

May 5, 1959

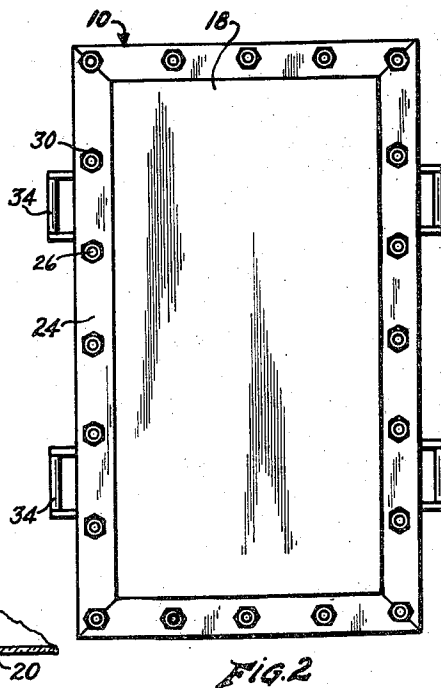
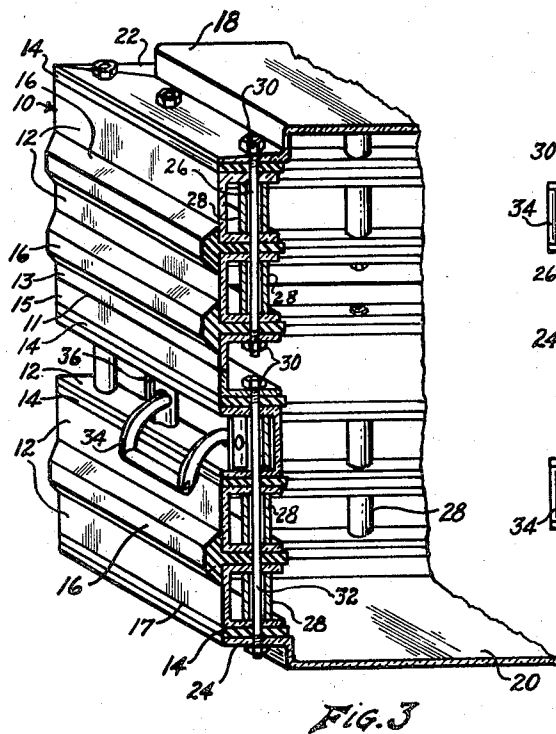
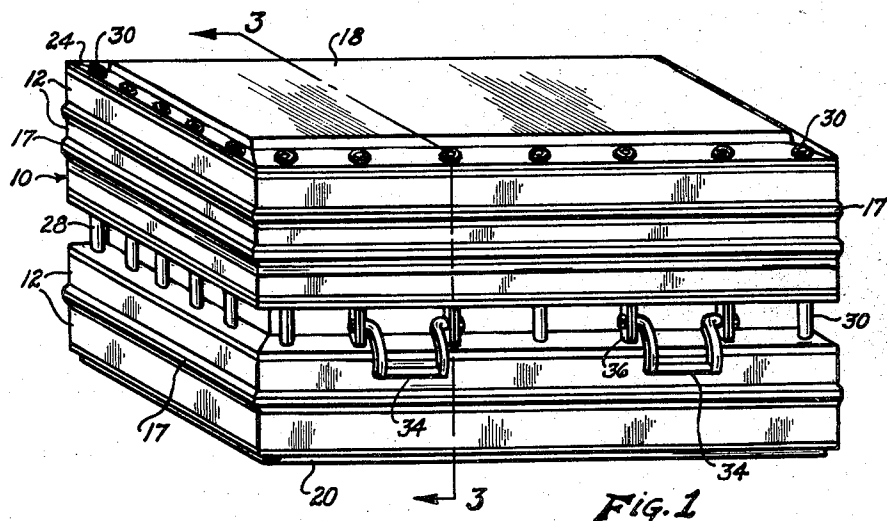
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2,885,070

