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FIGURE 4 CORNER POST

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2 Sheets-Sheet 1

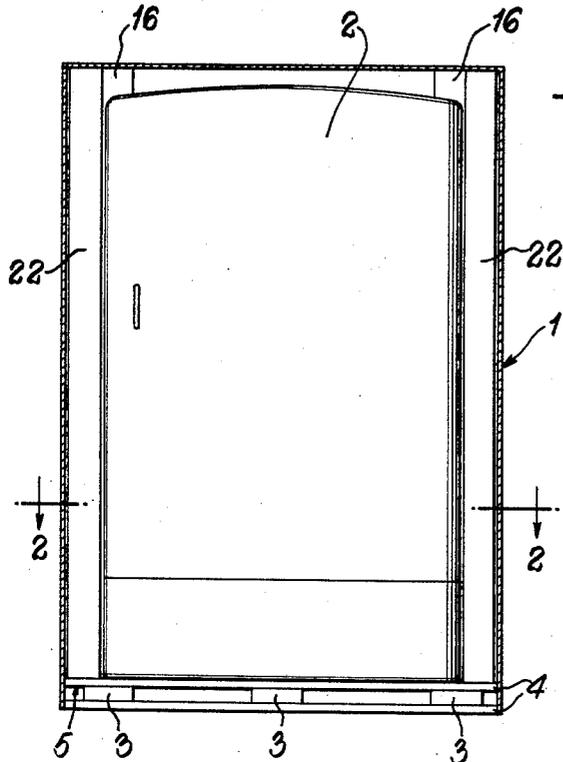


Fig. 1.

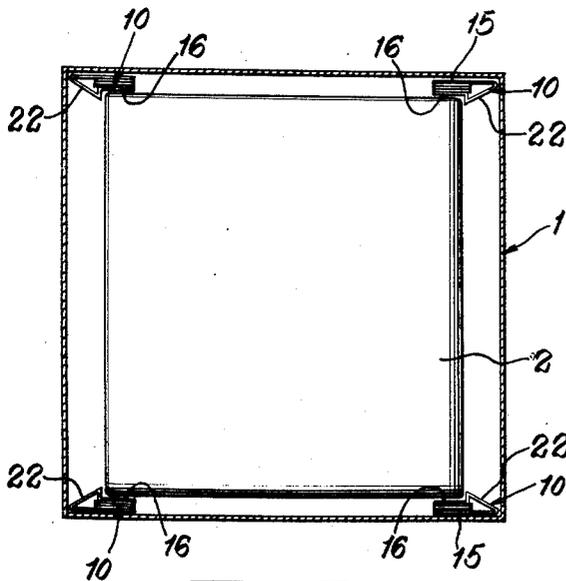


Fig. 2.

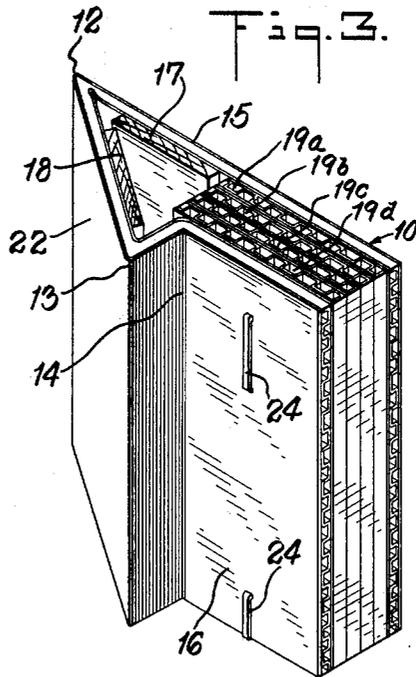


Fig. 3.

