

[54] **PLUG-IN EQUIPMENT SHIPPING CONTAINER AND RACK SYSTEM**

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[51] Int. Cl.² **B62B 05/00**

[58] Field of Search 312/234.5, 244, 252, 320, 312/333, 338, 341, 348, 293, 294; 281/15 B; 40/325; 16/124; 206/334, 523; 214/16.4 R, 16.4 A; 220/55 J, 42 A; 211/155, 176; 294/15, 27, 81 R

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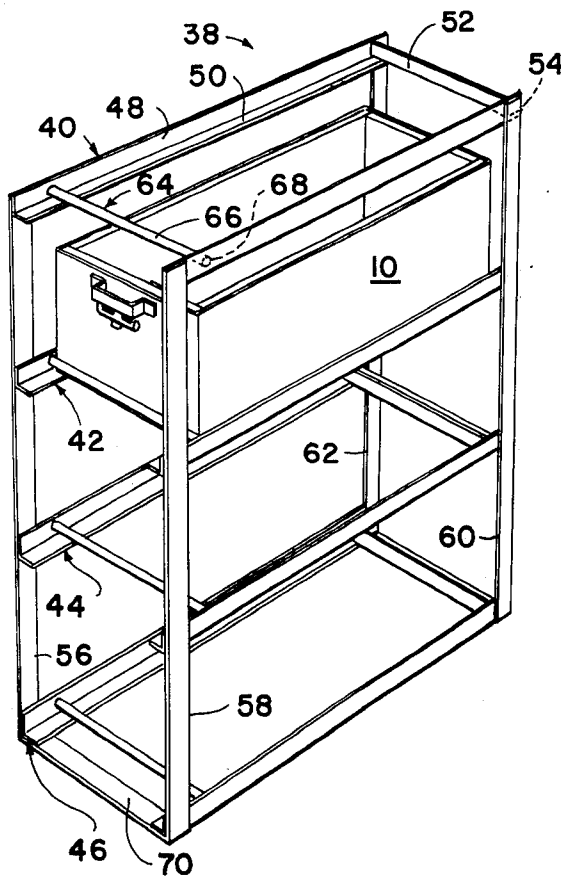
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[57] **ABSTRACT**

A shipping container and rack system including a plurality of interior-cushioned rectangular open-top containers adapted for fitting within guide systems of racks of various capacities and modes of movement, each container guide system within a rack including a planar rest for engaging the bottom of a container, each planar rest having upstanding sides and back with an axle-mounted roller extending across the front in spaced relation to the back such that containers passed into the rack on the roller fit securely behind and are retained by the roller; a method of using the system is also disclosed.