SELF-CUSHIONING MODULAR-FORM TRANSIT CASE

Filed Jan. 26, 1956

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

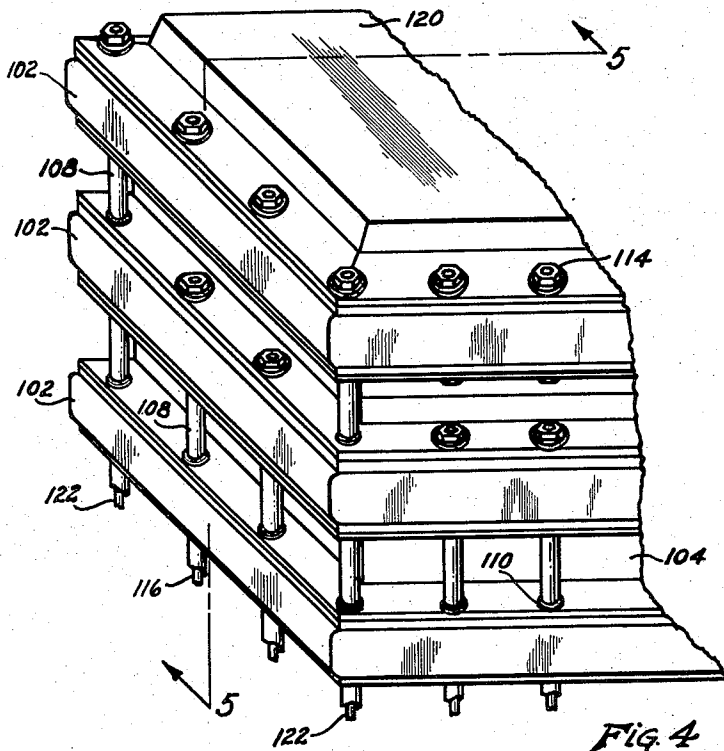


Fig. 4

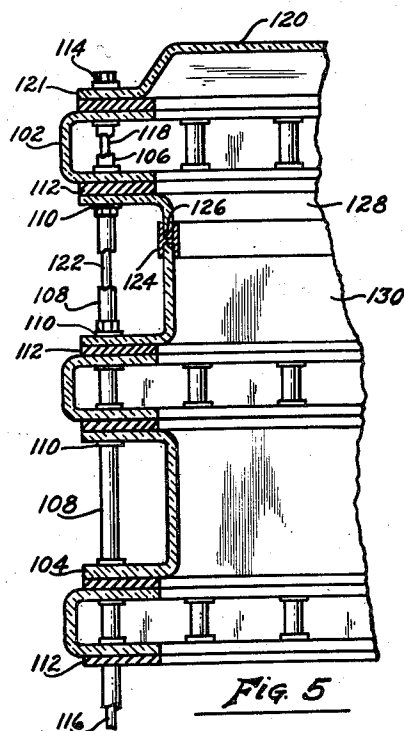


Fig. 5

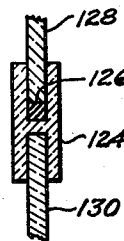


Fig. 6

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3 Sheets-Sheet 3

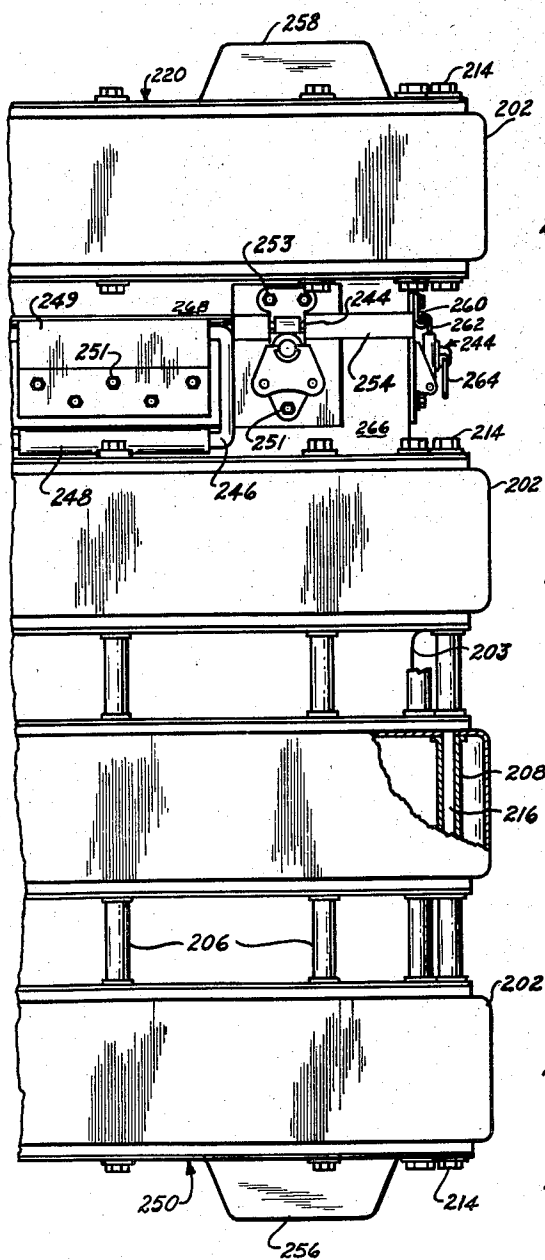


Fig. 8

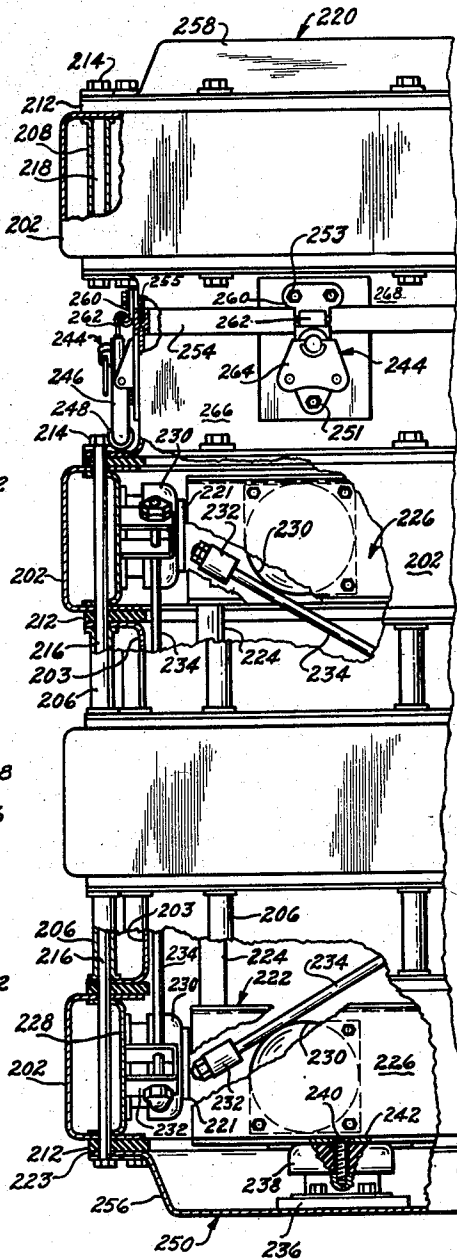


Fig. 7

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SELF-CUSHIONING MODULAR-FORM TRANSIT CASE

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8 Claims. (Cl. 206—1)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without payment to me of any royalty thereon.

The present invention relates to a knockdown modular-form transit case for packaging delicate instruments, such as electronic equipment, airplane engines, guides missiles and other materiel necessitating great care in shipment.

A preferred embodiment of such a transit case may comprise a plurality of horizontally disposed frame-like modules with frame-like gaskets interposed between adjacent modules, and tie rods and nuts securing said modules and gaskets in vertical alignment to top and bottom cover plates.

A feature of the present transit case is its versatile building-block construction, whereby only the defective modules of a damaged transit case need be replaced.

Another feature of the present transit case is that by the use of modules of different dimensions and shapes, a transit case may be readily assembled to conform with the requirements of any given article to be packaged.

A still further feature of the present invention is the provision of a transit case which may be easily knocked down or assembled.

