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Dougherty

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[54] **FLOOR STRUCTURE FOR CARGO CONTAINER**

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[52] **U.S. Cl.** **220/1.5;** 220/72; 220/74; 220/DIG. 25; 220/DIG. 29

[51] **Int. Cl.²** **B65D 87/00;** B65D 7/42

[58] **Field of Search** ..... 220/1.5, 71, 72, DIG. 25, 220/DIG. 29, 83, 84, 67, 70, 74; 52/177, 471, 495, 579

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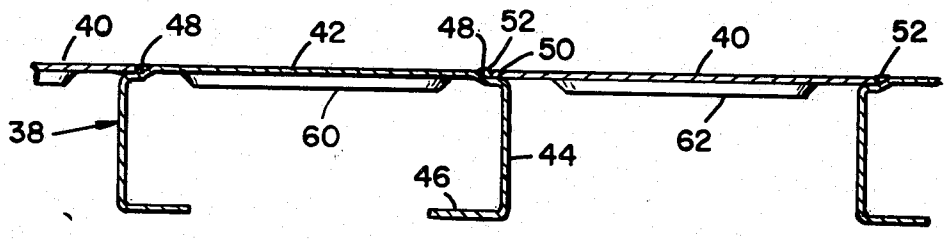
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Primary Examiner—William I. Price
Assistant Examiner—Joseph M. Moy
Attorney, Agent, or Firm—Owen, Wickersham & Erickson

[57] **ABSTRACT**

A floor structure for a cargo container comprises a plurality of spaced apart and parallel channel members extending between longitudinal side members. The channel members are interconnected by metal plate members to form a rigid pallet like structure having transverse pockets to receive the forks of a lifting type freight vehicle.