5 Claims, 16 Drawing Figures



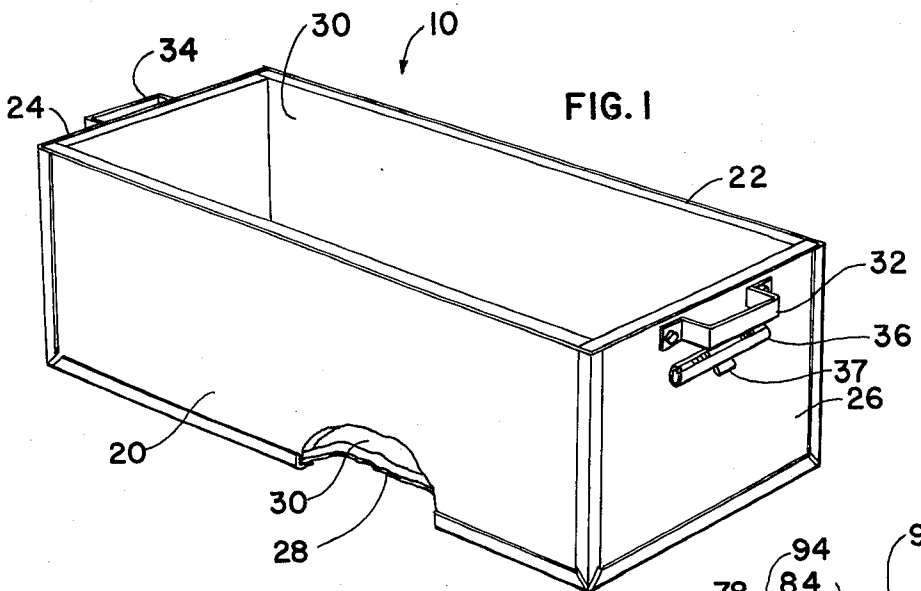


FIG. 1

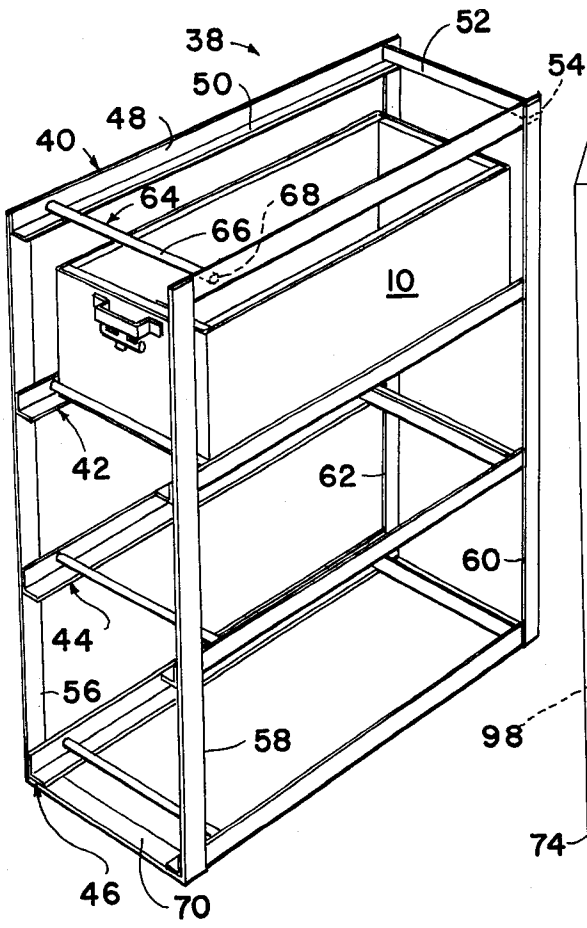


FIG. 2

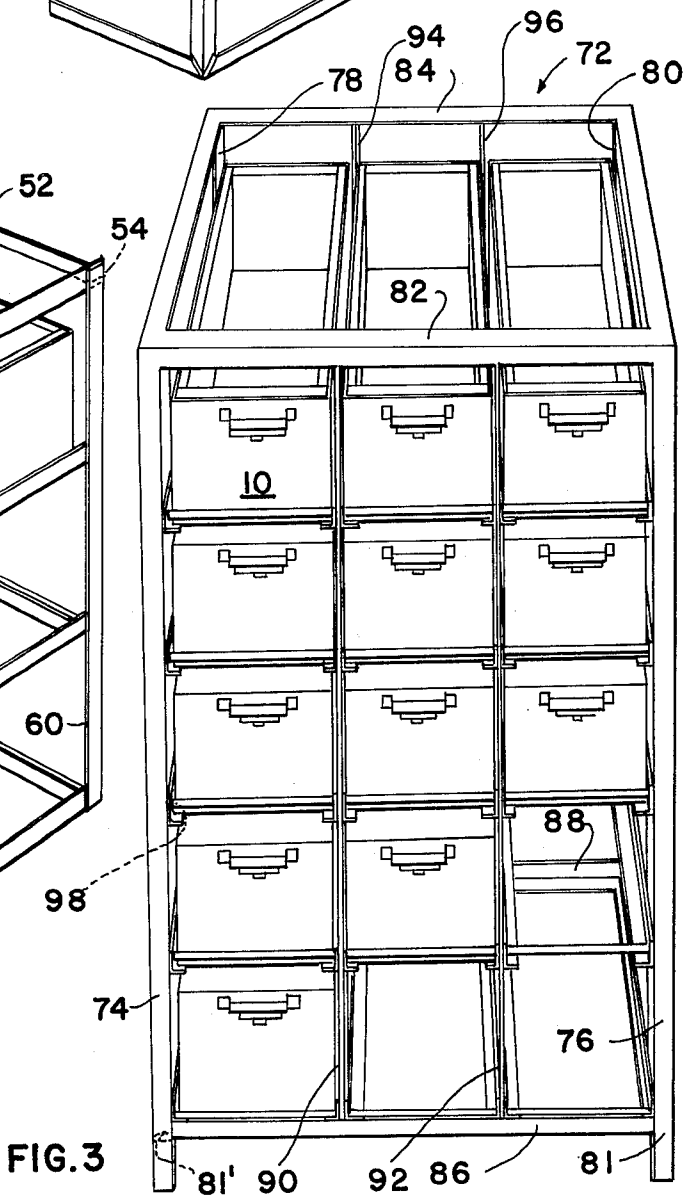
