perspective, partly broken away and partly in section, of a lading container embodying the present invention;

FIGURE 2 is a section taken along the line 2—2 of FIG. 1;

FIGURE 3 is a section taken along the line 3—3 of FIG. 1;

FIGURE 4 is a section taken along the line 4—4 of FIG. 1;

FIGURE 5 is a section taken along the line 5—5 of FIG. 1;

FIGURE 6 is a perspective showing one of the interior upper corners of the container of FIG. 1;

FIGURE 7 is a perspective showing a modified corner construction, and

FIG. 8 is a perspective showing a modification of the frame members of the invention.

In FIGURES 1–6 there is shown, a lading container 15 having a roof section 20, a floor section 21, right and left side wall sections 22 and 23 respectively and front and rear end sections 24 and 25 respectively. Each section is formed of honeycomb structural material and comprises an inner panel or sheet P_1 and an outer panel or sheet P_2 secured along their opposing surfaces to a suitable honeycomb core C.

The front end section provides outlet hatch cover assemblies 26 for covering openings into the interior of the container at the lower portion thereof. Underlying these openings are four triangularly shaped plates 27 forming lading guide surfaces extending from the floor to the front end section of the container. The two plates at the sides of the container extend upwardly along the side sections where they are connected at their outer edges. The guide surfaces are arranged so that when the container is lifted at its rear end and tilted forwardly the lading may be emptied through the nozzles. The rear end of the roof provides a fill opening and manway access covered by a hatch cover 28. Again the object is that the container may be tilted when being filled to distribute the lading forwardly from its entrance through the fill opening. To facilitate tilting and also lifting operations, each corner of the container provides a grab casting 29 for receiving lift mechanisms. These castings also perform the function of connecting the ends of the container framing elements now to be described.

The frame of the container is comprised of longitudinal frame members 35 for connecting the side wall and the roof and the floor sections, transverse frame members 36 for connecting the end and the roof and the floor sections, and vertical frame members 37 for connecting the end and the side sections. Each frame member in FIGURES 1–6 presents a web 38, the inwardly facing surface of which is the common securing surface for the peripheral edges of the inner panels of adjacent converging sections. The web is disposed at an obtuse angle to the connecting sections which are welded to the web to present a single, smooth corner framing with no lading catching crevasses. The flanges 39 of each frame member extend from the outer side of the web 38 and are bent outwardly to form obtuse angles to the web and to extend in planes perpendicular to their adjacent sections. In this respect, the web and flanges present a cross section forming a distorted channel facing or opening outwardly of the container. The outer panels or sheets have been made smaller to permit their edge connection to the flanges to facilitate the spacing, on either side of the web inner surface, of the connecting edges of the converging inner panels. In this way a maximum weld for each inner panel edge is accommodated.

Each frame member provides an integral reflange element 45 which, together with the web and flanges may also be considered to form a distorted channel with unequal flanges, comprising the reflange and opposing free flange, and a bent web, comprising the web 38 and the flange connecting the reflange. In the case of the horizontally disposed upper frame members connecting the roof, end and side sections, the reflanges extend outwardly from the upwardly extending flanges of the frame members and in a plane above the roof section of the container. In the case of the horizontally disposed lower frame members connecting the floor, end and side sections, the reflanges extend outwardly from the downwardly extending flanges of the frame members and in a plane below the floor of the container. In the case of the vertically disposed frame members connecting the end and side sections, the reflanges extend outwardly from the endwardly extending flanges of the frame members. Those at the front of the container extend in a plane forward of the end section, and those at the rear of the container extend in a plane rearward of the end section. Each re-

flange extends in parallel spaced relation to the other or free flange of its frame member, and its edge extends longitudinally of the member in a plane common with the edge of the other flange. A number of small channel pieces **46** are spaced along the length of the longitudinal frame members within the channels. They connect the third flange or reflange **45** and its opposing flange **39** for reinforcement.

The arrangement of the frame members is such that the side wall sections of the container are framed with laterally outwardly facing channels; the roof and floor sections are framed with endwardly facing channels at their ends and laterally outwardly facing channels at their sides; and the end sections provide endwardly facing channels at their upper and lower edges. The outwardly open channels accommodate the insertion of lifting or pulling or pushing means which may operate against the flanges of the frame member throughout its length. Also, in the container shown, the channel is utilized for the introduction therethrough of an electrical wiring system, not shown, for supplying electricity to lights **47** which are also recessed within the channel openings of the upper transverse frame members. The electrical lighting arrangement is for use when transporting the container over highways.

As previously indicated, the ends of the frame members are connected, as by welding, along the inwardly disposed surfaces of the block shaped corner grab castings **29**. The outer surfaces of the castings extend in a plane to the outside of their adjacent sections and frame members to provide corner bases at the bottom, bumpers at the ends and sides, and seats at the top to accommodate the stacking of another container thereupon.

