Nov. 24, 1959 L. J. BUDD 2,914,232

APPARATUS HANDLING STRUCTURE

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FIG. 2

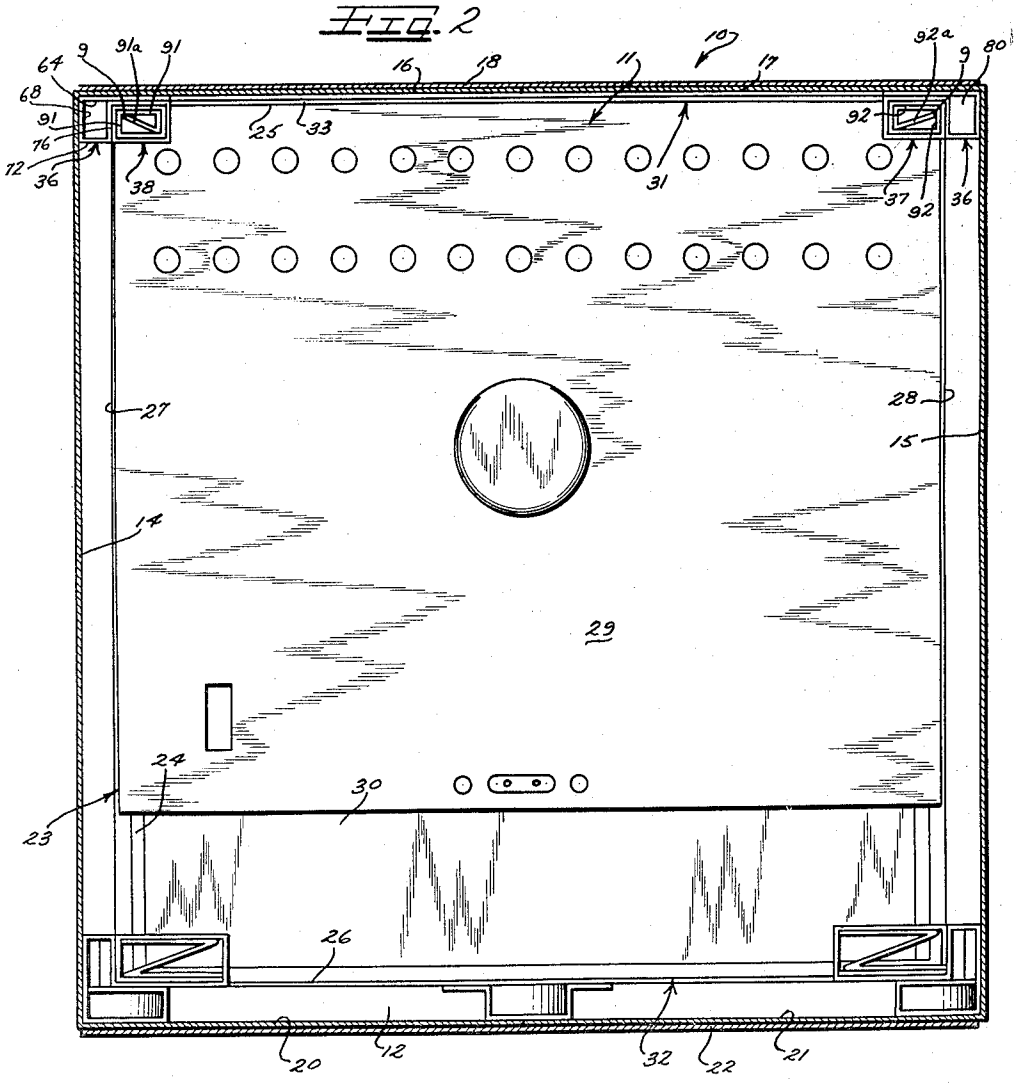
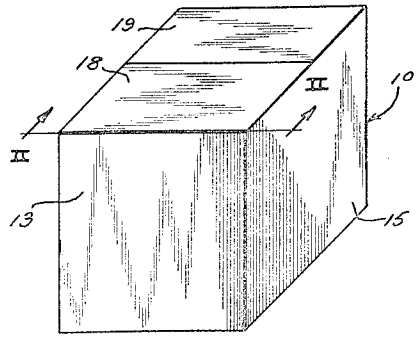