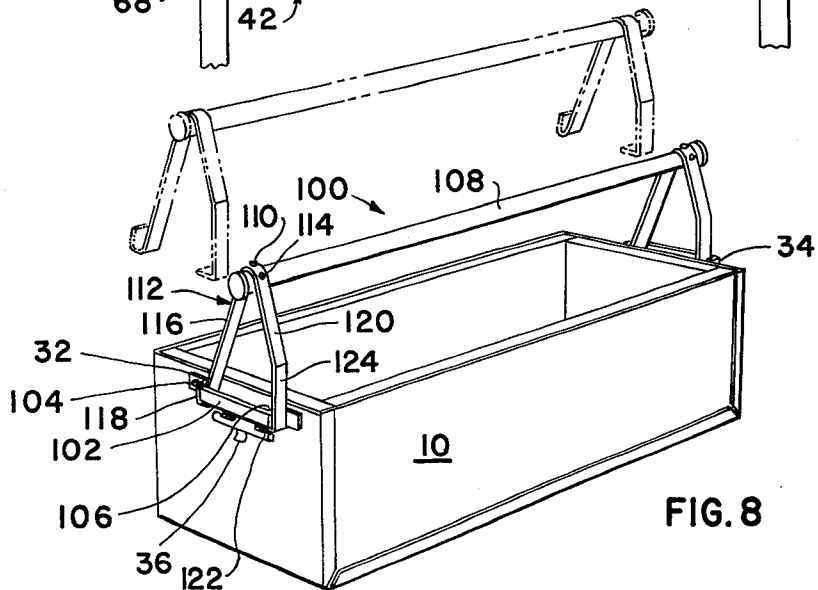
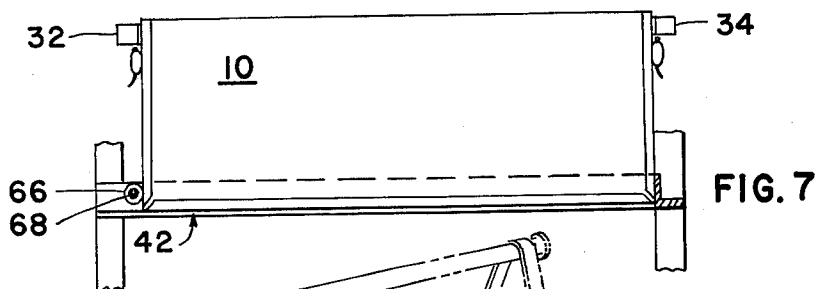
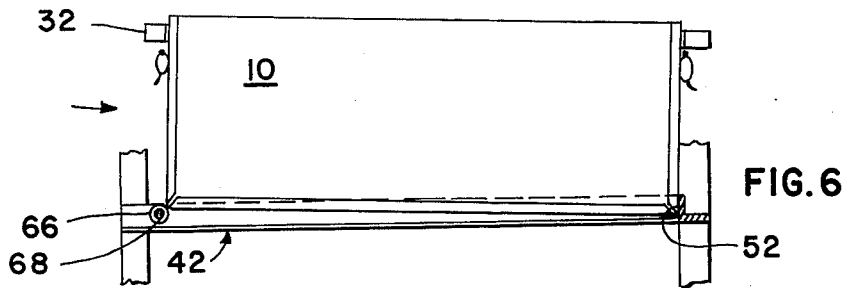
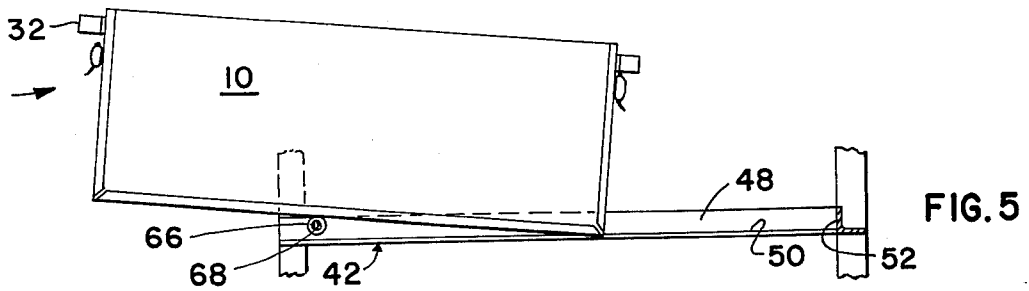
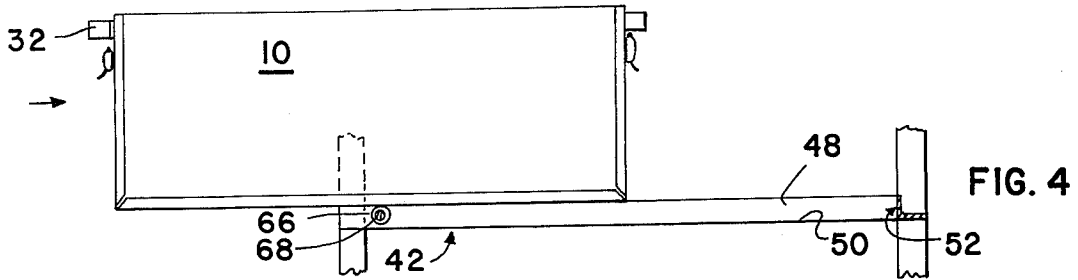


