

Aug. 25, 1964

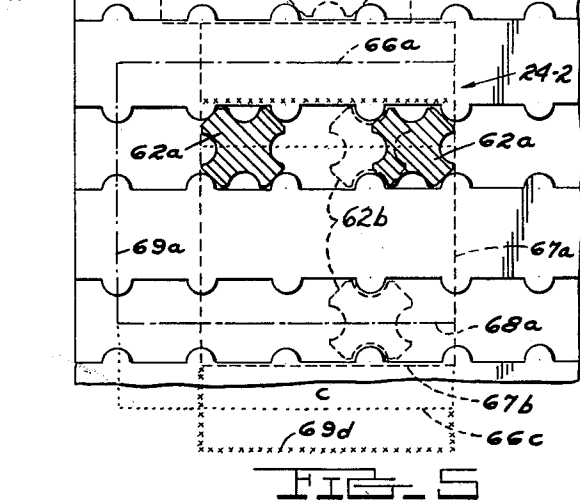
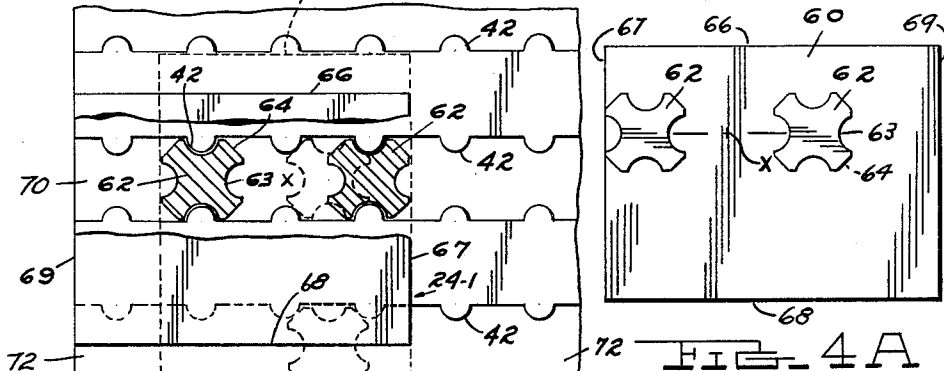
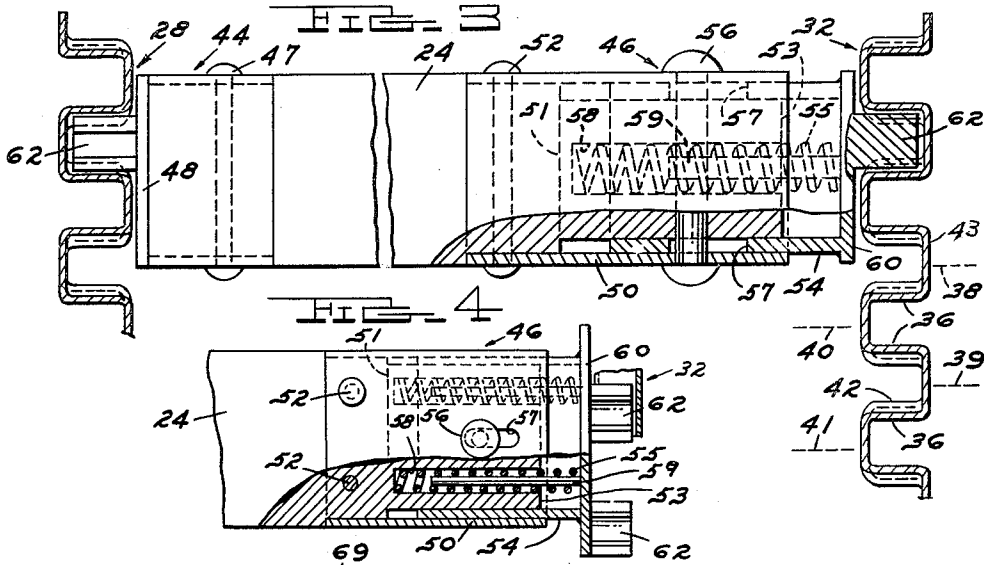
F. B. HILLGER ETAL

3,145,834

SHIPPING CONTAINER AND DUNNAGE STRUCTURE THEREFOR

Filed March 27, 1961

4 Sheets-Sheet 2



INVENTORS
 FREDERICK B. HILLGER
 BY LEONARD G. BURGESS
Farley Forster & Farley
 ATTORNEYS