Another feature of the present invention is its substantially air-tight and water-tight construction.

Additional features of the present invention over conventional transit cases of this type are: ease of fabrication, ruggedness and relatively low cost of construction.

Other features, objects and advantages of the present invention will become apparent from the accompanying drawings, the sub-joined detailed description and the appended claims, in which:

Fig. 1 is an isometric view of one embodiment of the transit case of my present invention;

Fig. 2 is a plan view of the transit case shown in Fig. 1;

Fig. 3 is an enlarged fragmental sectional isometric view taken on line 3—3 of Fig. 1;

Fig. 4 is a fragmental isometric view of a further modification of the present invention;

Fig. 5 is an enlarged sectional view taken on line 5—5 of the embodiment shown in Fig. 4;

Fig. 6 is an enlarged fragmental sectional view of the rim gasket assembly, shown in Fig. 5;

Fig. 7 is a fragmentary sectional view of the front of another modification of the present invention; and

Fig. 8 is a fragmentary sectional view of the side of the construction shown in Fig. 7.

In the embodiment shown in Figs. 1 to 3, the transit case 10 comprises a plurality of channel-shaped modules 12, each of said modules forming a horizontally disposed rectangular frame and either gaskets 14 or 16 interposed between adjacent modules. One of the modules 12 is oriented so that its web portion is disposed inwardly of the outer periphery of the transit case 10 and the remaining modules 12 have their web portions in vertical

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alignment and disposed outwardly to form the outer periphery of the transit case.

The module located third from the top of the transit case 10 is divided along line 11 to form two L-shaped module sections 13 and 15 which may be equally dimensioned heightwise.

A top cover plate 18 and a bottom cover member 20 are provided with offset downwardly extending peripheral flanges 22 and 24, respectively, situated along the edges of each of cover plates 18 and 20.

The gaskets 14 are interposed between the top cover plate 18 and bottom cover plate 20 and are coextensive with flanges 22 and 24, respectively. Gaskets 14, each of which comprises a rectangular frame member of uniform thickness in cross-section, are also interposed between the flange portions of the module 12, having an inwardly disposed web, and the modules 12 adjacent thereto, having outwardly extending webs.

The gaskets 16 are provided with rubber or plastic shock pad projections 17 formed integral therewith and said gaskets are interposed between the remaining modules 12, intermediate of the top and bottom plates 18 and 20. The shock pad projections 17 are in the form of isosceles trapezoids, in cross-section, and extend laterally from the sides of the transit case 10 to protect the contents thereof against external shocks. The inner edges of all of gaskets 14 and 16 extend inwardly of the inner rigid edges of the modules 12 to prevent the contents of the transit case 10 from abutting against the said inner rigid edges of said modules 12.

A series of tie rods 26 are provided to extend through the peripheral flange 22 of top cover plate 18, through a gasket 14, both legs of a module 12, a gasket 16, another module 12, another gasket 16 and through the horizontal leg of the L-shaped module section 13. Tubular spacer members 28 are interposed between the legs of the modules 12 and embrace the tie rods 26 to stiffen the structure. The ends of said tie rods 26 are threaded so that nuts 30 may be secured to said rods 26 along the upper surface of flange 22 and below the longer leg of L-shaped module section 13, to unite the aforementioned modules 12, L-shaped module section 13, gaskets 14 and 16 and top cover plate 18, into a top cover unit.

Each of said spacer members 28 serves to arrest buckling action longitudinally along the web of its corresponding module 12 and thereby prevents the flanges of said module from moving toward one another. It is, therefore, obvious that the inclusion of said spacer members 28 considerably strengthens and stiffens the present construction.

The elements located below line 11 comprise the bottom receptacle portion and are assembled in a somewhat similar manner to the aforesaid top cover units. That is, tie rods 32 are provided to extend through the peripheral flange 24 of bottom cover plate 20 through a gasket 14, a module 12, a gasket 16, another module 12, a gasket 14, a module 12, a gasket 14 and the longer leg of L-shaped module section 15. Tubular spacers 28, which embrace tie rods 32, are interposed between the flanges of the two lowermost of the aforementioned modules 12 and spacers 36 which have outwardly extending flanges, integrally formed therewith, embrace the part of some of the tie rods 32 extending through said module 12 having an inwardly disposed web. Spacers 36 are provided in at least two pairs along each side of the case and the flanges of said spacers 36 are provided with horizontally disposed holes to pivotally retain the laterally offset portions of a handle 34.