6 Claims, 13 Drawing Figures



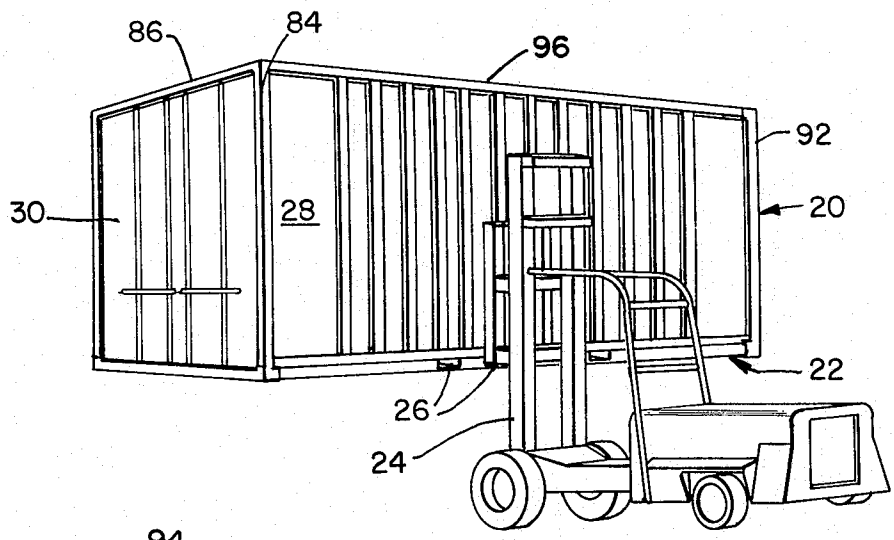


FIG _ 1

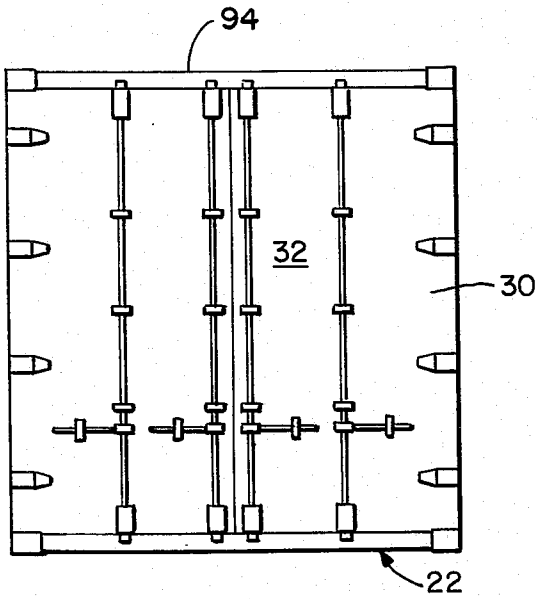


FIG _ 2

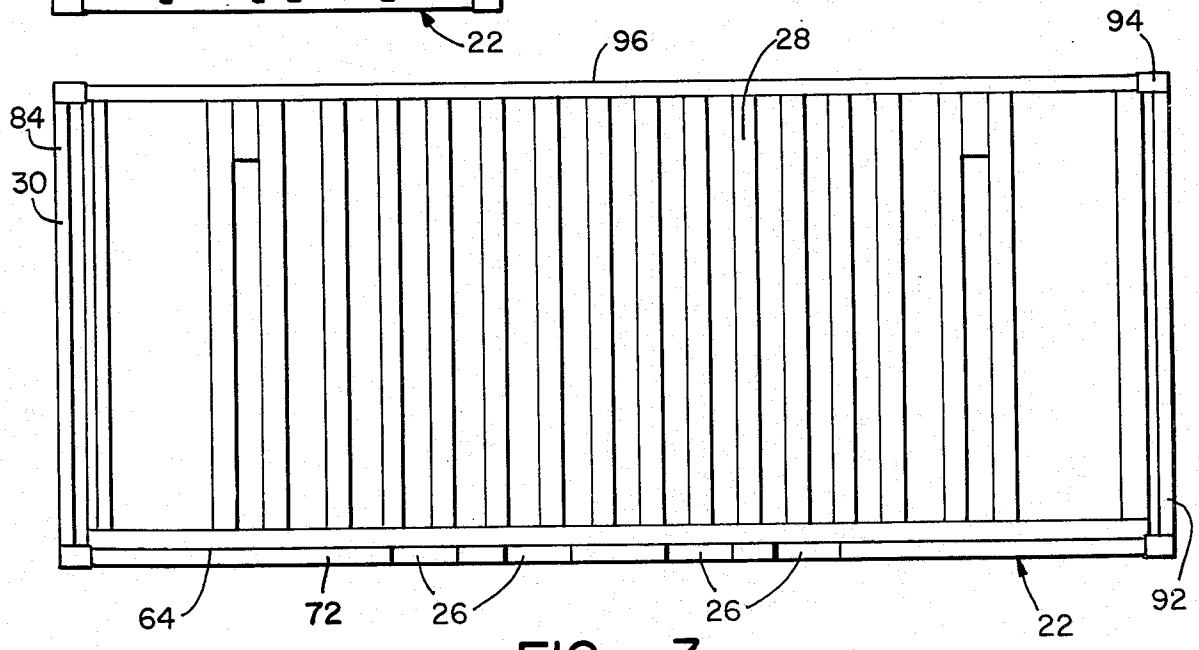


FIG _ 3

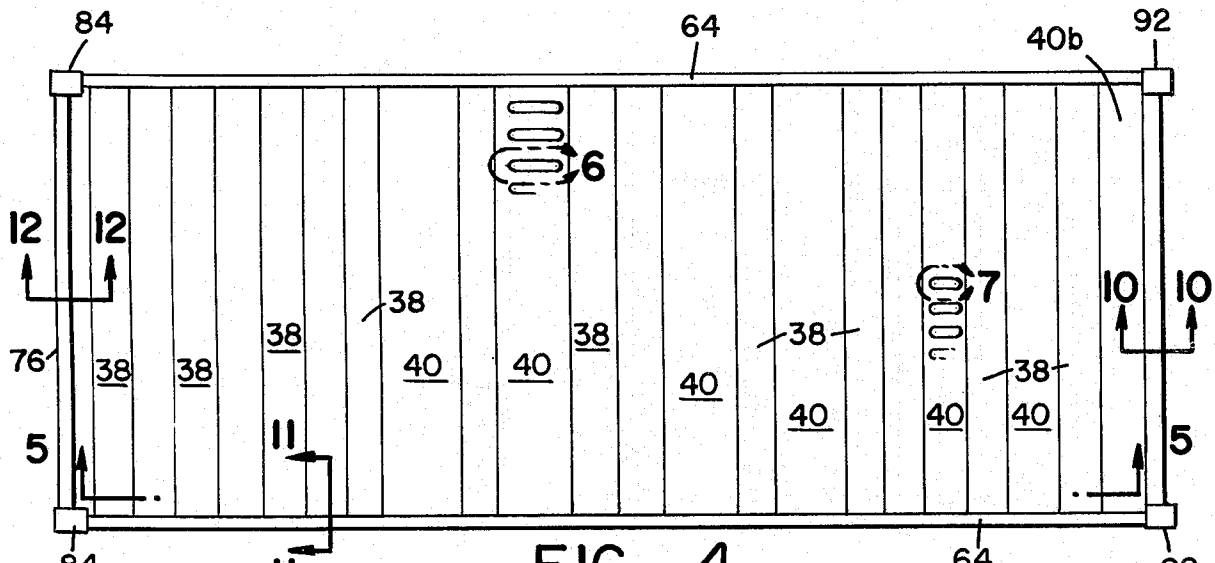


FIG_4

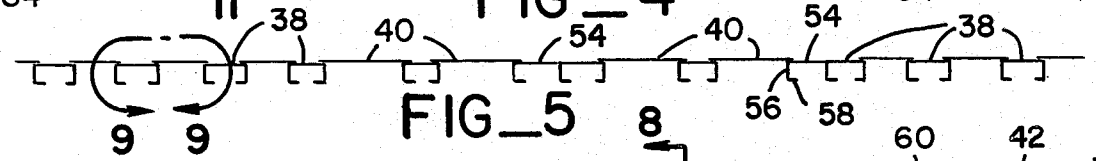


FIG_5



FIG_8

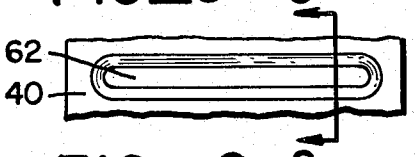


FIG_6

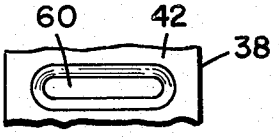


FIG_7

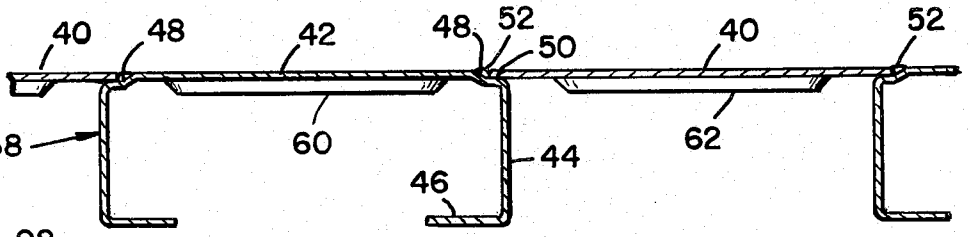


FIG_9

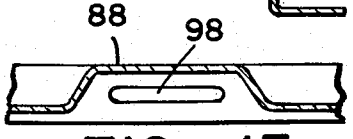


FIG_13

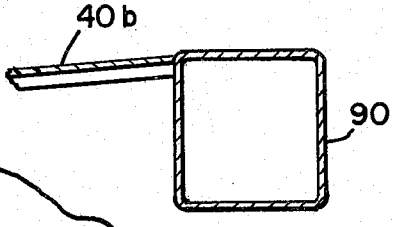


FIG_10

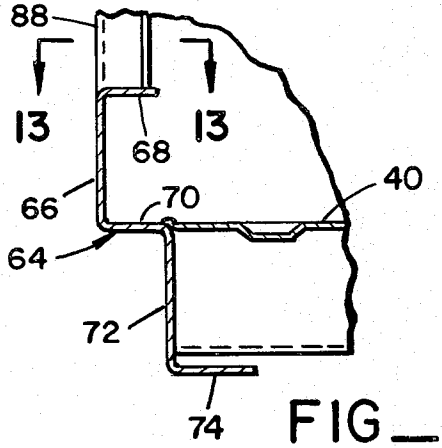


FIG_11

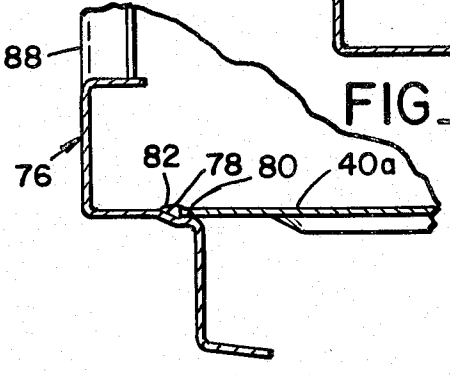


FIG_12

FLOOR STRUCTURE FOR CARGO CONTAINER

BACKGROUND OF THE INVENTION

This invention relates to cargo or shipping containers for use in transporting freight on ships, trains, trucks and other transport means and more particularly it relates to a unique floor construction for such containers.

Cargo containers of the aforesaid type have been used to an increasingly greater degree because they substantially increase the speed, convenience and efficiency of freight