A box beam is formed at each vertical corner of the container by the provision of a vertically extending L-shaped member **49** which is interposed between, and welded at its ends to, the edge of the reflange and the inner portion of the endwardly extending flange of the frame member. Angle rub rails **48** are provided at the vertically extending outer corners of the container. They abut and overlie the endwardly facing surfaces of the reflange elements of the vertical frame members and extend rearwardly at the front frame members and forwardly at the rear frame members to abut and overlie the outer surface of the small leg of the L-shaped members. A retainer strip **50** connects this end and the rub rail leg and extends along the outer surface of the longer leg of the L-shaped member. Nut and bolt assemblies **51**, extending through the rub rail at its lateral extension, the reflange, the L-shaped member and the retainer strip, secure the rub rail at the corners of the container.

It will be noted in FIGURES 3–5 that the front end section and the floor section are of equal thickness and that the roof and side sections as seen in FIGS. 2 and 3 as well as the rear section (not shown in cross-section) are not as thick as the floor and front end sections. This difference obtains because the container shown is to be tilted forward during the loading and unloading process and the thicker, stronger section at the front end is used to provide greater load bearing ability at that end. The floor section is thicker to accommodate the expected vertical load forces.

To accommodate the use of the rather substantial corner castings **29** the corners of the floor and roof sections are clipped at the inner vertical edges of the castings, as indicated at **52**. The upper and lower edges of the side wall sections and end sections end at their connection to the lower leg and web of the upper frame members and to the upper leg and web of the lower frame members, which are substantially in flush alignment with the downwardly and upwardly facing surfaces respectively of the corner castings. Therefore, it is not necessary to clip the corners of the side walls and end sections to accommodate the castings at these points.

FIGURES 2, 3 and 6 show the manner in which the

openings at the corners are closed. A triangularly shaped plate **53** is cut at its apices to fit the inwardly facing surfaces of the webs **38** of the mutually perpendicular frame members at the upper corners and at the right rear lower corners of the container. The side edges of the plate and the cut edges are connected to the sections and surfaces respectively by welding. This arrangement is not necessary at the front corners of the floor section as the lading guide plates **27** separate the container lading space and the front corners.

FIGURE 7 shows an alternate manner of closing the corners of the container. In this instance a corner casting, such as shown, is not used and the sections are not cut, but form square corners at their converging edges **60**. The horizontal angle members **61** and **62** are cut at their ends at forty-five degree angles to form a 90° angle joint and they are welded along their edge joinder. The vertical angle member **63**, extends to the corner joinder of members **60** and **61**, where the end edges of its flanges abut the outer surfaces of the upper legs of the horizontal members. The web of the member **63** is extended to form a pointed edge, the sides of which fit against the webs of the members **61** and **62**, its tip falling upon the joinder line of the webs of the members. The end edge of the reflange of the vertical member extends along the upper surface of the free flange of the member **62** and terminates with the end edge of that member.

In FIGURE 8, there is shown a modified form of the framing of the invention which utilizes regularly shaped channel members. The longitudinal roof frame member **65** and the vertical side frame member **66** have their channels facing outwardly while the transverse roof frame member **67** has its channel facing upwardly. Thus, work flanges along the lengths of the frame, for lifting, pulling or pushing the container are provided. Portions of the outer surfaces of the channel shaped frame members face inwardly to provide common securing surfaces for peripheral edges for the panels of adjacent converging sections. The edges of the roof section **69** are connected along the inner flange of the transverse frame member **67** and the web of the longitudinal member while the edges of the end section **70** are connected along the downwardly facing surface of the web of the transverse member **67** and the web of the vertical member **66**. The edges of the side section **71** are connected along the lower flange of the longitudinal frame member **65** and along the inner flange of the vertical frame member **66**. The continuous outer surfaces of the channels extending between the adjacent converging sections provide smooth interior corners for the container in that they present single frame pieces for adjacent converging sections. The ends of the mutually perpendicular frame members are welded together in abutting relation, one against the other, to form a square corner, although castings, such as those used in the container of FIGURES 1–6, may be used.

It will now be appreciated that a container embodying the invention presents a simple and economic construction utilizing identically formed frame members and identically formed wall, roof and floor sections. It provides smooth interior surfaces including the surfaces along the longitudinal, vertical and transverse corners by providing single frame elements connecting the peripheral edges of adjacent, converging container panels. The frame elements accommodate the use of light weight double paneled sandwich sections and permits the spacing of adjacent inner panels for ease in the required welding operations. The outwardly extending flanges of the frame elements, and in the case of the distorted channel with its reflange extending from one flange in parallel spaced relation with the other flange, give the container work flanges along the lengths of the frame elements for utilization as skids and as holding means for container lifting elements and the like.

Certain structures have been described herein which

will fulfill all the objects of the present invention, but it is contemplated that other modifications will be obvious to those skilled in the art which come within the scope of the invention as defined by the appended claims.