FIG. 1



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Fig. 3

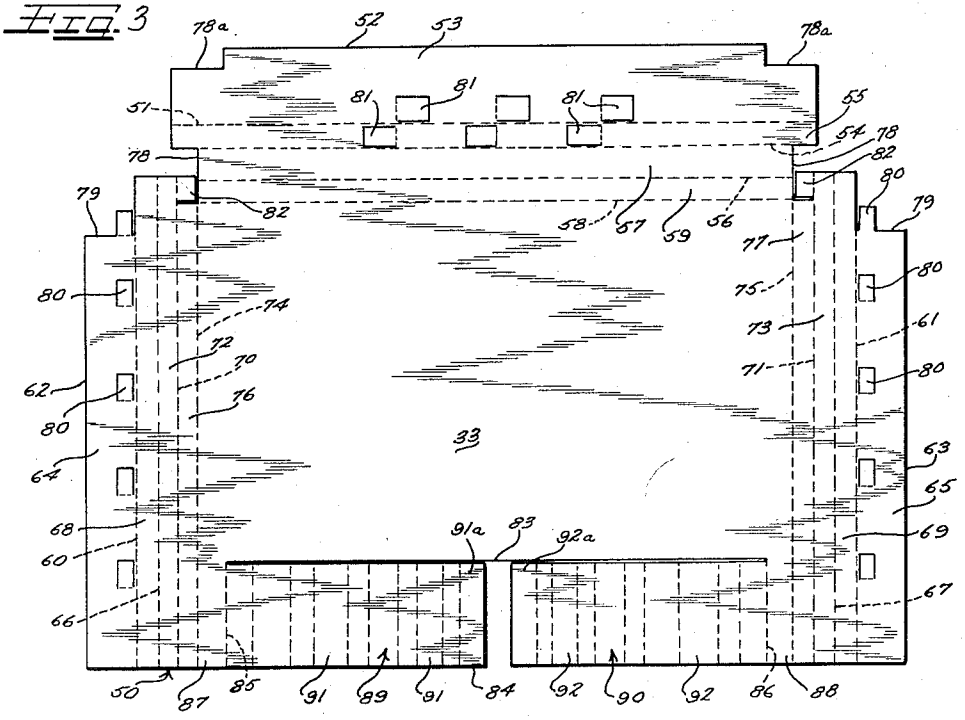
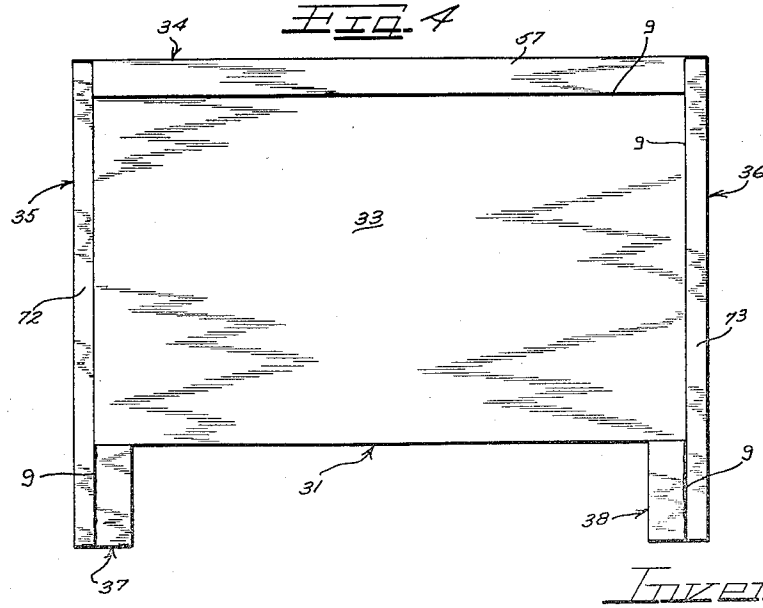