handling, prevent pilferage and reduce overall freight costs. The size and capacity of such containers is standardized and controlled by domestic and international regulations and agreements so that they can be readily stowed on container ships and loaded on various types of land transport vehicles such as trains and trucks. However, the precise construction of such containers has not been standardized and considerable efforts have been made heretofore to provide the most advantageous construction. It is essential that the containers be strong and durable, and yet they must be as light as possible and therefore capable of being readily lifted and moved by such freight handling equipment as fork lift trucks. Heretofore, the most common form of freight container was the so-called "FRP" type, that is one utilizing a fibreglass-reinforced-plywood panel attached to frame members. In such containers the floor was generally comprised of metal frame members covered by wood planks or sheets. In order for such a floor construction to fulfill the desired strength requirements, a considerable amount of material and labor was necessary. Also, because of increasing shortages of lumber and its consequent high price, coupled with the problems of sealing the floor against moisture and infestations by insects, a need for a suitable all metal floor arose. The problem was to provide such a floor construction having sufficient strength and yet light in weight and also one that is compatible with various standard fabrication techniques for the walls of the container. It is therefore a general object of the present invention to provide a freight container with an improved all-metal floor construction that solves the aforesaid problems.

Other important objects of the present invention are to provide an all metal floor construction for a freight container that has a relatively high strength to weight ratio to provide a floor construction that will enable the container to be readily lifted and maneuvered by fork lift trucks and the like to provide a floor construction for freight containers that is strong and durable and to provide a container floor construction that is particularly well adapted for ease and economy of manufacture.