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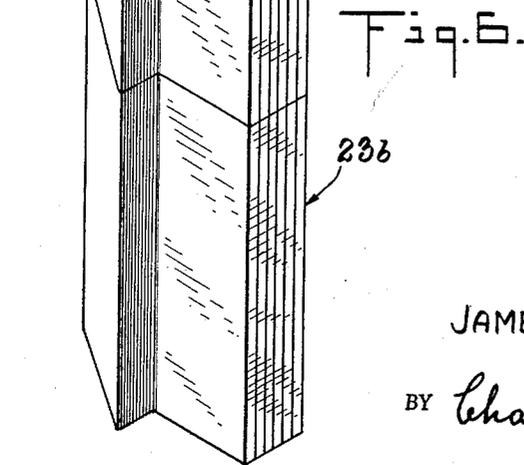
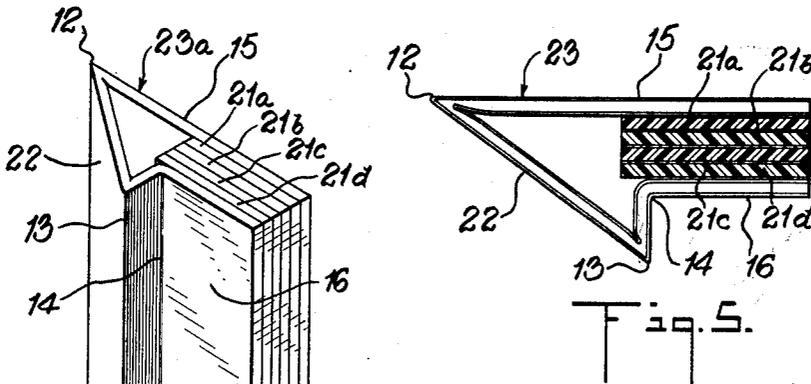
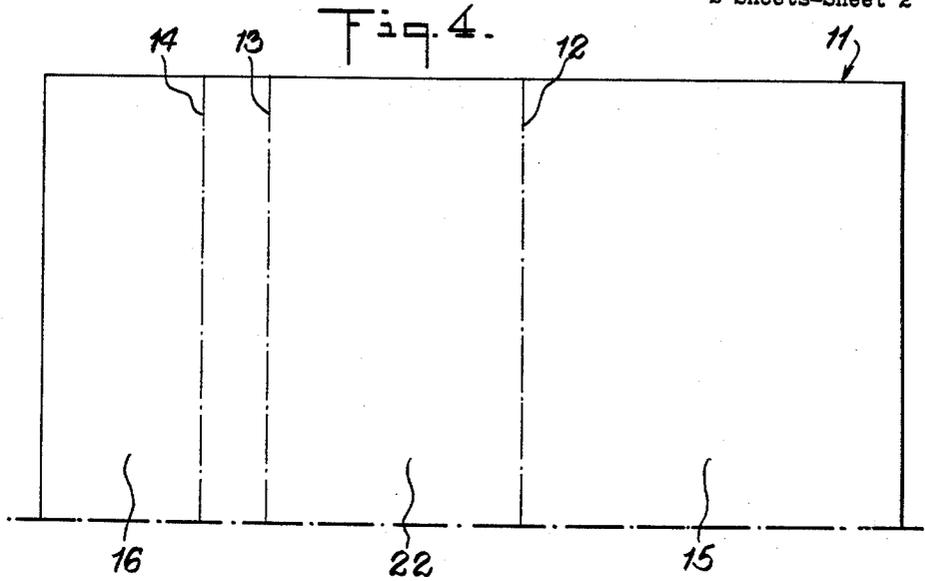
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FIGURE 4 CORNER POST

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2 Sheets-Sheet 2



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FIGURE 4 CORNER POST

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This invention relates to a novel vertical corner post protector having a cross-section in the shape of the number 4 which is used for packaging bulky, heavy articles in paperboard type of boxes, thin wooden boxes, crates or like containers. The novel vertical post of the invention serves a dual function of providing ample vertical stacking strength for the package and contents to prevent damage to the contents by one or more of such packages being vertically stacked to bear against a lower package and to cushion the contents of the package against external blows or shocks by maintaining the contents in fixed spaced relation to the inner walls of the container.