Aug. 25, 1964

F. B. HILLGER ETAL

3,145,834

SHIPPING CONTAINER AND DUNNAGE STRUCTURE THEREFOR

Filed March 27, 1961

4 Sheets-Sheet 3

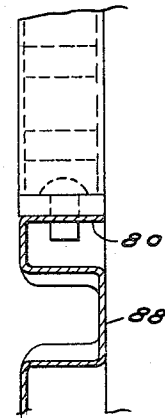
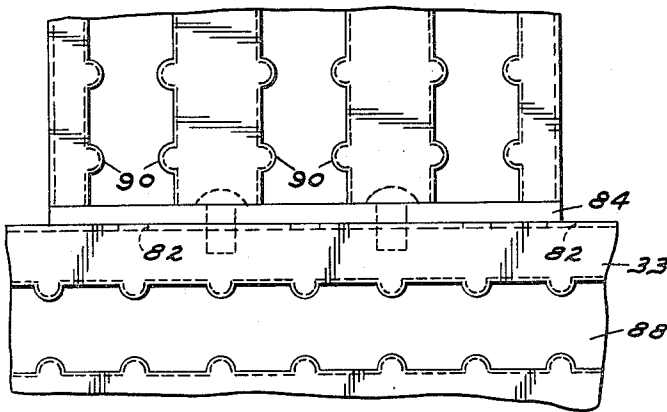
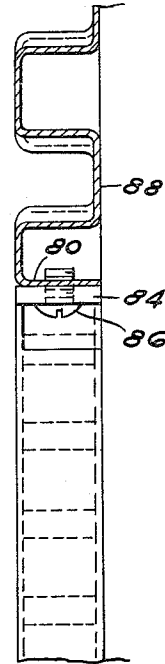
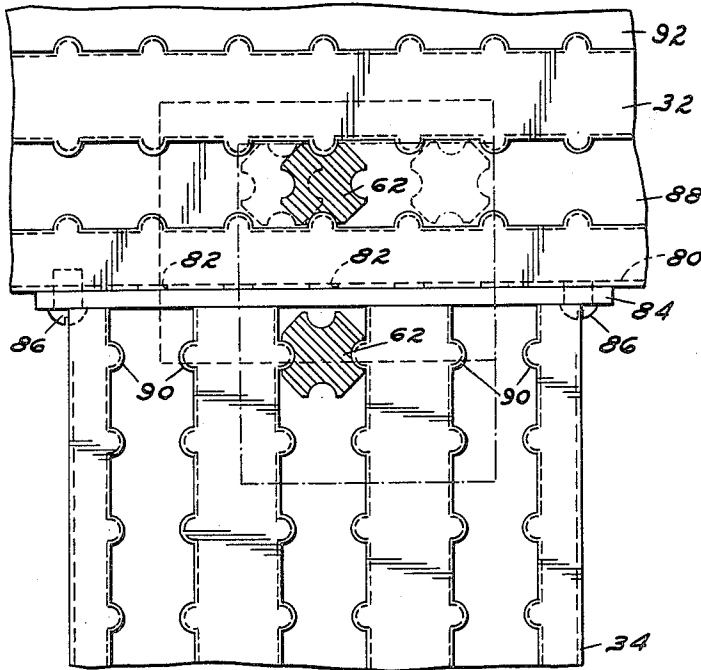


FIG. 6

FIG. 7

INVENTORS
FREDERICK B. HILLGER
BY LEONARD G. BURGESS
Farley, Forster & Farley
ATTORNEYS