SUMMARY OF THE INVENTION

In general, a container floor construction according to the present invention is comprised of a series of metal channel members arranged in a spaced apart, parallel order to form the width of a rectangular shaped container floor. The ends of these channel members are connected to a pair of opposite, parallel side members. The web portion of each channel member is provided with a series of elongated spaced apart, transverse depressions or recesses along its length which provide increased stiffness and strength. Spaced inwardly from the edge of each channel web portion is a longitudinal shoulder or offset forming a narrowledge. Extending between adjacent spaced apart pairs of channel members are elongated metal plates whose opposite side edge portions are supported within the aforesaid longitudinal ledges of the channel members. These plate strips are also provided with spaced apart, transverse stiffening recesses along their length. The edge of each plate strip is welded to the shoulder of the channel member forming its edge depression. When fully assembled the web portion of channel members and the plate strips between them as joined together form a pallet-like platform or container floor that is essentially smooth on its upper surface except for the recesses and substantially flush fasteners or weldments. Side, end and top wall members of any suitable construction are then added to the floor structure to form a completed container.

Other objects, advantages and features of my invention will become apparent from the following detailed description taken with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in perspective of a shipping container having a floor construction embodying the principles of the present invention and shown as it is being manipulated by a fork-lift truck;

FIG. 2 is an end view in elevation of the container of FIG. 1;

FIG. 3 is a side view in elevation of a container of FIG. 1;

FIG. 4 is a plan view of a container floor structure according to the present invention;

FIG. 5 is a view in elevation and in section showing a single line representation of my floor taken at line 5—5 of FIG. 4;

FIGS. 6 and 7 are enlarged fragmentary views taken at lines 6 and 7 respectively of FIG. 4;

FIG. 8 is a view in section taken at line 8—8 of FIG. 6;

FIG. 9 is an enlarged fragmentary view in section taken at line 9—9 of FIG. 5;

FIGS. 10, 11 and 12 are enlarged fragmentary views in section taken at lines 10—10, 11—11 and 12—12 respectively of FIG. 4; and

FIG. 13 is another fragmentary view in section taken at line 13—13 of FIG. 11 and showing a portion of a side wall attached to the floor structure.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

With reference to the drawing, FIGS. 1–3 show a completed cargo container 20 for storing freight for transport on various types of vehicles and having a floor structure 22 according to the present invention. FIG. 1 illustrates how the container may be maneuvered for loading and unloading it on a transport vehicle by means of a typical fork-lift truck 24. The container floor has a series of four elongated openings 26 which extend transverse to its longitudinal dimension and are spaced apart along its sides to receive the forks of the lift-truck. Attached to and extending vertically upward from the sides and ends of the floor are pairs of sidewalls 28 and endwalls 30, at least one of the latter having hinged access doors 32. These walls are connected at their top edges to a suitable roof structure which completes the enclosure around the floor. The sidewalls, endwalls, roof and access door may be con-

structed in any suitable manner which is compatible with my floor structure. The particular wall structure illustrated is of the metal frame and corrugated metal type, but a standard metal frame and fibreglass reinforced panel (FRP) type of structure could also be used with my floor structure **22**, which provides the basic platform for the container. Since the structural details of the alternative wall constructions are well known to those skilled in the art, they will not be described in detail herein.

As shown in FIGS. **4** and **5**, my floor structure **22** generally comprises a series of spaced apart, relatively stiff, metal cross members **38** formed with predetermined cross sectional shapes and connected to somewhat less rigid, substantially flat plate members **40** located between the stiffer members. In the embodiment shown, most of the stiffer cross members **38** have a channel-like cross sectional shape with a central web portion **42**, downwardly extending side flanges **44** and inwardly extending flanges **46** on the lower edges of the side flanges. Preferably, these cross members are formed by bending sheet steel into the desired channel shape, but other forming means or other kinds of metal could be used within the scope of the invention. As shown in FIG. **9**, the central web portion **42** of each channel cross member **38** is formed with an elongated shoulder **48** spaced inwardly from each junction of the web and a side flange. This forms a pair of narrow ledges **50** near the opposite edges of each web portion, each being lower from the surface of the web portion by a distance approximately equal to the material thickness of the adjoining plate member **40** (e.g. 11 gauge sheet steel). When my floor is assembled, as shown best in FIGS. **4** and **8**, the channel cross members **38** are arranged at parallel, spaced apart intervals. The sheet metal plate members **40** are located between them with their opposite edge portions resting in the elongated ledges **50** of the web portions **42** of adjacent channel members, as shown in FIG. **9**. Each plate member **40** is attached to a channel member by welding, preferably by providing an elongated weldment **52** that joins the edge of the plate to the shoulder **48** of the adjacent channel member.