The transit case of the embodiment of Figs. 1 to 3 is specifically designed so that the top cover unit and the bottom receptacle portion are substantially equal in

height. Such an arrangement is advantageous in removing heavy equipment from the transit case since a large portion of said equipment would extend into the area confined by the top cover unit and facilitate removal of such equipment when the top cover unit is removed. The top cover unit may be secured to the bottom receptacle portion by any conventional type of latches, locks or other fastening means (not shown).

In the transit case illustrated in Figs. 4 and 5, a series of relatively small U-shaped, in cross-section, modules 102 are alternately and vertically aligned with similar alternately spaced large modules 104. All of modules 102 and 104 are in the form of horizontally disposed rectangular frames but the webs of the small modules 102 are disposed outwardly of the periphery of the transit case while the webs of the large modules 104 are disposed inwardly of said periphery.

The top cover unit comprises a top cover plate 120 having downwardly offset flanges 121 extending along its edges, a rectangular gasket 112 positioned below said flanges 121, a small module 102, another gasket 112 below said last-named module 102 and an upper L-shaped module section 128, in cross-section, formed by cutting through the web of a large module 104.

Short tie rods 118 pass through apertures in said flange 121, said gaskets 112, said module 102 and said upper L-shaped module section 128. Said rods 118 thereby secure the aforementioned elements together by a washer 110 and nuts 114 fastened to threaded portions of short rods 118 below the horizontally disposed leg of upper L-shaped module section 128. Short tubular spacer members 106 and washers 110 are positioned between the flanges of said module 102 and said spacer members also embrace each short tie rod 118.

Similarly, the lower receptacle unit comprises a base plate (not shown), alternately spaced small modules 102 having outwardly extending web portions and large modules 104 having inwardly extending web portions. Adjacent modules 102 and 104 are separated by gaskets 112, and short spacers 106 and washers 110 are interposed between the horizontal flange of the small modules 102, while long spacers 108 and washers 110 are interposed between the horizontal flanges of the large modules 104. Long tie rods 116 extend through aligned apertures in the base plate (not shown), modules 102 and 104, gaskets 112, spacers 106 and 108, washers 110 and through a lower L-shaped module section 130 of a large module 104, which has been cut intermediate of its web portion. Nuts 114 and washers 110 are fastened to threaded portions of rods 116 to secure said nuts 114 to the upper surface of the lower L-shaped module section 130.

The vertical portion of the lower L-shaped module section 130 is provided with an H-shaped rim member 124 which straddles and is either welded or cemented to the upper edge of said vertical portion, depending upon the materials from which member 124 and portion 130 are formed (see Figs. 5 and 6). An internal rubber gasket 126 is inserted in the upper channel portion of the H-shaped rim member 124 and extends to about one-third the height of said channel portion. The lower vertical edge of upper L-shaped module section 128 is placed above said internal gasket 126 to form a snug fitting seat for the top cover unit.

At the corners of the transit case, as shown in Figs. 4 and 5, extra long tie rods 122 may be used to extend continuously from the upper top cover unit through to the base receptacle unit and thereby provide a means for securing said units together while the transit case is in shipment. In addition, the long spacers 108, which are externally exposed, may be used as hand grips to provide means whereby the transit case of the present embodiment may be carried from place to place.