FIG. 3



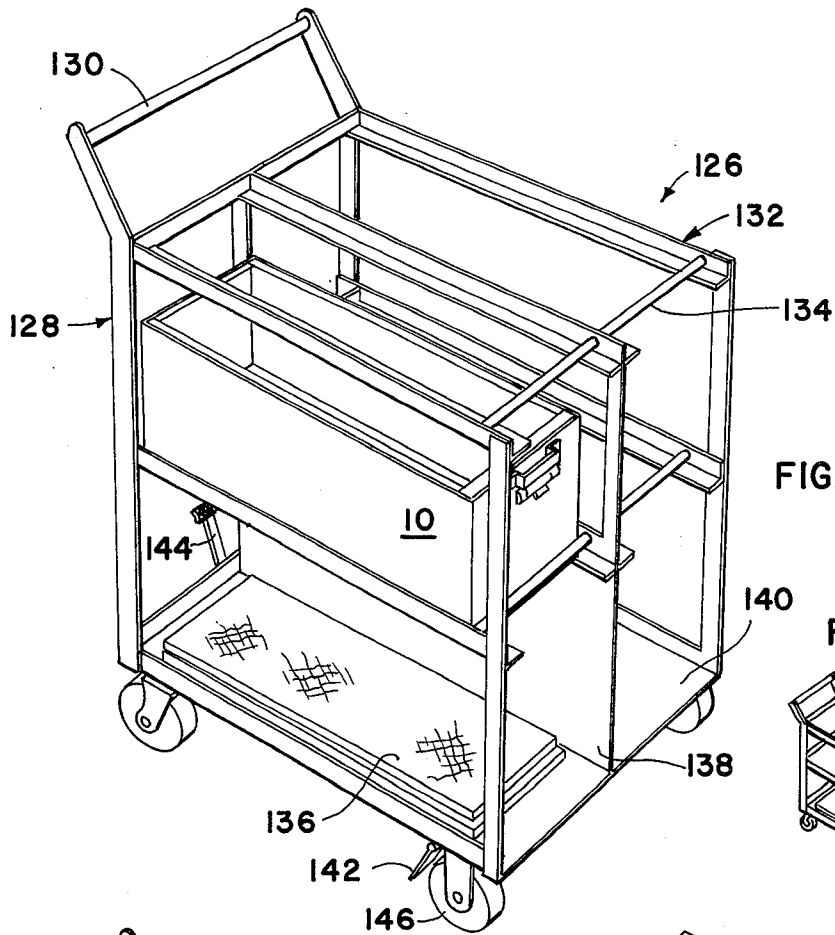


FIG. 9

FIG. 10

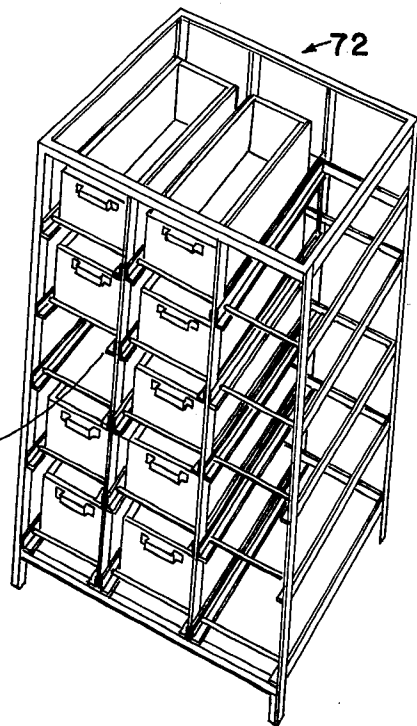
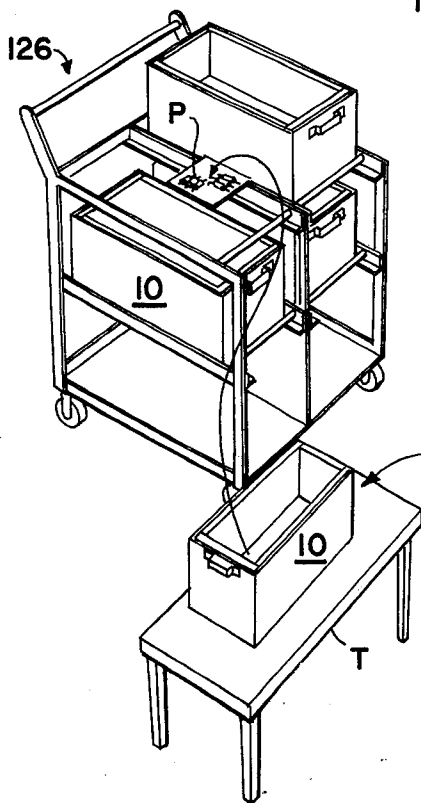
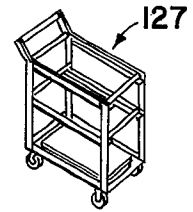