In order to adjust the length and reduce the weight of the floor I may vary the width of the members **38** and **40** and I may also use cross members **54** having a right angle cross section instead of a channel cross section. Such a cross member has a horizontal flange portion and one downwardly extending flange portion **56** with an inwardly extending lower edge flange **58** as on the channel cross member. Here, as shown in FIG. **4**, the edge of the horizontal flange portion of this cross member **54** is fixed to an adjacent channel member **38** in the same manner as a plate member **40**, while the other side of the web portion is fixed to the edge of another plate member. Thus, it is seen in FIGS. **4** and **5**, the relatively stiffer channel and the right angle cross members **38** and **54** combined with the alternate plate members **40**, when welded together, form a strong, rigid platform surface which is also relatively light weight.

Spaced apart at even intervals along the web portions **42** of each of the various cross members **38** and **54** and transverse to its longitudinal dimension are a series of parallel elongated recesses or depressions **60**. (See FIGS. **4** and **7**). Similar recesses or depressions **62** are provided in the plate members **40**, as shown in FIGS. **4** and **6**. All of these recesses are formed by a cold stamping method in the various members before the floor is assembled to a depth of about one half their width (e.g. a depth of around ½ inch for 11 gauge sheet steel). They provide increased stiffness to both the cross members and plate members without increasing weight. Yet, the recesses are sufficiently narrow and are spaced far enough apart so that they have no effect on the wheels of standard freight handling vehicles and apparatus. Therefore, to such vehicles the floor upper surface is substantially flat and has no obstructions which could interfere with the operation of such freight handling equipment within a container.

Along the sides of the floor **22** the end edges of the cross members **38** and plate members **40** are aligned and are welded to a pair of opposite side frame members **64**, as shown in FIGS. **4** and **11**. These side members, preferably formed from the same durable material as the other floor components such as sheet steel, have an upper portion with a channel shaped cross section formed by a vertical web **66** having inwardly extending upper and lower flange portions **68** and **70**. An integral lower portion of each member **64** has a right angle cross section formed by a downwardly extending portion **72** with a inwardly extending flange **74** along its lower edge.

At one end of the floor to which the container endwall **30** is attached, end frame member **76** is provided having a similar cross section to the side members **64**. Preferably, this member has a shoulder **78** in the lower flange of its upper channel portion which forms an elongated ledge **80** for the edge of an end plate member **40***a*, as shown in FIG. **12**. An elongated weldment **82** may be used to secure this edge of the end plate member to the shoulder **78**. The end member **76** extends between and is attached to two vertical frame members **84** of the endwall **30** which are connected at their top by an upper horizontal frame member **86**. As stated above, these frame members are adapted to support a suitable wall siding such as corrugated sheet metal **88** or fibreglass-reinforced plywood panels.

At the other end of the container, as shown in FIGS. **4** and **10**, an end plate member **40***b* is connected, as by welding, to a lower frame member **90** of the other end wall which is equipped with standard freight container doors **32**. Since these latter doors are of standard construction and are available commercially they need not be described in detail. Here, the top surface of the lower frame member which has a rectangular cross section, is flush with the adjoining floor plate so that a freight handling vehicle can roll through the doors **32** into the container with no obstruction when the doors are open. The frame member **90** is connected to a pair of vertical frame members **92** whose upper ends are connected by an upper horizontal frame member **94**. As stated above, suitable siding such as corrugated metal or prefabricated panels may be used to form the container walls between the vertical frame members **92**.