In the packaging of bulky, heavy articles such as refrigerators, television sets, high fidelity consoles, furniture cabinets, etc. within relatively lightweight but strong crates and containers made of reinforced paperboard, corrugated paperboard, light wooden crates, etc. it is customary to cushion those parts of the contents within the lightweight container against damage from sharp blows as may occur during transportation or storage handling of the packaged goods. Heretofore, there have been used for light-weight cushioning protection either a soft, flexible relatively thick padding strip folded over to cover the side and top corners of the article within the container as shown in patent to J. Duvall, U.S. Patent No. 1,989,794 granted February 3, 1935 or a rigid protector such as disclosed in patent to Kirby, U.S. Patent No. 2,271,265 granted January 27, 1942, the protector being made of about three to half a dozen thicknesses of corrugated paperboard formed as a corner cap and adapted by its top and side panel construction to maintain the article in spaced relation to the interior walls of the container. These lightweight flexible and rigid types of corner protectors are preferred in practice over the use of wooden spacing blocks nailed to vertical slats for internal container reinforcement since they provide equally good protection without hand labor for custom fitting each article in spaced protective relation to its container. However, these protectors, which have been used do not permit the vertical stacking of loaded containers without incurring damage to underlying containers and contents, particularly with heavy bulky goods such as refrigerators or heavy television consoles. With warehouse vertical stacking about 3 to 6 containers high, the weight on the underlying containers is sufficient to bend and to break the corner areas and to buckle the side walls of the underlying containers which bear the major stacking load. This bending and breaking is aggravated in normal fork lift or other mechanized handling with the result that the contents are damaged. In highly finished heavy wooden furniture pieces or heavy refrigerators even minor scratches are a source of customer and dealer dissatisfaction with the manufacture of the goods.

The present invention eliminates these difficulties and disadvantages had with corner protectors of the prior art by providing a multi-ply reinforced corrugated paper board vertical post of figure 4 cross section having a length greater than the height of the contents and which serves as an interior vertical post of the container to provide complete vertical reinforcement of the container for stacking of the filled containers one over the other and at the same time cushioning the contents against damage from blows or shocks as will occur when one loaded container may fall against the other.

In contrast to the more expensive insertion of vertical wooden posts by hand labor, which requires the use of selected wooden stock of good quality for adequate corner strength in the container, the present invention uses readily available corrugated paperboard stock which is readily commercially available at low cost and which can be easily and cheaply manufactured into the container length corner post stacking support to provide surprisingly high strength, rigid corner posts comparable to the best wooden post constructions of similar dimensions.

In one embodiment of the invention adapted for the majority of heavy bulky loads such as small or medium size refrigerators and television sets, the novel, "full-container length," vertical stacking post having a cross-section in the shape of the number 4, is shipped to the packaging site in the form of flat sheets comprising the outer folded outside blank which is upset to a cross-section having the shape of the number 4 and a plurality of intermediate flat corrugated paper reinforcing strips. The intermediate reinforcing corrugated strips are secured at the site between the bottom flaps constituting the lower vertical projection of the 4 by suitable adhesive or other means to provide a substantial thickness at the bottom of the 4 cross-section the two bottom flaps or plies forming this bottom extension of the 4 cross-section. This buildup thickness from laminated corrugated strips constitutes the main vertical load supporting reinforced component of the corner post structure and amounts to about 40-80% of the length dimension of the bottom projection of the 4. Since this thickness runs the full height of the box with the 4-shaped post at each corner of the box in cushioned relationship to the article such as a refrigerator, the dual functions of vertical support for filled containers and cushioning support for the articles are provided by the integral one-piece corner post of the invention.

In this typical construction shown in the present drawings, there is preferably adhesively inserted between the lower outer flaps of the 4-shaped cover about three to six corrugated strips each of which is substantially equal in width to this lower flap cover projection and is approximately equal in length to the total length of the 4-shaped cover. Thereby this bottom portion is built-up in reinforced rectangular and multiply laminated cross-section, the width of the rectangular section of the lower flaps of the 4-shape being at least about 40% of the height, e.g., the other cross dimension as distinct from the total length of the entire structure (see FIG. 3).

As a result, the laminated built-up construction at the base of the 4 cross-section, provides a rigid, surprisingly strong, vertical post of "container length" (e.g., the full height of the box) to give completely adequate vertical strength at the container corners for vertical stacking of the heavy filled boxes to the extent desired in warehousing and shipping operations.

The upper corner of the 4, being of single ply corrugated construction, exhibits sufficient flexibility to provide a yielding cushioning action at the side corner of the rectangularly shaped contents, the side at the corner of the article fitting against the upper inner corner at the lower rigid projection of the 4 shape and the other side at the corner fitting against the flexible transverse middle element of the 4 shape. This transverse middle element is made of a single ply of corrugated paperboard and is flexible in that portion extending from the lowermost vertical projection of the 4 section, the lowermost projection being made rigid by being built-up with the inserted corrugated strips as explained above.