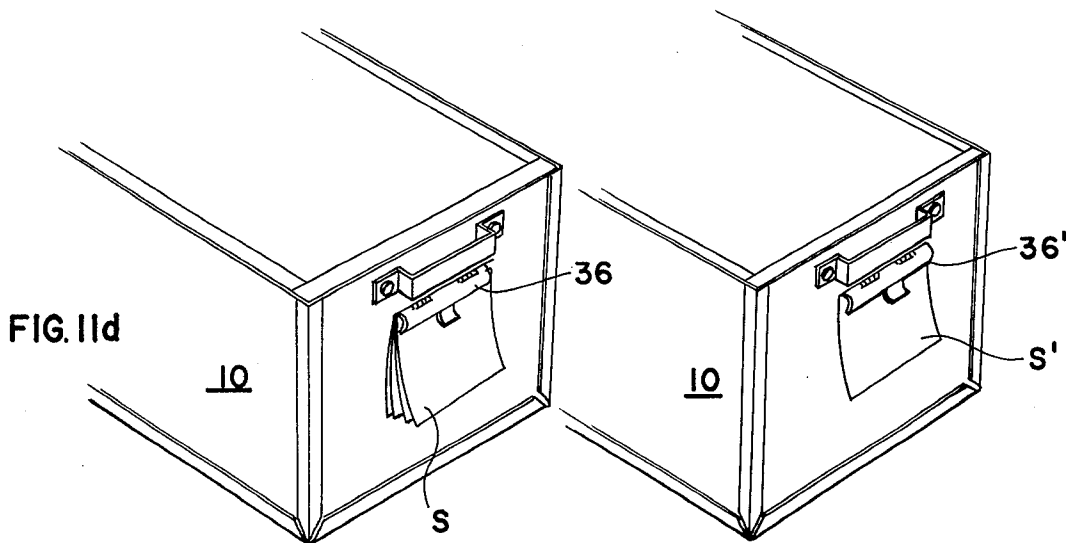
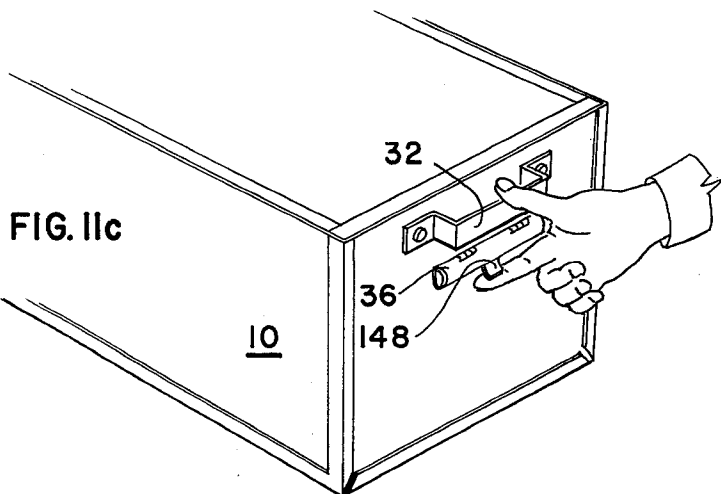
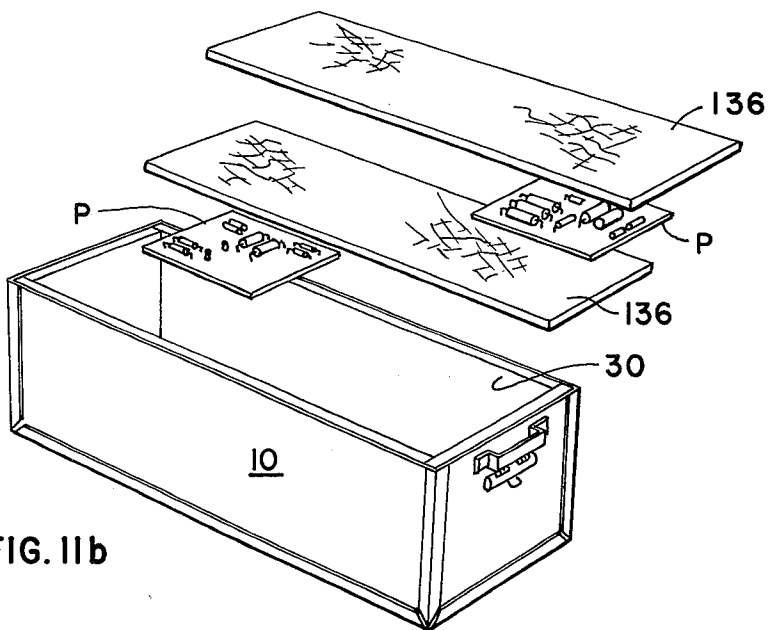
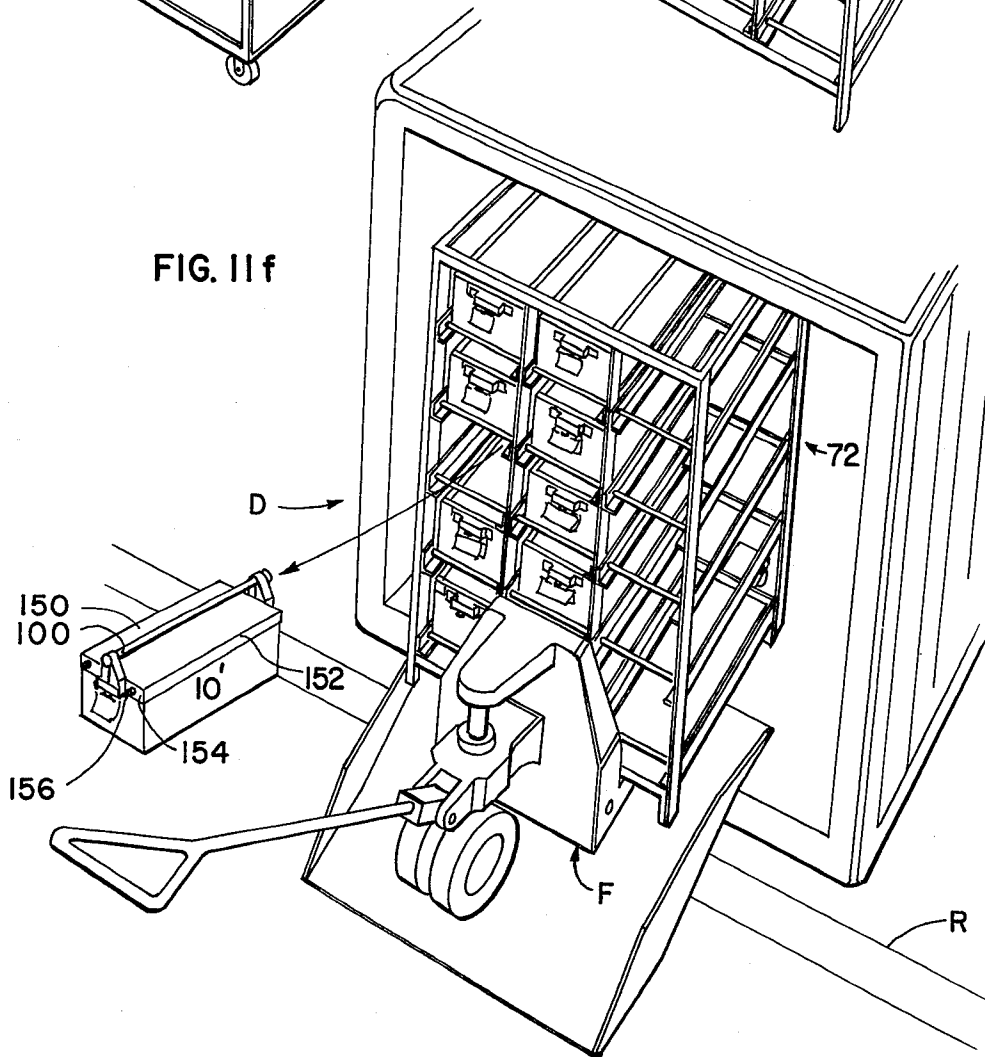
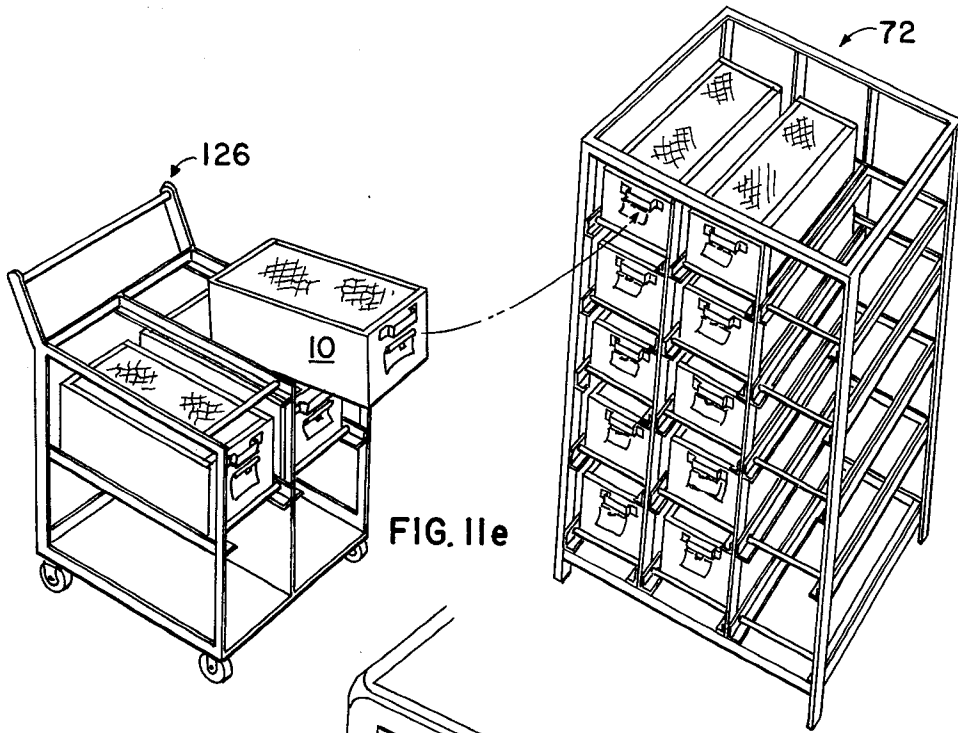