Aug. 25, 1964

F. B. HILLGER ETAL

3,145,834

SHIPPING CONTAINER AND DUNNAGE STRUCTURE THEREFOR

Filed March 27, 1961

4 Sheets-Sheet 4

FIG. 9

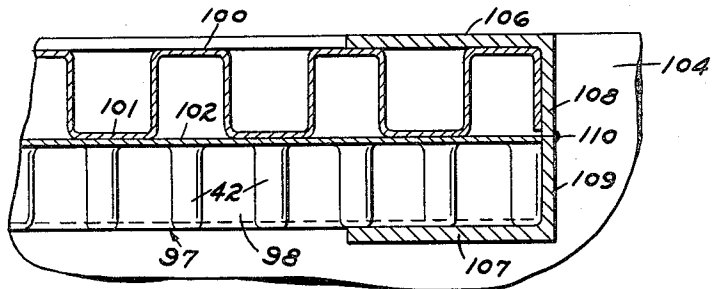


FIG. 10

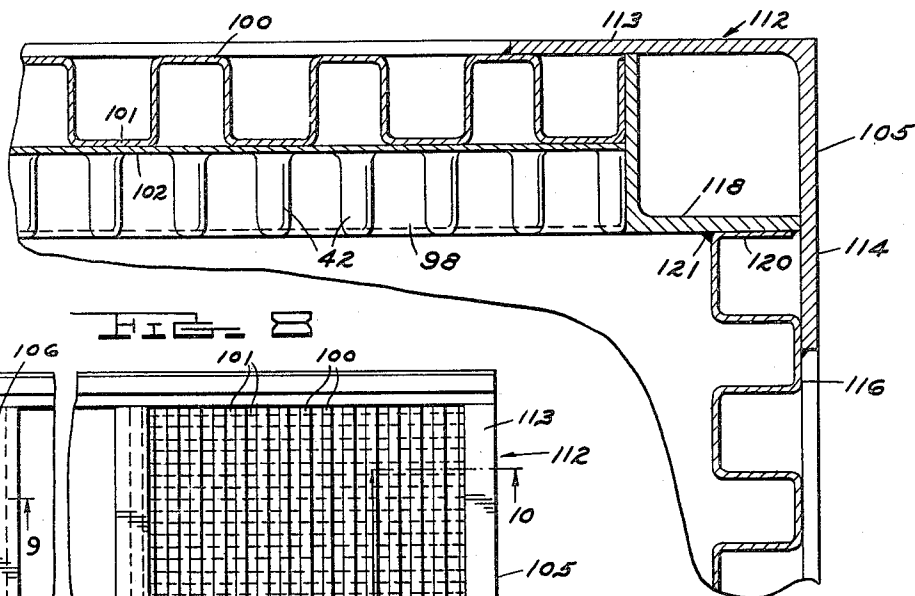


FIG. 8

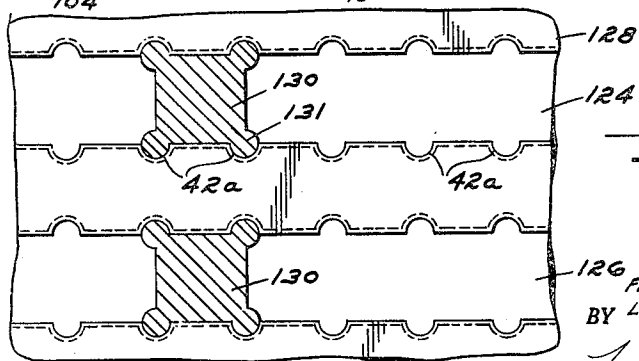
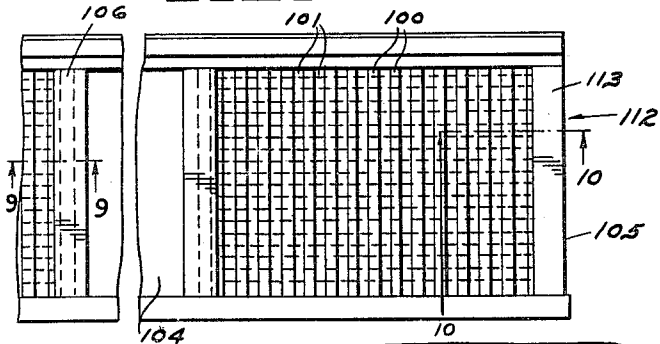


FIG. 11

INVENTORS
FREDERICK B. HILLGER
BY LEONARD G. BURGESS

Farley Forster & Farley
ATTORNEYS

1

2

3,145,834

**SHIPPING CONTAINER AND DUNNAGE
STRUCTURE THEREFOR**

Frederick B. Hillger, Grosse Pointe Farms, and Leonard G. Burgess, New Baltimore, Mich., assignors to Equipment Manufacturing, Inc., Warren, Mich., a corporation of Michigan

Filed Mar. 27, 1961, Ser. No. 98,453
17 Claims. (Cl. 206-1)

This invention relates to improvements in the construction of cargo shipping containers, which may either take the form of separate boxes or an integral part of the body of some type of vehicle, and to improvements in the construction of dunnage apparatus for anchoring cargo in such a container.

Many constructions have been proposed for the walls of shipping boxes and cargo handling vehicles for detachably connecting dunnage structure thereto so that the cargo may be held against shifting. A general object of all these constructions is one of flexibility, so that dunnage structure can be positioned in a given container as required by loads of various sizes, types, etc. In general, it has been sought to attain this object by the provision of connector elements, such as apertures, on opposing container walls either in a pattern along the wall or some portion thereof, or in the form of structural members which may be placed in various positions along the wall as required to locate the connector elements where desired for engagement by other connector elements on dunnage structure such as a dunnage bar.