Fig. 4



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APPARATUS HANDLING STRUCTURE

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Fig. 5

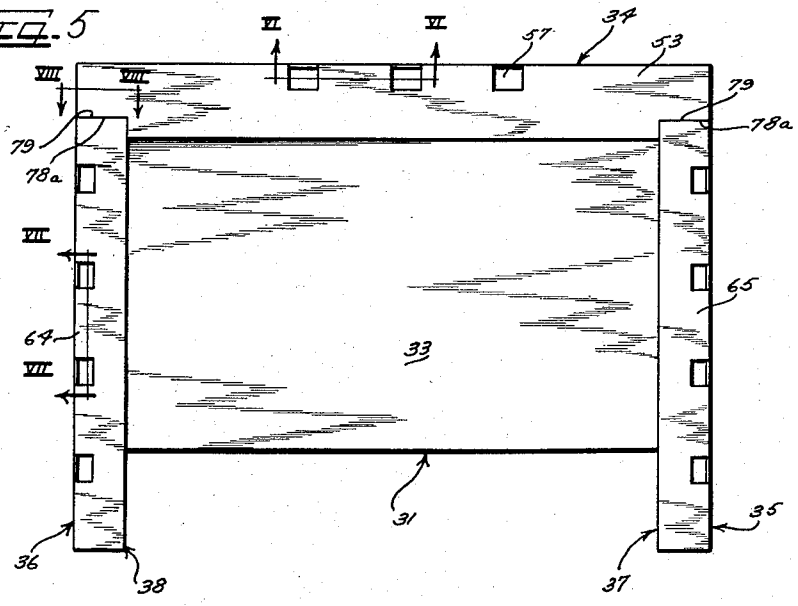


Fig. 6

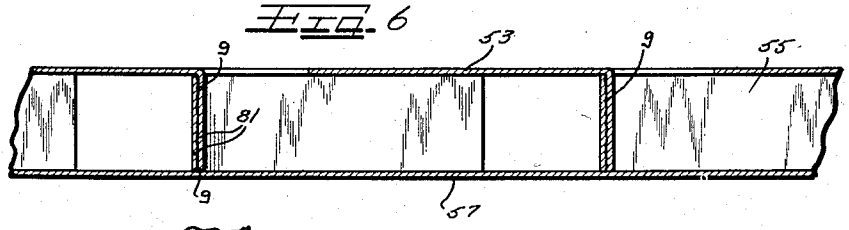


Fig. 7

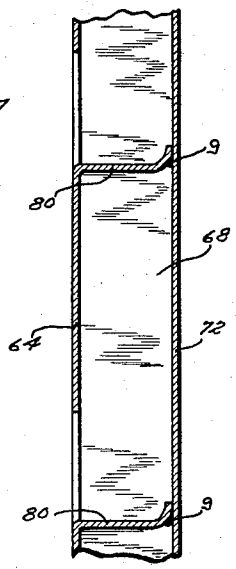
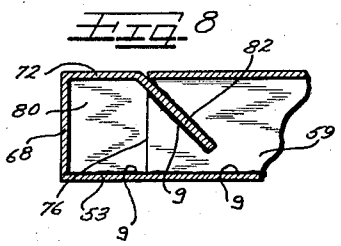


Fig. 8



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United States Patent Office 2,914,232 Patented Nov. 24, 1959

2,914,232

APPARATUS HANDLING STRUCTURE

Larry J. Budd, Des Plaines, Ill., assignor to Pallet Devices, Inc., Des Plaines, Ill., a corporation of Illinois

Application January 23, 1957, Serial No. 635,645

2 Claims. (Cl. 229—14)

This invention relates to means for supporting apparatus for shipment and more particularly to the support of apparatus with minimum expense and with maximum safety and efficiency.

In an exemplary application or embodiment of the present invention, a television receiver having both cabinet and receiver apparatus is supported within a container for shipment. To this end, a palletized structure underlies the cabinet to support the cabinet bottom wall in spaced relation to the cabinet bottom. This palletized structure may also carry means upstanding therefrom for engaging lower portions of the front wall, rear wall and side walls of the cabinet to hold such walls in spaced relation to the inner surfaces of the vertical walls of the container.