FIG. 11a





PLUG-IN EQUIPMENT SHIPPING CONTAINER AND RACK SYSTEM

This invention relates generally to shipping containers and specifically to drawer-type container-and-rack systems.

In the prior art of drawer retention within racks or cabinets various roller and guide systems have been disclosed such as those described in U.S. Pat. No. 3,139,313 issued to R. H. Rule on June 30, 1964, and U.S. Pat. No. 2,430,141 issued to H. M. Reeves on Nov. 4, 1947.

Particularly in the field of plug-in electronic module panels, parts to be stored as in drawer-type containers held in racks are very expensive, very important, and relatively easily damaged, and for that reason various, however, in contrast with the objects of the present invention, no roller and guide system to the present has combined positive, visible drawer retention with a combination of rolling and sliding friction to insure smooth drawer insertion and easy drawer removal in a cushioning system including gradual drawer-front lowering into wedge-locked position, and a full-width barrier to accidental drawer removal, and no shipping container and rack system has incorporated the above advantageous provisions in mobile and fixed rack structure of the type disclosed in the present invention.

In brief summary given for cursive description only, the invention includes means and method for protecting delicate equipment such as plug-in type modular electronic panels in transit and in storage, including a cushioning container and roller arrangement positioned for anti-friction insertion and removal and for positive retention of the container between the roller and a frame member after insertion.

The above and other objects and advantages of the invention will become more readily apparent on examination of the following description, including the drawings in which:

FIG. 1 is an isometric view of a typical shipping container constructed according to this invention;

FIG. 2 is an isometric view of the FIG. 1 shipping container held in an office rack constructed according to this invention;

FIG. 3 is a front isometric view of a palletized shipping rack constructed according to this invention;

FIGS. 4, 5, 6 and 7 are side elevations in partial section of successive positions in loading a shipping container into a rack;

FIG. 8 is a two-position isometric diagram of a special carrying handle with a container;

FIG. 9 is an isometric view of a double warehouse loading cart constructed according to this invention;

FIG. 10 is an isometric view of a single warehouse loading cart similar to the FIG. 9 cart;

FIGS. 11a and 11b are isometric diagrams of operations in transporting material in the system of this invention;

FIG. 11c is an isometric diagram of clip operation; and

FIGS. 11d and 11e are isometric details similar to FIG. 11c and FIG. 11f is an isometric view.

Now taking up the Figures in detail, FIG. 1 is an isometric view of a shipping container 10 in the general form of a rectangular open-top box or drawer of aluminum sheet or other suitable material. The container has interconnected first and second sides 20, 22 ends in the form of a back and a front 24, 26 and a bottom 28, and

is lined throughout with a layer of cushioning material 30. The cushioning material, which covers all exposed surfaces of the interior of the container, is preferably of polyurethane foam or other soft, sponge-type material. The front and back of the container have respective handles 32, 34 of bent strap protruding from the container across the upper center, and a releasable spring clip 36 affixed proximately beneath the front handle. Helium shielded arc-welding, spot welding, or other conventional fabrication techniques may be used to secure the sheet metal of the container. The handle and spring clip may be riveted in place.

FIG. 2 shows in isometric view a container 10 held in an office rack 38 having structure defining a set of horizontal apertures for holding containers. The office rack has four sets of guides 40, 42, 44, 46, equipping the rack to hold four containers. Each guide comprises a pair of horizontally spaced angles with one angle flange 48 upright and the other angle flange 50 turned inward. At the rear a stop or transverse angle joins the ends of the horizontally spaced angles, one flange 52 of the rear angle being upright and the other flange 54 being turned outward. The outward turned flange insures that the end of the container stopped against the transverse flange will be recessed, including the handle, preventing accidental direct contact between the container and passing aisleway traffic, or with a wall or other rack against which the office rack may be stacked. Vertical members 56, 58, 60, 62, affixed at each corner of the office rack vertically support the guide assemblies, which are welded to the vertical members, with the upright flanges inside the vertical members.

A roller assembly 64 having a free-rolling roller 66 extending across the front of each set of guides between the upright flanges 48 safely secures the container at rest on the supporting flanges. The axle 68, which is preferably welded at each end to a respective flange, rotatively mounts the roller and spaces the side guide angles and strengthens and stiffens the office rack assembly as a whole. The need for other transverse members at the front is eliminated by the through-axles, except for transverse strap 70 which serves as a bottom bearing surface, connecting the lower ends of the front vertical members 56, 58.

Clear loading-unloading access is thus provided over the respective rollers limited by the horizontal flanges above at the sides, insuring that the container sides cannot rise above the horizontal flanges. Each roller assembly is preferably slightly higher than the inward turned guide flanges adjacent to it. The distance from the inward periphery of the rollers to the forwardmost portion of structure defining the horizontal apertures in which containers are retained exceeds the protrusion of handles from the containers, safely recessing the fronts of containers. The roller structure above a container being inserted or removed presents a rounded, smooth contour which will not snag cushioning material, and which minimizes impact on any oversize or accidentally protruding material in the container.

The top guide 40 structure is entirely free of overhead structure, permitting an oversize height load to be held in a container in the top guide.

FIG. 3 shows an array of containers 10 held in a palletized shipping rack 72. Aspects structure of the palletized shipping rack are different from the office rack structure, although the design is similar.

The vertical angle-section members **74, 76, 78, 80**, at the corners extend below the rack, forming legs **81** spacing the rack from the floor a distance sufficient for fork-lift pickup and handling. Each leg has a reinforcing length of pipe **81'** welded to it inside the angle and to the transverse member above, the pipe being preferably of about 1 ½ inch pipe size. One flange of the vertical members is oriented outward to the side, with the other flange positioned on the inner side, providing mounting for the guide assemblies and effectively recessing the container location to prevent accidental contact.