For supporting the container roof, upper horizontal side members **96** are provided between the vertical end frame members **84** and **92**, and these upper side members support a suitable roof paneling. The fabrication details of the paneling or wall construction for the roof and the sidewalls and end walls are not shown, because they are not part of the invention and any suitable standard construction can be used. My unique floor struc-

ture **22** can provide the basic platform for a container using various types of wall or paneling materials.

For purposes of illustration the walls of the container **20** are shown using corrugated sheet metal. As shown in FIGS. **3** and **13** where corrugated metal **88** is used for the sidewalls, its lower end edge is flush against and attached to the upper flange **68** of the channel portion on each side member **64.** At spaced apart intervals along this upper flange a series of slots or holes **98** are provided which serve as tie down means for strapping or nailing, used in securing freight within the container.

As shown in FIG. **3,** the four access openings or pockets **26** for the forks of a loading vehicle are cut in the vertical flange **72** of the side members **64** of the container floor structure. These openings are spaced between channel cross members **38** of the floor structure. The two innermost openings are spaced apart the standard distance between lifting forks of a typical freight vehicle. The outermost openings are located to align with other spaces of the floor structure formed between other cross members and they are spaced farther so as to equal an extended distance between the fork members of freight handling vehicles.

When a container having the floor structure **22** according to the present invention is maneuvered by a freight handling vehicle **24,** as shown in FIG. **1,** the forks of the vehicle may be inserted into the two innermost openings **26** of the floor if the container is lightly loaded or empty. When the container is filled and much heavier, the forks of the freight handling vehicle are used in the outermost openings **26.** In either case the structural integrity of the cross member and welded plate arrangement of my floor structure provides a high degree of strength and rigidity with a minimum of weight. The advantage of the latter is extremely important since in all freight operations, weight and cost are directly related.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. For example, although my floor structure has been described with particular reference to "cargo containers" it should be apparent that it is also applicable to and useful on other structures, such as the van portion of truck trailers.

I claim:

1. In a portable cargo carrying container for use in storing and transporting freight, a metal floor structure for said container comprising,

a rigid rectangular metal frame member including side and end rails,

a plurality of elongated relatively stiff metal cross-members laterally spaced apart at intervals along the length of said side rails,

said cross-members each provided with a web portion having its marginal side edge portions depressed below its top level by a predetermined amount,

a wall depending from each depressed side edge of the web portion,

a plurality of elongated metal plate members, each located between a pair of adjacent spaced apart cross-members and welded at its side edges to the depressed marginal edge portions of the web portions, the thickness of said plate members being substantially equal to the amount by which the marginal side edge portion of a web portion is depressed,

said side rails each including a vertical wall,

the end edges of said plate members of said web members and of the depending walls of the web portion abutting the vertical wall and being welded thereto, to secure said plate members, cross-members and side rails together into a unitary self-contained structure free of external fastening devices and/or overlapping portions of materials.

2. In a portable cargo carrying container according to claim **1** wherein the depending wall of at least one side rail is provided centrally of its ends with at least one pair of longitudinally spaced openings for receiving the lifting forks of a freight-handling vehicle, each opening registering with the space between a pair of adjacent cross-members beneath an intervening plate member.

3. In a portable cargo carrying container according to claim **2** wherein the depending walls from each cross-member terminates at their free ends with inwardly turned flanges extending toward one another.

4. In a portable cargo carrying container according to claim **1** wherein the depending walls from each cross-member terminates at their free end with inwardly turned flanges extending toward one another.

5. In a portable cargo carrying container according to claim **1** wherein the plate members and web portions are provided with transversely extending evenly spaced stiffening indentations along the lengths thereof.

6. In a portable cargo carrying container according to claim **1** wherein the plate members and web portions are provided with transversely extending evenly spaced stiffening indentations along the lengths thereof.

* * * * *