According to the features of the present invention, there is herein provided a new and improved support structure which may be disposed over the cabinet top and may carry means depending therefrom for engaging upper portions of the front wall, rear wall and side walls of the cabinet to support the same in spaced relation to the vertical walls of the container and also to protect the edges of the cabinet at the intersections of the top wall with the front wall, rear wall and side walls.

An important feature of the present invention relates to the use of a single sheet of material folded in such a manner as to provide reinforced tubular cushioning supports about a central panel.

According to still other features of the present invention, new and improved means have been provided for rigidifying the tubular supports to eliminate the former requirement of inserting inserts into the tubes to rigidify the same and in this manner reduce the construction and assembly costs of the cushioning support structure.

Accordingly, it is an object of this invention to provide a new and improved article-support structure particularly adapted for cushioning and supporting an article within a container.

Yet another object of the present invention is in the support of an article within a container utilizing a new and improved cushioning support construction to provide a light-weight, compact, simple and inexpensively manufacturable structure which supports the article with maximum safety and efficiency.

According to a specific feature of the present invention, tabs are cut out of the tubular supports at spaced intervals and turned inwardly into the confines of the tubular support to rigidify the same.

Still another specific feature of the present invention relates to cutting out tabs from different walls of the tubular support and turning the tabs in back to back relation and securing them together thereby rigidifying the tubular supports.

Yet another important feature of the present invention relates to the particular manner in which cushioning pads have been provided by slitting the central sectional panel and deforming the slit portions to provide cushioning supports adjacent the reinforced tubes.

According to still other features of the present invention there is provided an article cushioning structure comprised of a foldable sheet of a sturdy paper-like material having a central portion and having marginal edge portions bounding four sides of the central portion with three of the marginal portions being folded under with each of the three marginal portions providing four flaps defining walls which are disposed in angular relation to one another defining a box-like tubular leg, the outermost flaps of the respective tubular legs being return bent in face to face retained engagement with the central portion, reinforcing truss portions internally confined within the tubular legs, the fourth marginal portion having intersecting slits generally at right angles to one another providing cut out blank portions between the tubular legs with the blank portions being folded into multi-layered box-shaped cushioning pads.

Other objects and features of the present invention will more fully become apparent from the following detailed description taken in conjunction with the accompanying sheets of drawings which illustrate a preferred embodiment and in which:

Figure 1 is a perspective view of a container having a television receiver packed therein for shipment, and in accordance with the principles of this invention;

Figure 2 is a cross sectional view taken substantially along line II—II of Figure 1 just inside one end wall of the container and showing the television receiver and support structure therefor in rear elevation;

Figure 3 is a view illustrating a blank from which the support structure for the top of the television receiver may be formed;

Figure 4 is a bottom plan view of the support structure for the top of the television receiver;

Figure 5 is a top plan view of the support structure for the top of the television receiver;

Figure 6 is an enlarged cross sectional view taken substantially on the line VI—VI of Figure 5 looking in the direction indicated by the arrows;

Figure 7 is an enlarged cross sectional view taken substantially on the line VII—VII of Figure 5 looking in the direction indicated by the arrow; and

Figure 8 is an enlarged cross sectional view taken substantially on the line VIII—VIII looking in the direction indicated by the arrows.

The reference numeral **10** generally designates a shipping container which may house a television receiver **11**. The container **10** may comprise a front wall **12**, a rear wall **13**, side walls **14** and **15**, a top defined by a first pair of flaps **16** and **17** extending inwardly from the top edges of the side walls **14** and **15**, respectively, and a second pair of flaps **18** and **19** extending inwardly over the flaps **16** and **17** (Figure 1) from the top edge of the front wall **12** and the rear wall **13** respectively. The container **10** is provided with a bottom defined by flaps **20** and **21** extending inwardly over the lower edges of the side walls **14** and **15**, respectively, and flaps **22** extending inwardly from the lower edges of the front and rear walls **12** and **13** under the flaps **20** and **21**.