The vertical members extend above the upper guide assembly where they are joined in the front and back by transverse and longitudinal angle-section members **82** and **84** respectively, forming a top frame shielding the rack, and by transverse bottom members **86, 88**.

Two laterally spaced vertically extending divider members **90, 92** join the upper and lower transverse angle members at the front, and two **94, 96** at the back, providing anchorage for five tiers of three containers each, in a typical-size embodiment. Preferably the axles **98** extend continuously through the guides from one side to the other, automatically aligning all rollers in the tiers and securing the front members of the assembly together. The three-container width stabilizes the palletized rack when moved by a fork lift truck, so that sudden stops do not tip over the rack.

FIGS. 4-7 show successive positions in loading a container **10** into a guide **42** in a rack.

First (FIG. 4) the container is laid across the roller **66**. Regardless of the contour of the container bottom, the full width feature of the roller **66** secures the bottom against tipping, jamming, or vibrating when moved into place on the roller.

Next (FIG. 5) the container is gently tipped until the inner end passes between the upstanding flanges **48** of the guides and rests on the horizontal flanges **50**.

Next (FIG. 6) the container is gently pushed inward, rolling on the roller with the inner end sliding lightly on the guide horizontal flanges until the inner end of the container reaches the upright flange **52** of the transverse angle member.

Finally (FIG. 7) the outer end of the container is lowered, rolling down past the roller and preferably wedging securely in place behind it.

The container length is preferably proportioned in length to fit the space between the transverse member upstanding flange and the vertical tangent to the inner periphery of the roller, preferably with a slight spring in the roller functioning to prevent rattle. Gently secured in position in this manner, the container will withstand the heavy vibrations and sideloads imposed by truck transportation and forklift transportation without loosening. Even if by mistake not fully thrust into the rack, the downhill tip afforded by the roller tends to prevent accidental dislodging. Even so, container release and unloading are readily accomplished, since the rolling friction permits lifting the outer end of the container easily. If desired the thumbs can be hooked under the handle **32** and the fingers hooked over the roller above, gently but strongly lifting the outer end of very heavily loaded containers. The handle is then gently swung forward, resting the container bottom on the roller, and the container is then gently rolled forward by pulling on the handle until in position

to be lifted free, employing the rear handle **34** also, as desired.

FIG. 8 shows a novel disconnectable one-hand carrying handle **100** especially adapted for use with the square "C" shape handles **32, 34** at the ends of the containers. In plan view each squared "C" handle consists of a straight portion **102** parallel-spaced from the adjacent end of the container by a pair of spaced shanks **104, 106**, which extend from the container end parallel with the container sides and connect the straight portion with the container. Plastic ends **110** safely cover the ends of the carrying handle.

The one-hand disconnectable handle comprises a longitudinal grip **108**, preferably a straight tube extending the length of the container above the container parallel with the container centerline. The apex or mid-portion of a pair of generally "V" shaped straps **112**, having first and second divergent legs, connect with the tube, preferably by rivets **114**, at each end of the tube. The end of the first leg **116** of each "V" turns outward and upward, forming a sharp hook **118** proportioned for engagement with shank **104**, with the first leg **116** inside the handle **32**. The end of the other or second leg **120** of the "V" turns inward, the inwardly turned portion **122** pointing toward the hook **118** of the first leg. Preferably the second leg of the "V" has a relatively shallow inward turn **124** intermediate the length.

The result of this structure is a simple, easy, secure operation, affording guide connection and quick disconnection at either end or at both ends simultaneously.

To secure the one-hand handle **100**, starting from the phantom position shown, the one-hand handle is lowered passing hooks **118** inside the container "C" shape handles **32, 34** and then is rotated and lifted, engaging the hooks **118** with shanks **104**. Spacing between the ends of the "V" shapes is such that in order to engage the hooks **118** the "V's" must be slightly sprung open by contact between the second legs **120** of the "V's" and shanks **106** of the handles. On lifting, the inward turned portions of the second legs lift shanks **106**.

Disengagement of the one-hand handles consists in simple downward pressure, causing the hooks to fly free in an inward direction, permitting the one-hand handle to be rotated and lifted free. The sprung relation of the parts when engaged prevents rattling when carrying the container, and the one-direction rotation for engagement and disengagement prevents the parts from snapping against each other when engaged or released. Additionally, there is no interference with the spring clip **36** below the handle or with shipping papers retained by the clip during operation of the one-hand handle.

FIG. 9 shows a double warehouse loading cart **126**. The loading cart **126** comprises a wheeled angle-section frame **128** with a handle **130** extending diagonally rearwardly from the back upper corners. Four guide assemblies **132** with front roller assemblies **134** arranged generally as described in reference to earlier Figures, provide for carrying four containers **10**. Below these layer cushions **136** of fire retardant polyurethane foam or the like, sized to fit within the container, can be carried flat between compartments separated by a solid sheet divider **138** over a solid plate floor **140**.

A cardinal feature of the invention, the anti-friction roller assemblies **134** makes for easier introduction of

the containers 10 or removal of the containers 10 from the cart, and for absolutely secure retention of the containers under all conditions of use, whether in static storage or in transit.

Brakes 142 actuated by a handle 144 are provided at the wheels 146 of the car to fix the cart in position when desired. The brakes may be of the type illustrated employing external friction pads or may be of any other conventional type and may be actuated by any other conventional method.

FIG. 10 illustrates a central office cart 127 similar to the FIG. 9 double warehouse loading cart but having only one set of vertical rack positions, adapting the cart for passage along narrower aisles of central offices or similar locations.