The extent to which these constructions have achieved flexibility is limited in one way or another. Constructions employing perforated wall plates are limited in the minimum increment of adjustment of a dunnage bar by the difficulty of providing apertures at sufficiently close spacing to each other without unduly weakening the structure. The cost of forming sufficient apertures is also another important factor. Constructions employing movable members are subject to the general disadvantage of requiring additional setup time each time a different load dimension is encountered.

The present invention provides a construction which affords a smaller increment of adjustment of the dunnage structure both horizontally and vertically along a container wall than does any other with which we are familiar. This desirable end result is attained by a construction which reinforces, rather than weakens, the container wall, and which in its preferred form, provides for adjustment in uniform increments over the entire wall surface in both vertical and horizontal directions. The preferred form of the invention also makes possible the provision of an improved container wall construction which is strong, relatively light and rigid, and in which the connector elements are incorporated as an integral part of the wall structure, contributing to the strength, lightness, and rigidity thereof. The invention also provides an improved relation between the connector elements of the wall structure and the construction of the dunnage bar which makes it possible to adjust the dunnage bar in uniform increments in either vertical or horizontal directions. These and other features of the invention will be discussed in greater detail hereinafter.

In general, the invention consists of a panel member for a container wall having corrugations formed thereon in parallel rows with connector elements integrally formed on the faces of a corrugation. For example, the connector elements may take the form of pairs of projections struck at equally spaced intervals or increments along the faces of one corrugation. The rows of corrugations are formed with a spacing between adjacent rows

which is a multiple of the spacing between the connector element in any one row. For example, if the connector elements along any row are spaced at one inch intervals, the center to center distance between adjacent rows may be two inches.

A dunnage bar is provided with end fittings adapted to engage any pair of connector elements or be engaged between two adjacent pairs, and as a result the increment of adjustment of the dunnage bar along any row is one half the distance between the individual pairs of connector element therealong. Thus the basic increment of adjustment in the example given above is one-half inch, and in order to provide this same increment of adjustment between rows, the connector elements are located eccentrically with relation to the cross section of the bar, being offset unequally from a number of bar faces or sides by a difference in offset equal to the increment of adjustment. The number of bar sides with which this relation must apply is equal to the spacing between adjacent rows of corrugations divided by the increment of adjustment. In other words, in the example given above, with a two inch spacing between rows and a one-half inch increment of adjustment, the attachment members at each end of the dunnage bar must be located unequally from four bar faces by a difference in offset equal to one-half inch. As a result a four-sided dunnage bar has a rectangular cross-section as distinguished from the square cross-section commonly encountered in dunnage bars today.

The foregoing combination of connector elements and attachment members enables a dunnage bar to be moved in equal increments either vertically or horizontally while one face of the bar is maintained in the same position in the direction other than that in which movement is being made. Thus one face of a bar can be kept, for example, in the same position lengthwise of a container while the dunnage bar is being moved vertically in one-half inch increments. Likewise, one face of the bar can be kept in the same vertical position in the car while the bar is being moved horizontally in one-half inch increments.

Corrugated panels incorporating connector elements may be applied in any pattern desired to the walls of conventional containers, either completely covering the wall surface, or being arranged along the wall surface in horizontal strips, in the manner of belt rails, and in vertical sections which may be located between adjacent strips as desired. These wall panels, being corrugated, are relatively rigid in one direction, and the strength of the individual corrugations is augmented by the connector elements formed thereon.

A preferred wall construction consists of an inner panel having corrugations formed with connector elements as described which run in one direction, horizontally for example. An outer wall panel of the same corrugated section but without connector elements is joined to the inner panel, the corrugations of the outer panel running at right angles to those of the inner one. The resulting wall section is extremely rigid, simple and light, with connector elements for dunnage structure being incorporated as an integral part thereof and contributing to the strength thereof.

The foregoing and other features and advantages of the invention will become more apparent from consideration of the following description of the presently preferred representative constructional examples disclosed in the accompanying drawings which consist of the following views:

FIGURE 1, a sectional elevation, partly schematic, of a shipping container showing alternate wall constructions;

FIGURE 2, a side elevation taken as indicated by the line 2-2 of FIG. 1;

FIGURE 3, an enlarged elevation showing a dunnage bar mounted between two wall panel members;

FIGURE 4, a plane view of the right hand end of the dunnage bar;

FIGURE 4A, an end view of the dunnage bar;

FIGURE 5, an elevation of a portion of a single wall panel member showing the interengagement of the connector elements of a dunnage bar therewith, with the bar being shown in alternate positions;

FIGURE 6, an elevation similar to FIG. 5 but showing a wall panel structure composed of a plurality of members;

FIGURE 7, an end elevation of the structure shown in FIG. 6;

FIGURE 8, an elevation of a portion of a side of a shipping container wall;

FIGURES 9 and 10, enlarged sectional details of the construction shown in FIG. 8 taken respectively as indicated by the lines 9-9 and 10-10 thereon; and

FIGURE 11, an elevation similar to FIG. 4, of a portion of a wall panel showing an alternate construction.