The television receiver **11** may comprise a cabinet generally designated by reference numeral **23** which may comprise a front wall **24**, a top wall **25**, a bottom wall **26**, side walls **27** and **28** and a removable rear wall **29**. Receiver apparatus is installed within the cabinet **23** which may comprise a chassis **30** disposed on the upper surface of the cabinet bottom wall **26**.

To support the receiver **11** within the container **10**, top and bottom support structures generally designated by reference numerals **31** and **32** are provided. The bottom support structure is described in detail in my copending application entitled "Method and Means for Supporting Apparatus for Shipment," Serial No. 430,381,

filed May 17, 1954, now Patent No. 2,895,661, issued July 21, 1959.

It is believed the manner of construction of the top support structure **31** will be best understood from a step-by-step description of the construction thereof. In general, each of the support structures **31** and **32** may be formed from a single blank of relatively rigid form-sustaining sheet material and preferably of an inexpensive expandible material such as paper board, fiber board or the like. The support structures are formed by making bends at score lines which may be scored by marking the blank or preferably by actual indentation of the blank, especially when the blank is of paper board or a like material, but it will be appreciated that marking or indentation is not necessarily required and the terms "scoring" and "score line" are therefore used in a figurative sense to indicate the position of the bends.

Before proceeding with a step-by-step description with the method of construction, a general description of the top support structure **31** is believed to be in order. The top structure **31** may comprise a section **33** for engaging the upper side of the cabinet top wall **25**, a generally tubular support means **34** for engaging between an upper portion of the cabinet front wall **24** and an opposed inner surface portion of the container front wall **12**, generally tubular support means **35** and **36** for engaging upper end portions of the cabinet side walls **27** and **28**, respectively, and supporting the same in spaced relation to opposed surface portions of the container side walls **14** and **15**, and a pair of generally tubular support means **37** and **38** for engaging upper end portions of the rearward cabinet wall **29** and support the same in spaced relation to opposed inner surface portions of the container rear wall **13**.

In Figure 3, reference numeral **50** designates a blank from which the top structure **31** may be formed. To form the tubular support means **34** which, as desired above, engages an upper portion of the cabinet front wall **24** and a facing inner surface portion of the container front wall **12**, a score line **51** may be located parallel to and at a first predetermined distance inwardly from one edge **52** of the blank **50** to define a section **53**, a score line **54** may be located parallel and at a distance spaced inwardly from the score line **51** a distance substantially less than the aforesaid first predetermined distance to define a section **55**, a score line **56** may be located parallel to and spaced inwardly from the score line **54** a distance greater than the last aforesaid distance to define a section **57** and a score line **58** may be located parallel to and spaced inwardly from the score line **56** by a distance slightly less than the aforesaid second predetermined distance (by about the thickness of the sheet material) to define a section **59**.

The blank **50** may be bent at the score lines **51**, **54**, **56** and **58** so that the section **59** extends downwardly at right angles to the base section **25** with the section **57** projecting outwardly from the lower end of the section **59** and generally in parallel relation to the section **25**, with the section **55** extending upwardly from the outer edge of the section **57** (at the score line **54**) in parallel aligned relation to the section **59**, and with the section **53** extending inwardly from the upper edge of the section **55** over a portion of the base section **25**. Most preferably, this portion of the section **53** may be adhesively secured by glue and the like *g* to such portions of the section **33**.

To form the tubular support means **35** and **36** which, as described above, engage between end portions of the cabinet sides **27** and **28**, respectively, and inner surface portions of the container sides **14** and **15**, respectively, score lines **60** and **61** may be located parallel to and at first predetermined distances inwardly from opposite edges **62** and **63** of the blank **50** to define sections **64** and **65**, score lines **66** and **67** may be located parallel to and at second predetermined distances inwardly from score lines **60** and **61** to define sections **68** and **69**, score lines **70** and **71** may be located parallel to and at distances substantially less than the aforesaid first predetermined distances from the score lines **60** and **61** to define sections **72** and **73**, and score lines **74** and **75** may be located parallel to and at distances slightly less than the aforesaid second predetermined distances (by about the thickness of the sheet material) from the score lines **70** and **71** to define sections **76** and **77**.