What is claimed is:

1. A lading container comprising a roof section, a floor section, side and end wall sections, horizontal and vertical frame pieces connecting said sections, each of said sections comprising a core secured between an outer and an inner panel, said panels having peripheral edges, each of said frame pieces comprising an elongated distorted channel having a web and integral flanges extending therefrom, said web having a surface angularly disposed relative to said panels and facing inwardly of said container, each of said flanges extending outwardly of said container and in a plane perpendicular thereto, and a reflange extending outwardly of said container and perpendicularly from one of said flanges, the edge of said reflange terminating in a plane common with the edge of the other of said flanges, said peripheral edges of said inner panels being secured along said angularly disposed and inwardly facing surfaces of said webs, said peripheral edges of said outer panels defining a perimeter of smaller dimension than said peripheral edges of said inner panel and being secured along said flanges.

2. The combination with a lading container, of wall, roof and floor sections of sandwich construction, each of said sections having larger inner and smaller outer panels with a core structure secured therebetween, said larger inner and smaller outer panels having peripheral edges, a frame joining said sections together, said frame comprising longitudinally disposed frame pieces connecting the roof and adjacent wall sections and connecting the floor and adjacent wall sections, transversely disposed frame pieces connecting the roof and adjacent wall sections and connecting the floor and adjacent wall sections, vertically disposed frame pieces connecting the wall sections, each said frame member being of substantially identical cross sectional form and providing an inwardly facing surface at an obtuse angle to said panels and having outward extensions therefrom, said inwardly facing obtuse angle surfaces of said frame pieces integrally connecting said peripheral edges of said larger inner panels.

3. The combination with a lading container, of wall, roof and floor sections of sandwhich construction, each of said sections having larger inner and smaller outer panels with a core structure secured therebetween, said larger inner and smaller outer panels having peripheral edges, a frame joining said sections together said frame comprising longitudinally disposed frame pieces connecting the roof and adjacent wall sections and connecting the floor and adjacent wall sections, transversely disposed frame pieces connecting the roof and adjacent wall sections and connecting the floor and adjacent wall sections, vertically disposed frame pieces connecting the wall sections, each of said frame pieces being of substantially identical form and providing an inwardly facing surface positioned at an obture angle to said panels and outward extensions therefrom, the peripheral edges of said larger inner panels being connected along said inwardly facing surfaces of said frame pieces, said peripheral edges of said smaller outer panels being connected along said outward extensions.

4. A lading container for handling bulk materials comprising four wall sections, a top section and a bottom section, each of said sections utilizing a honeycomb core secured between an outer and an inner panel, frame pieces of substantially identical cross sectional form connecting said sections along their adjacent peripheral edges, each one of said frame pieces comprising an integrally formed elongated member, said member having longitudinal edges in open parallel spaced relationship defining an outwardly facing opening, a plurality of intermediate portions extending between said edges and providing a continuous surface for connecting adjacent converging sections inwardly of said outwardly facing opening, a first intermediate portion extending diagonally between said inner panels of said adjacent converging sections and interconnecting the same along said continuous surface, second intermediate portions integral with and extending outwardly from each side of said first intermediate portion, said second intermediate portions being spaced apart and extending perpendicularly of and connecting said outer panels of said adjacent converging sections along said continuous surface.

5. The lading container of claim 4 in which said plurality of intermediate portions also include a third portion extending perpendicularly of one of said second intermediate portions in parallel spaced relation with the other of said second intermediate portions.

6. In a lading container, having a roof section and floor section in spaced relation, spaced side sections and spaced end sections, said side sections being adjacent to and converging with said end sections, said roof section and said floor section, a frame comprising upper and lower longitudinal members having inwardly facing continuous surfaces connecting said adjacent and converging side, roof and floor sections, upper and lower transverse members having inwardly facing continuous surfaces connecting said adjacent and converging end, roof and floor sections, and front and rear vertical members having inwardly facing continuous surfaces connecting said adjacent and converging end and side sections, each of said members being formed of substantially identical cross sectional form and comprising, an elongated distorted channel opening outwardly of the lading container and having a web disposed diagonally between two said adjacent converging sections, flanges diverging outwardly of the container on both side edges of said web and extending perpendicularly of the adjacent section, and a reflange extending from one of said flanges in parallel spaced relation with the other of said flanges, said reflanges of said members connected to said roof section lying in a common plane spaced above and parallel to said roof section, and said reflanges of said members connected to said floor section lying in a common plane spaced below and parallel to said floor section.

7. In the lading container of claim 6 wherein said reflanges of said front and rear vertical members lie in planes parallel to and spaced outwardly of the respective end sections and said sections comprise a core material secured between outer and inner panels, said panels having peripheral edges, the peripheral edges of said inner panels of said two adjacent and converging sections are connected along said web in spaced relation and the peripheral edges of said outer panels of said two adjacent converging sections are connected along said flanges adjacent said web, said peripheral edges of said outer panel defining a perimeter of smaller dimension than said peripheral edges of said inner panel.

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