The embodiment shown in Figs. 7 and 8 comprises a bottom receptacle unit having a series of alternately spaced small and large channel-shaped modules, design-

ated by numerals 203 and 202, respectively, and said modules 203 and 202 are vertically aligned by either long tie rods 206 or short tie rods 218, in a similar manner as shown in the embodiment of Figs. 4 and 5. In addition, the webs of the large modules 202 are disposed outwardly, while the webs of the small modules 203 are disposed inwardly, of the periphery of the transit case therein shown. Horizontally disposed rectangular gaskets 212 are interposed between each pair of adjacent modules 202 and 203. Short tubular spacers 206, having end annular flanges, embrace portions of long tie rods 216 and extend between the flanges of each of small modules 203. Similarly, long spacers 208 embrace other portions of rods 216 and extend between the flanges of some of the large modules 202. In place of tubular spacers, channel-shaped shock plates 228, having apertures in their horizontally disposed flange portions, embrace portions of rods 216. Said shock plates 228 are only aligned with the bottom and top modules 202 of the bottom receptacle unit. The flanges of plates 228 face outwardly of the transit case, while the modules 202 adjacent thereto have their flanges disposed inwardly so that said plates 228 and modules 202 may be commonly secured by long tie rods 216.

A base cover plate 250 and another gasket 212 are secured to the lowermost large module 202 by means of tie rods 216 and nuts 214, fastened to threaded end portions of said rods. Said base cover plate 250 has an offset peripheral flange 223 and said flange is provided with apertures aligned with apertures of the modules 202 and 203, gaskets 212 and spacers 206 and 208.

The base plate 250 is also provided with a pair of parallel downwardly extending dished-out channels 256 located intermediate of the peripheral flanges 223 and which constitutes a pair of feet for the transit case (Figs. 7 and 8). By providing channels 256, the transit case may be raised above its resting surface so that upon inserting the elevator lift fork of a cargo lift carrier (not shown) into the space between said channels 256, the transit case may be easily moved from one place to another.

Each channel-shaped shock plate 228, is provided with an inwardly facing rubber shock element 230, secured to said plate 228 by nuts and bolts. Such a plate 228 is secured to each corner of the sides and ends of the top and bottom modules 202 of the bottom receptacle unit. In addition, an inverted U-shaped bracket 232 is welded or cemented to each plate 228. The legs of said inverted U-shaped brackets 232 are apertured to receive brace rods 234 and said brackets 232 are so oriented with respect to plates 228 so that said rods 234 cross in pairs at angles of approximately 30° with respect to bottom base plate 250.

An internal rack member 222, comprising vertical struts 224 at each of the corners of said rack, extends to the top edge of the uppermost module 202 of the receptacle unit. Horizontal strips 226 are welded or cemented to the upper and lower ends of said vertical struts 224 to form a horizontal frame therearound. Circular spacers 221 are fastened by screws (not shown) to the outer faces of said horizontal strips 226 at points thereon. Said spacers 221 are aligned with and abut the rubber shock elements 230.

In each dished-out channel 256 are secured a plurality of shock mount plates 236 having a rubber shock element 238 bolted thereto. Rack 222 is provided with a pair of bottom strips 242 having apertures aligned with the top of each shock element 238, so that screws 240 may fasten said rack strips 242 to plate 236 through said elements 238.

The top portion of the bottom receptacle unit is in the form of a L-shaped module section 266 (similar to L-shaped portion 130 in the embodiment of Figs. 4 and 5). Section 266 is secured above the uppermost module 202 of said receptacle unit by the upper ends of long tie

rods 216, which pass through apertures in the lower horizontal flange of said L-shaped section 266 and nuts 214 threaded to the ends of said rods.

The top cover unit comprises a top cover plate 220 having a pair of dished-out channels 258, similar to the channels 256, in the bottom cover plate 250. Top cover plate 220 is identical to bottom base plate 250 and, therefore, said plates may be used interchangeably. Plate 220 has a downwardly directed peripheral flange which rests on a gasket 212 and overlies a module 202. Another gasket 212 is positioned below said module 202 and an L-shaped top module section 258 is located below said last-named gasket 212. Each of the said plates 220, gaskets 212, module 202 and L-shaped module section 268 are provided with a series of aligned apertures and a plurality of short tie rods 218 and nuts 214 securing the aforementioned parts together.