The blank **50** may be bent at the score lines **60**, **61**, **66**, **67**, **70**, **71**, **74** and **75** so that the sections **76** and **77** project downwardly at right angles from the opposite edges of the base section **33** with the sections **72** and **73** projecting outwardly from the lower edges of the sections **76** and **77** in parallel relation to the base section **33**, with the sections **68** and **69** projecting upwardly from the outer edges of the sections **72** and **73** in parallel aligned relation to the sections **76** and **77**, and with the sections **64** and **65** extending inwardly from the upper edges of the sections **68** and **69** over edge portions of the base section **33**. Most preferably, the sections **64** and **65** may be adhesively secured, by glue and the like *g*, to such edge portions of the base section **33**.

Joints are provided between the support means **34** and the support means **35** and **36** by cutting the blank to an appropriate shape as illustrated in Figure 3. To this end, the support means **34** is provided with inner and outer spaced notches **78** and **78***a* at opposite ends thereof. The support means **35** and **36** are provided with notches **79—79**. Hence, when the tubular support means **34**, **35** and **36** are folded into position they may be interlocked with only one thickness of sheet material extending above and in overlying engagement with the section **33**. To this end, the sections or wall portions **53**, **64** and **65** are interlocked and are in overlying abutting face to face secured relation with respect to the section **33**. Suitable adhesive such as glue may be used to maintain the walls **53**, **64** and **65** in assembled relationship with respect to section **33**.

It has been found that the tubular support means **34**, **35** and **36** are very easy to form in the manner as above described, requiring a minimum amount of material, and yet support the cabinet **23** with maximum safety and efficiency. The reason for the improved safety and efficiency of support may be best understood by an analysis of the forces supplied to the support means **35**, for example, as viewed in Figure 2. With forces applied to the section **76** to a force tending to move the cabinet **23** toward the side wall **14**, such forces will be split between the sections **72** and the portion of the section **64** in aligned relation with the section **72**. These forces will be applied to the ends of the section **68** and may be evenly distributed over the inter-engaging surface portions of the section **68** and contain a side wall **14**. This even spliting of forces is, of course, desirable to achieve maximum strength with a minimum thickness of material. With the forces applied against the corner defined by the sections **64** and **68**, the vertical component of such force will tend to tilt the structure about an axis approximately at the upper end of the section **76** to apply such components through the section **68** to the section **72**. The horizontal component of such force will be applied principally through the section **64**. Accordingly, such a force tends to apply equal forces through the sections **64** and **72**. It may further be noted that with the portion of the section **64** overlying an edge portion of the base section **33**, additional protection is provided at the corner between the top wall **25** and the side wall **27**.

It is not essential, but highly desirable, that the tubular means **35** and **36** may be packed with cut out tab means **80**. The ends of the tabs are turned as is shown in Fig. 7 and adhesively secured by means such as glue at *g* to the section or tubular side wall 72. These tabs **80** have a configuration which corresponds to the bore of the tubular cushioning means 35 and 36. These tabs en-

gage in nested engagement continuously about their periphery with the walls defining the tubular means 35 and 36 and in this manner efficiently and economically rigidify the structure. By such construction, additional insert supports are not required and the support structure 31 may be made in its entirety from a single strip or sheet of material.

The tubular means 34 is likewise provided with cut out tabs 81 which tabs in this instance are cut out from different side walls of the tube defining the tubular means 34 in such a manner that the tabs may be engaged in back-to-back relation and adhesively secured together by means such as glue and the like at *g*. The tabs 81 are also adapted to nestingly engage within side walls of the tubular means 34 so as to rigidify the same.

To assist in the further rigidification of the tubular means 34 and to provide a tight joint between the tubular means 34 and the tubular means 35 and 36, tabs 82 are cut out of the sections 76 and 77, one tab for each section. When the tubular means 34, 35 and 36 are folded into position, the tabs 82 are adapted to be deflected into nested interlock engagement within the tube defined by the tubular means 34. When the tabs 82 are in assembled position, they are particularly advantageous in that they maintain the section or side wall 59 in substantially perpendicular relation to the section 33.