Referring to FIGS. 1-4, the shipping container 20 shown in FIG. 1 has a pair of side walls 21 and 22 which face each other and between which dunnage structure such as the dunnage bar 24 is to be mounted in order to support or brace cargo.

Walls 21 and 22 are each shown with a different inner panel construction for the sake of illustration. In the case of wall 21 the construction consists of an outer panel 26, the inner surface of which is covered with a corrugated panel 28. Wall 22 is made up of an outer panel 30 on which inner corrugated panel members 31, 32 and 33 are mounted forming horizontal bands or belt rails, with vertically extending corrugated panels 34 mounted therebetween as desired, the relationship between the horizontal and vertical panels being further illustrated in FIGS. 6 and 7.

All of these corrugated panels are of similar construction, which is shown in detail in FIGS. 3 and 5. Each individual corrugation of one of these corrugated panels includes a pair of surfaces 36 which extend outwardly from the rear face 43 of the panel in generally perpendicular relation thereto and to the wall on which the panel is mounted. This is the case whether each corrugation is considered to lie between the center lines 38-39 or 40-41 as shown in FIG. 3.

At least one, but preferably both of the surfaces 36 of each corrugation are provided with integrally formed connector element means for positioning dunnage structure such as the bar 24, and consisting of a series of spaced corrugations 42 formed on each of the surfaces 36 and extending in a direction transverse to the length thereof, or perpendicular to the rear face 43 of the panel. Preferably, the corrugations 42 are formed at equally spaced intervals and in transversely aligned pairs as shown in FIG. 5.

The dunnage bar 24 (FIG. 3) is provided with a fixed end fitting 44 and an extensible end fitting 46, each of which incorporate connector elements engageable with those of a corrugated panel. End fitting 44 consists of a sleeve into which one end of the bar is fitted and secured as by a rivet 47, a plate 48 being mounted on the end of the sleeve. End fitting 46 consists of a sleeve 50 into which a portion of the other end of the bar is fitted up to the line 51 and secured by rivets 52. The remaining end portion of the bar between line 51 and the end 53 is reduced in size. Sleeve 50 serves as a guide for a tubular plunger 54 which is slidably mounted therein adjacent the reduced end portion of the bar and normally urged by springs 55 outwardly thereof to a limit established by the engagement of a cross pin 56 in a slot 57 of the tubular member 54. Each of the springs 55 is mounted in a socket 58 formed in the end of the bar 24 and encircles a guide pin 59 carried by an end plate 60 secured to the member 54.

The complementary connector elements 62 of the dunnage bar are carried in pairs on the end plates 48 and 60, and the bar 24 is mounted between a pair of corrugated

panels by first engaging the connector elements on the end fitting 46, and telescoping the plunger 54 inwardly while the connector elements of end fitting 44 are engaged with the opposite panel. These connector elements 62 are each generally four sided, with notches 63 corresponding in contour to the corrugations 42 formed in each of the sides, and with chamfered portions 64 at the corners. As a result, one of the connector elements 62 can be positioned with the notches 63 engaging an aligned pair of connector elements 42 or with the chamfered corner portions 64 engaged between an adjacent pair of connector elements 42, all as shown in FIG. 5. When the connector elements 62 are positioned in either manner relative movement between the dunnage bar and the wall panel is prevented in one direction by the pair of surfaces 36 of each wall panel corrugation, and is prevented in a direction right angles thereto by engagement of the connector element 62 with or between connector elements 42 on the pair of surfaces 36.

The flexibility resulting from this construction can perhaps best be illustrated by a specific example. Referring to FIGS. 3-5, assume that the spacing between adjacent connector elements 42 along the surfaces 36 of each corrugation is one inch and that the center to center distance between a pair of connector elements 62 and between adjacent corrugations is two inches. Then the dunnage bar 24 can be moved along any corrugations in opposing wall faces in a basic increment of one-half inch by engaging the connector elements 62 between a pair of connector elements 42 or intermediate adjacent pairs thereof as shown in FIG. 5.

Provision is made for obtaining the same increment of adjustment in a direction transverse to the length of the corrugation. This is accomplished by locating the connector elements 62 on the dunnage bar unequally from the side faces of the bar by a difference in offset equal to the basic increment of adjustment. Referring to FIGS. 4A and 5, the midpoint X of a line drawn between the centers of a pair of connector elements 62 is located one inch from the face 66 of the bar 24, one and one-half inches from the face 67, two inches from the face 68 and two and one-half inches from the face 69. As a result the bar is constructed with a rectangular cross-section, and by properly locating the connector elements 62 in engagement with the side wall connector elements, one bar face can be moved in either a vertical or a horizontal direction in one-half inch increments while the position of another bar face is held in a constant position in the other direction.