A plurality of latches 244, of conventional type, are positioned so that portions thereof are secured to the outer vertical surface of each of L-shaped module sections 266 and 268. That is, a plurality of latch hooks 262 are fastened to L-shaped module section 266 and a plurality of complementary latch hooks 260 are fastened to L-shaped module section 268 by bolts and nuts 253. A latch actuation arm 264 is secured to each inwardly facing latch hook 260 and thereby provides means for selective engagement and disengagement between the inwardly facing hooks 260 and outwardly facing hooks 262, to cover the receptacle unit.

A carrying handle 246, having a grid grip 248 and a bracket 249, is preferably secured to the exterior ends of the L-shaped module section 266, between a pair of latches 244, by bolts and nuts 251.

An H-shaped rim member 254, similar to rim 124 in Figs. 5 and 6, is welded or cemented to the upper edge of L-shaped module section 266. An internal rubber gasket 255 is cemented within the upper channel of the H-shaped member 254 so that the lower edge of L-shaped module section 268 may be snugly fitted to the bottom receptacle unit.

The modular sections or modules may take various geometric forms, in cross-section, such as rectangular, circular, oval or any special configuration necessary for shipment of a particular irregularly shaped object. The preferred material from which these modules are constructed may be reinforced fiber glass, although other materials such as metal, plastic, reinforced plastic or wood can also be used. The term "module," as used herein, embraces any segment of a predetermined standard unit size.

In place of the tie rods, turnbuckles, tension rods, wire ropes, straps or cables may also be used to secure the gaskets and modules to the cover plates.

The interposed gaskets may be constructed of plastic, asbestos, rubber, cork or metal or any combination of the aforementioned materials. The gaskets may include exterior and/or interior shock mount pads so that the transit case of the present invention may protect its contents from exterior shocks or the shifting of said case due to the forces of inertia.

It is obvious that various modifications and rearrangements of parts may be made without departing from the scope of the invention as defined by the following claims.

What is claimed is:

1. A knockdown transit case comprising a top cover unit and a bottom receptacle unit, a plurality of horizontally disposed continuous frame-like members form-

ing each of said units, said members being channel-shaped in cross-section including two flange portions connected by a web portion, the flanged portions of the members being in parallel spaced relation, a bottom cover plate, a top cover plate, an L-shaped section positioned at the bottom of the top cover unit, a complementary L-shaped section positioned at the top of the bottom receptacle unit, said L-shaped sections having a leg of each in vertical alignment and an H-shaped member receiving the adjacent edges of said vertically aligned legs, sealing means interposed between adjacent members, between each of said plates and its adjacent members and between each of said L-shaped sections and its adjacent members, each of said members, sealing means, plates and L-shaped sections having a series of aligned apertures and tie means securing said members, sealing means, plates and L-shaped sections of each of said units together through said apertures to provide said unitary top cover unit and said bottom receptacle unit.

2. A knockdown transit case as defined in claim 1, wherein additional sealing means is provided between the adjacent edges of said L-shaped sections.

3. A knockdown transit case as defined in claim 2, wherein the height of the webs of said members are of at least two different sizes.

4. A transit case as defined in claim 1, wherein the webs of said members face alternately in inward and outward directions with respect to the outer periphery of the transit case and spacers embracing said tie means are provided between each pair of flanges of said members.

5. A transit case as defined in claim 1, wherein at least one of said members has its web disposed inwardly of the outer periphery of said case, spacers embracing said tie means between the flanges of said member having an inwardly disposed web, flanges formed integrally with said spacers having horizontal apertures therethrough and hand gripping means pivotally secured within each pair of said last-named apertures.

6. A transit case as defined in claim 1, wherein hand gripping means are secured to the outer surface of said L-shaped section of the bottom receptacle unit and fastening means securing the top cover unit to the bottom receptacle unit.

7. A transit case as defined in claim 1, wherein shock absorbing means are secured to certain of said members at the corners of the inside of the bottom receptacle unit, brace rods also secured to said certain members and a rack unit disposed inwardly of said shock absorbing means for safely retaining the contents of said transit case in shipment.

8. A transit case as defined in claim 7, wherein said bottom cover plate is provided with a plurality of dished-out channels, shock absorbing means secured within said channels wherein the bottom of said rack unit rests upon said last-named shock absorbing means.

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