To form the tubular support means 37 and 38 which engage between upper rearward portions of the cabinet 23 and the container rear end wall 13, the blank 50 may be cut along a line 83 transverse to the score lines 74 and 75 defining the opposite edges of the base section 33 with the terminal ends of the line 82 being spaced inwardly from the score lines 74 and 75. Generally at the mid point of the line 82 a cut is made between the line 83 and one edge 84 of the blank 50.

A pair of score lines 85 and 86 may extend between the terminal ends of the cut 83 and the edge 84 and the portion of the blank between the score lines 85 and 86 and score lines 74 and 75 may be described as sections in the same plane as and extending outwardly from the base sections 33, the sections being designated by reference numerals 87 and 88, respectively. Between the score lines 85 and 86 are elongated tabs 89 and 90 each of which is scored at predetermined intervals along the length thereof to divide each tab into ten sections 91 and 92 which have varying widths, with the end sections being designated at 91*a* and 92*a*, respectively.

To form the tubular support means 37 and 38, the blank 50, and more specifically the elongated tabs 89 and 90 may be bent at the score lines so that the sections 91 and 92 are folded in a manner as to provide tubular supports. In each case, the tubular supports are of a box-like or rectangular configuration and the end tabs 91*a* and 92*a* extend diagonally across the rectangular tube. The end sections 91*a* and 92*a* are secured by adhesives such as glue *g* at the corner to rigidify the cushioning support means 37 and 38. More specifically, the sections 91*a* and 92*a* are adhesively secured at the right angle junction of sections 91—91 and sections 92—92, respectively.

It will be appreciated that the tubular support means 37 and 38 so formed will offer very secure support for the upper ends of the rear portion of the cabinet 23.

According to a specific feature of the invention, the supports 35 and 36 and the supports 37 and 38 may provide mutual support for each other, by gluing at *g* or otherwise securing the outer surfaces of the sections 91 and 92 to the facing portions of the sections 76 and 77, respectively.

In summary, each of the tubular support means 34–38 is of a rectangular or box-like configuration and is reinforced by reinforcing portions which extend transversely of the respective tubes defined by the tubular supports.

With the elimination of the support means 34 and possibly the support means 37 and 38, the remaining structure may provide an improved pallet construction formed from a single piece of material.

It will be appreciated from the foregoing that this invention provides an inexpensive, light weight, compact, readily manufacturable support structure for supporting an article within a container with maximum safety and efficiency.

It will thus be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. Article support means formed of sheet material and comprising: a rectangular base section; a first section projecting transversely from one edge of said base section; a second section projecting outwardly from said first section; a third section projecting from said second section in parallel aligned relation to said first section; a fourth section projecting inwardly from said third section in spaced parallel aligned relation to said second section and secured to said base section; said first, second, third and fourth sections thereby forming a hollow support of rectangular cross-section, one of said sections having in spaced relation therealong a plurality of openings of rectangular form substantially the same as the inside cross-section of said hollow support, and a plurality of rectangular tabs each having substantially the same size as said openings and each extending inwardly in transverse relation to said hollow support from an edge of one of said openings in said one of said sections to engage the inside of the other three sections and thereby increase the strength of said hollow support with respect to transverse forces the tabs each being integral with said one section having said openings along one edge of one of said openings.

2. In a shipping container, article support means formed of sheet material and comprising: a rectangular base section; a first section projecting transversely from one edge of said base section; a second section projecting outwardly from said first section; a third section projecting from said second section in parallel aligned relation to said first section; a fourth section projecting inwardly from said third section in spaced parallel aligned relation to said second section and secured to said base section; said first, second, third and fourth sections thereby forming a hollow support of rectangular cross-section; two of said sections having openings therein of rectangular form substantially the same as the inside cross-section of said hollow support with an edge of the opening in one section being co-planar with an edge of the opening in the other section; rectangular tabs integral with said sections of substantially the same size as said openings extending inwardly from said edges thereof into abutting relation in transverse relation to said hollow support, and adhesive means securing said rectangular tabs together, said rectangular tabs thereby increasing the strength of said hollow support with respect to transverse forces.

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