An attempt to illustrate this has been made in FIG. 5 where two dunnage bars, 24-1 and 24-2 are shown in various positions. The upper bar 24-1 has its connector elements 62 shown cross-hatched in one position in which the bar faces 66 and 68 extend horizontally and the bar faces 67 and 69 extend vertically. Obviously the same vertical position of the faces 66 and 68 can be maintained while changing the position of the faces 67 and 69 in a horizontal direction in one-half inch increments by merely moving the connector elements 62 along the channel 70 of the corrugated panel. If the bar is turned to the position shown in dotted line in which its connector elements 62 engage adjacent channels 70 and 72, the bar can likewise be moved along these two channels in one-half inch increments in a horizontal direction without disturbing the vertical elevation of the bar faces 69 and 67.

The lower of the two bars 24-2 is shown in four different positions, each position being designated by the letter *a*, *b*, *c*, or *d*. In each of these four positions one face of the bar remains in a constant position in a horizontal direction at the location of line 67*a*, while another face of the bar is in one of four positions which differ from each other by an increment of one-half inch in a vertical direction as indicated by the horizontal level of the lines 68*a*, 67*b*, 66*c* and 69*d* which show the posi-

tion of the bar face of that number in each of the four positions.

These various positions of the bar are rather difficult to show on a drawing and can perhaps be better appreciated by making a template of the bar cross-section and connector elements on a transparency which can then be positioned as desired in relation to the connector elements of a corrugated panel.

Some flexibility in adjustment is sacrificed in the region where panels having their corrugations extending in one direction are joined with a panel having its corrugations extending in a direction at right angles thereto. This construction, illustrated in the wall panel 22 of the container in FIG. 1, is shown in greater detail in FIGS. 6 and 7 which illustrate a typical connection between a pair of horizontal panels 32 and 33 and a vertical panel 34. Each of the panels 32 and 33 is provided with a side flange 80 in which a number of holes 82 may be provided. A plate 84 is secured to each end of the panel 34 and is provided with holes for receiving fastening elements, such as the screws 86, for registry with the holes 82 in the flanges 80.

The dimensioning is such that the spacing between the center of the last row 88 of connector elements in each of the horizontal panels 32 and 33 and the first row of horizontally aligned pairs of connector elements 90 in the vertical panel 34 is equal to the center-to-center spacing between adjacent rows of connector elements in any of the panels such as the rows 88 and 92 in the panel 32. Consequently the connector elements of a dunnage bar can be simultaneously engaged with connector elements of a horizontal panel and of a vertical panel as shown by the cross-hatched connector elements 62 appearing in FIG. 6. However, the position of a dunnage bar 24 cannot be changed in the basic increment when the connector elements thereof are in engagement with both a vertical and a horizontal panel. The lack of flexibility in this region, if critical, can be compensated for by changing the location of the vertical panel 34 by removing the screws 86 and inserting them in different holes 82.

This right angle panel construction is particularly adapted to be installed in shipping containers such as freight cars and highway trailers where full coverage of the container side walls for mounting dunnage structure is not necessary.

For new construction of any type of shipping container, the structure exemplified in FIGS. 8 to 10 is particularly useful because it results in a relatively low cost, extremely rigid, wall panel which gives full coverage for dunnage structure with adjustability in the basic increment in either horizontal or vertical directions as previously described.

This construction consists in the combination of an inner wall panel 97 similar to the corrugated inner wall panel 28 shown in FIG. 1 and having rows of corrugations 98 which extend horizontally along the length of the wall from top to bottom. These corrugations 98 are formed with transversely extending corrugated connector elements 42 as previously described. The outer portion of the wall panel is formed from a similar corrugated sheet 100, except that no connector elements are formed on the corrugations thereof, placed with the corrugations running at right angles to the corrugations 98 of the inner wall panel with the abutting surfaces 101 and 102 of the outer and inner panels respectively being joined together, as by spot welding.

The resulting wall construction is extremely rigid, the corrugations of the outer and inner panels mutually reinforcing each other against distortion in either direction, and the corrugated connector elements 42 of the inner panel additionally serving to reinforce that panel against distortion.