FIG. 11a shows that according to the method of the present invention, a container 10 can be removed from a palletized shipping container 72, as in a warehouse, set on a table T, and unloaded of selected or required plug-in equipment represented by module P. The selected units are loaded for shipment to points needed into another container or containers 10 retained in a warehouse loading cart 126. Sequence of loading of the containers can be as indicated by the arrows from the bottom up from one container to the next, since the general design of the invention as embodied in the cart affords excellent access from the top down, between the guides, thus reducing handling.

FIG. 11b indicates that loading sequence of the individual containers 10 comprises generally a bedding-down of plug-in units P, or other valuable and delicate equipment, in horizontal layers separated by sheets of cushioning material 136. Since the containers 10 included an initial lining 30 of cushioning material throughout as indicated in reference to the first Figure, the results of carelessness on the part of employees in packing is minimized. The lining may be maintained in place by any suitable cement.

FIG. 11c shows a further feature of the invention, positioning of the handles 32 proximately above the conventional spring clips 36 for retaining shipping papers. Each spring clip comprises a "C"-section member with a pivot and a spring at the top biasing the free end against the container. A simple pinching action of the hand employing the thumb over a handle 36 in conjunction with the forefinger hooked below the clip handle 148 serves to raise the clip easily and without danger of snapping shut, for insertion of tags or other papers identifying contents. The clip handle 148 is located remotely from the container handle and points down and away, safely preserving knuckles from injury while at the same time providing the easy opening by pinching as noted above.

FIGS. 11d and 11e show a feature of the invention in the form of contents identifying shipping papers S, S' which may be attached by means of clips 36, 36' to both ends of a container 10 showing the contents from either end.

Alternatively one end of each of two containers may bear cross referencing contents tags or papers S, S'.

FIGS. 11e and 11f show further stages in transport of containers 10 according to this invention. Containers 10 are removed from a warehouse loading cart 126, and placed in a palletized shipping rack 72, preferably but not necessarily with ends reversed as indicated by the alternative phantom and solid arrow lines, since the provision of identical clips on both ends, when accom-

panied by identifying papers eliminates need for reversal of the transferred containers.

FIG. 11f shows fork-lift F loading of a palletized shipping rack 72 into a designated truck D positioned for loading at a ramp R. Regardless of ordinary or non-catastrophic tip or vibration, the containers 10 are safely retained within the rack 72 which will not itself easily tip over because of the relatively square proportions of the base. At anytime required, an individual container may safely be removed as desired from a rank in the designated truck during deliveries, as indicated at 10' by the arrow. A final structural feature of the system is the cover 150 which is of metal with edges 152 downwardly overlapping the container on the sides and ends except at the handle areas where the edges are cut away leaving two ears 154 on each end through which are fastened two quick-disconnect screws 156 for securing the tops. The tops are used especially when racks are not available or the use of racks would be temporarily impracticable.

It will be appreciated that the FIG. 11 method shown of selecting an electronic module container from a warehouse rack, removing a selected module or modules to another container on a warehouse cart, conveying the container with others to and into a palletized rack, loading the palletized rack on a designated truck, and removing such containers as are required at various delivery points, includes the additional steps, in the removal, of carrying containers from the palletized rack by the special disconnectable one-hand carrying handles 100 at the designated place in a central office, for example, placing the containers in an office rack, for temporary storage, prior to removal by office cart to a relay bay or other place for service installation.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed and desired to be secured by United States Letters Patent is:

1. A shipping container system comprising: a container having a bottom with upstanding interconnected left and right sides and front and back ends, a rack having structure defining a horizontal aperture therein proportioned to receive said container as a drawer inserted in the front of the horizontal aperture, said rack structure including: a horizontal support for receiving and holding the container at a predetermined level, guide means positioned for aligning the container during and after insertion of the container in the rack, a stop member located in position to limit rearward movement of the container when the container is fully inserted in the rack; a roller, and means rotatably mounting the roller to the rack, said roller extending horizontally across the front of the horizontal aperture proximately in front of the fully inserted position of the container and proximately tangent at the lower circumference thereof to the level of the horizontal support, for thereby serving as a rolling support for the bottom of the container during insertion and for a retainer contacting the front end of the container after insertion.

2. A shipping container system as recited in claim 1, wherein the roller is spaced forward of the stop member a distance providing a fit of the length of the container therebetween.

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3. A shipping container system as recited in claim 2, wherein the means rotatably mounting the roller to the rack comprises an axle passing through the length of the roller and affixed at each end to the rack.

4. A shipping container system as recited in claim 3, wherein the container has a handle protrusive from an end thereof and a spring clip proximately below said handle, the spring clip comprising a "C" section member including a spring biasing the lower end thereof inwards, and a spring clip handle oriented downward and away from said container handle.

5. A shipping container system comprising: a container having a bottom with upstanding interconnected left and right sides and front and back ends, a rack having structure defining a horizontal aperture therein proportioned to receive said container as a drawer inserted in the front of the horizontal aperture, said rack structure including: a horizontal support for receiving and holding the container at a predetermined level, guide means positioned for aligning the container during and after insertion of the container in the rack, a stop member located in position to limit rearward movement of the container when the container is fully inserted in the rack; a roller, means rotatably mounting the roller to the rack, said roller extending horizontally across the

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front of the horizontal aperture proximately in front of the fully inserted position of the container and proximately tangent at the lower circumference thereof to the level of the horizontal support, for thereby serving as a rolling support for the bottom of the container during insertion and for a retainer contacting the front end of the container after insertion, said container having a handle protrusive from each end thereof, each said protrusive handle comprising in plan view a straight portion and first and second spaced shanks extending from the container parallel with the sides thereof and connecting the straight portion with the container, and a one-hand disconnectable carrying handle in the form of a longitudinal grip extending the length of the container, first and second legs extending divergently downward at each end of the longitudinal grip, the end of each first leg turning outward and upward forming a hook proportioned for engagement with the first shank with the first leg inside the first shank, the end of each second leg turning inward toward said hook of the first leg; the divergence between said legs being proportioned for engaging the turned end of the second leg with the second shank on said engagement of the first leg with the first shank.

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