FIG. 8 contains a fragmentary showing of a container of this type, such as a railroad boxcar, which has a door

opening 104 and end walls 105. FIG. 9 illustrates the relation between the inner and outer panels 97 and 100 and one arrangement that may be employed around a door opening, consisting simply in a pair of outer and inner angle members 106 and 107 which are connected to the outer and inner panels respectively and have legs 108 and 109 which extend along the opening and are connected together as by welding 110.

A side to end wall connection is illustrated in FIG. 10 and includes an outer angle member 112, one leg 113 of which is connected to the corrugations of the outer panel and the other leg 114 of which is connected to the corrugations of the single layer end wall 116. An inner reinforcing angle 118 is joined to the outer angle, to the ends of the outer and inner panels, and to the end 120 of the end wall member 116 as shown at 121.

FIGURE 11 illustrates an alternate construction obtained simply by reversing one of the corrugated wall panels of FIGURES 1-5. This results in connector elements along each of the channels 124 and 126 of the corrugated panel 128 in FIG. 11 being formed as depressions 42a. Modified bar connector elements 130 are provided with enlarged corners 131 adapted to simultaneously engage four of the connector elements 42a. The resulting construction is somewhat stronger for a given specification of corrugated panel than is the construction previously described, both because of the fact that four individual connector elements 42a are engaged by each of the bar connector elements 130 and also because of the fact that there is more metal in the corrugated panel between adjacent connector elements 42a. As a result, greater resistance is offered to displacement of the bar in a direction longitudinally of the channels 124 and 126 in the corrugated panel.

For a given distance between adjacent connector elements 42a, the basic increment of adjustment with this construction in a direction along the channels 124 and 126 is twice that obtainable with the previously described construction. In other words, if the panel 128 were dimensioned in the same way as the panels previously described, the basic increment of adjustment would be one inch in the arrangement shown in FIG. 11 in a direction longitudinally of the corrugated channels, although one-half inch increments of adjustment can be obtained in a direction transverse thereto. Otherwise the features and advantages of this form of the invention are identical to those previously described.

While preferred embodiments have been described above in detail, it will be understood that numerous modifications might be resorted to without departing from the scope of the invention as defined in the following claims.

We claim:

1. In a freight handling container having at least a pair of opposed wall surfaces, means for mounting a dunnage member between said wall surfaces comprising a series of parallel side-by-side corrugations formed on each of said surfaces, each corrugation having a pair of spaced apart side walls which extend generally perpendicular to a wall surface, connector element means integrally formed on at least one of said side walls of each of said corrugations at spaced intervals along the length thereof, and a fitting at each end of said dunnage member, said fitting including portions engageable with said pair of side walls of a corrugation to anchor said dunnage member against movement transversely of said corrugations and said fitting further including complementary connector element means engageable with at least one of the connector element means of a corrugation to anchor said dunnage member against movement longitudinally of said corrugations.

2. A cargo container construction according to claim 1 wherein said connector element means of said corrugations comprise projecting portions formed on a side wall

of a corrugation, said complementary connector element means of said dunnage member including means for engaging at least one of said projecting portions.

3. A cargo container construction according to claim 1 wherein said connector element means consists of ribs formed on the side walls of a corrugation in transversely aligned pairs, said complementary connector element means of said dunnage member being engageable between adjacent pairs of said ribs.

4. A cargo container construction according to claim 1 wherein said connector element means consists of ribs formed on the side walls of said corrugations, said complementary connector element means of said dunnage member including a pair of elements projecting from an end of said dunnage member in spaced relation for engagement with a plurality of said ribs.

5. A cargo container construction according to claim 1 wherein each of said corrugations includes a pair of side walls which extend generally perpendicular to a wall surface, said connector element means being formed on said side walls with the spacing between adjacent connector element means on a side wall corresponding to the spacing between said pair of side walls, said complementary connector element means on a dunnage member including at least one element projecting from each end of said member, said projecting element having a generally square section which is engageable between said corrugation side walls and each face of said section having means for engaging at least one of said connector element means whereby said dunnage member can be mounted in any one of four positions of rotation about the longitudinal axis thereof.

6. A cargo container construction according to claim 5 wherein said complementary connector element means of said dunnage member includes a pair of connector elements at each end of said dunnage member, said pair of connector elements being spaced apart a distance corresponding to the spacing between adjacent corrugations on said wall surfaces, the spacing between adjacent corrugations being a multiple of the spacing between adjacent connector elements.

7. A cargo container construction according to claim 3 wherein said complementary connector element means of said dunnage member further include means for engaging a single pair of said ribs.

8. A cargo container construction according to claim 4 wherein said ribs are formed in transversely aligned pairs on the side walls of a corrugation, each of said pair of complementary projecting elements including means for engaging at least one pair of said ribs.

9. A cargo container construction according to claim 8 wherein each of said pair of complementary projecting elements is provided with corner portions adapted to engage two adjacent pairs of said ribs.

10. A cargo container construction according to claim 9 wherein each of said pair of complementary projecting elements is further provided with portions intermediate said corner portions for engaging a single pair of said ribs.

11. Structure for retaining a dunnage member in a selected position on a surface of a cargo carrying container comprising a corrugated panel forming at least a part of said surface, said panel having a plurality of equally spaced parallel corrugations with each corrugation including portions extending generally perpendicular to said surface, connector element means in the form of deformations on at least one of said portions of each corrugation at equally spaced intervals along the length thereof, complementary connector element means provided on said dunnage member for selective engagement with said connector elements in an increment of adjustment longitudinally of said corrugations, adjacent corrugations of said panel being spaced a distance apart which is a multiple of said increment of adjustment, said complementary connector element means of said dunnage

member including at least a pair of projecting connectors which are spaced apart a distance equal to said multiple whereby said connectors can be engaged selectively with the connector elements of a single corrugation of said panel or with the connector elements of adjacent corrugations thereof.

12. Structure for retaining a dunnage member in a selected position on a surface of a cargo carrying container comprising a corrugated panel forming at least a part of said surface, said panel having a plurality of equally spaced parallel corrugations with each corrugation including portions extending generally perpendicular to said surface, connector elements formed on said portions of each corrugation at equally spaced intervals longitudinally thereof, a pair of complementary connector elements extending from an end of said dunnage member for selective engagement with said connector elements in an increment of adjustment longitudinally of one of said corrugations, adjacent corrugations being spaced a distance apart which is a multiple of said increment of adjustment, said complementary connector elements being spaced apart a distance equal to the spacing between adjacent corrugations and being offset unequally by a difference equal to said increment of adjustment from a number of cargo contacting faces of said dunnage member equal to said multiple.

13. Structure for retaining a dunnage member in a selected position on a surface of a cargo carrying container including connector element means provided on said surface in parallel rows having one increment of spacing between adjacent elements in each row and a multiple of said increment of spacing between adjacent rows, a pair of complementary connector element means provided on said dunnage member for engagement with said connector element means of said surface, said pair of complementary connector elements being spaced apart a distance equal to the said spacing between adjacent rows, said dunnage member having a plurality of cargo engaging faces extending longitudinally thereof and said complementary connector element means on said dunnage member being offset unequally from a number of said dunnage faces equal to the said multiple of said increment by a difference in offset equal to said increment.

14. Dunnage member retaining structure according to claim 13 wherein said dunnage member has four of said cargo engaging faces, wherein the spacing between adjacent rows of connector elements is four times said increment, and wherein said complementary connector element means is offset by unequal distances from each of said four faces which distances differ from each other by said increment whereby said dunnage member can be selectively positioned on said surface so as to adjust one of the faces thereof either longitudinally or transversely of said rows of connector elements in said increment of adjustment.

15. A wall construction for a shipping container comprising a corrugated panel forming at least part of the inner surface of said wall, said panel having a plurality of equally spaced parallel corrugations, each corrugation having a pair of spaced apart side walls which extend generally perpendicular to said inner surface, connector element means integrally formed on at least one of said side walls of each corrugation at spaced intervals along the length thereof, a dunnage member, a fitting on at least one end of said dunnage member, said fitting including portions engageable with said pair of side walls of a corrugation to anchor said dunnage member against movement transversely of said corrugation and said fitting further including complementary connector element means engageable with at least one of the connector element means of a corrugation to anchor said dunnage member against movement longitudinally of said corrugations.

16. A wall construction according to claim 15 further

9

characterized by said wall construction including a pair of said panel members extending in spaced parallel relation, another of said corrugated panel members extending between said pair of panel members, and means for connecting said other panel member to each of said pair of panel members in selected positions along the length thereof.

17. A wall construction according to claim 15 further including an outer corrugated panel member joined to said inner panel member with the corrugations of said inner and outer panel members extending at right angles to each other.

10

References Cited in the file of this patent

UNITED STATES PATENTS

904,571	Stokely -----	Nov. 24, 1908
2,122,959	Scharff -----	July 5, 1938
2,124,082	Reifer -----	July 19, 1938
2,415,825	Knuth -----	Feb. 18, 1947
2,608,166	Pierce -----	Aug. 26, 1952
2,659,319	Herman -----	Nov. 17, 1953
2,747,520	Brown et al. -----	May 29, 1956
2,950,001	Bucko -----	Aug. 23, 1960
2,983,231	Henrikson -----	May 9, 1961