Accordingly, at the corner cushion with the cushioning vertical post in place one side at the corner of the article butts against a rigid vertical section of the 4-shaped pro-

tector and the immediately adjacent corner butts against the flexible median transverse single ply projection.

The outer upper diagonal of the 4 shape post is directed into the corner of the container from a point near the article container at the termination of the flexible median projection of the 4 shape.

The length of the flexible median projection effectively determines the overlap of the flexible median projection against the side of the article corner which is next to the side internally laterally supported by the rigid built-up multiply vertical post portion. This diagonal being the longest flexible single ply or unreinforced part of the section may be reinforced to a degree commensurate with maintaining its flexibility since it serves to provide a necessary cushioning function by yielding in an amount as will not distort or destroy the 4 shape of the section.

This yielding occurring on stacking or by blow against the box wall results in a realignment of the forces tending to damage the contents and there results a bending deformation of the top vertical part, the diagonal and the median flexible part of the 4 shape to cause these flexible parts to hug the side of the article away from the reinforced vertical post portion of the 4.

In other words, destructive forces against the container tends to push the flexible top of the 4 section post away from the lower rigid part of the post to thereby enhance cushioning protection by the realignment of the forces along the more flexible vertical and diagonal sides of the 4. This deformation under load contributes in an entirely new manner to enhance cushioning action in a one piece structure combining components of rigidity and flexibility and adopted by these components to cushion more effectively under buckling stresses applied to the container.

With heavier articles it may be desirable to reinforce the flexible upper portions of the 4 shaped corner post of the invention. The invention includes the use of reinforcing strips at the flexible top portions preferably on the underside (inner side) of the top diagonal of the 4 shape and on the inner side of the top flexible member in the closed triangle part of the 4 shape. These reinforcing strips are applied preferably with adhesive in a length substantially equal to the flexible upper parts and in a width sufficient to provide effective reinforcement. For most cases, a single ply of corrugated paperboard is sufficient to attain the desired flexibility yet provide such additional reinforcement as will withstand the most severe buckling and deforming forces encountered in packing large sized refrigerators, for example.

In these cases where very heavy and bulky articles (large size refrigerators) are packaged in lightweight containers with the novel 4-shaped cushioning corner post of the invention, there may be desired to provide additional reinforcement in the rigid vertical laminated base portion of the corner post. Accordingly, the invention includes the use of additional reinforcing sheet or member which by virtue of the built-up rigid construction, may be easily nailed, stapled or adhesively secured adjacent the base portion to either the outer edge of the 4 shape remote from the triangle part of the 4 or to the inner lower edge of the composite rigid laminate portion. It is particularly convenient to use as the supplemental reinforcing sheet or member adjacent the rigid multi-ply base part wooden inserts which lend additional strength. The depth of the rigid base part is such that such wooden inserts may be easily nailed or attached with adhesive or both. The additional outer reinforcement so applied may be in one piece of running length equal to the length of the one piece post or it may be made in sections and built-up at the bottom of the 4 shape or at the sides of the 4 shape.

The reinforcing strips which are adhesively inserted in laminated relation at the rigid base of the 4-shaped corner post of the invention have been described in terms of corrugated paperboard which is preferred because of availability and cheapness. The invention includes the use of

corrugated plastic as well, the plastic sheet material being handled in similar manner to paper and providing enhanced corner post rigidity for resistance to buckling. The advantage of lightness in weight is inherent in the use of this somewhat flexible corrugated stock made rigid by the present invention through lamination to achieve a depth in cross-section about 40-80% of the length of the cover flaps at the bottom of the 4. This advantage may also be obtained in accordance with the invention by utilizing honeycomb material of the type commercially available with 4, 5 or 6 sided cells made of flexible cellulose plastic or metal material and capable of being scored, folded, upset and laminated in exactly the same fashion as corrugated paper or corrugated plastic faced with the usual outer sheet material (kraft, plastic, resin impregnated paper, paperboard, thin metal foil (aluminum), steel, copper, etc.). These alternate structural materials combine as in the case of corrugated paper and plastic the advantages of high strength, light weight and resistance to moisture physical agencies and chemical agencies, appropriate selection of materials of the honeycomb and plastic type making possible further improvements in strength-weight ratio and resistance to the elements as may be needed for special shipment unusual storage or unusual handling conditions. These materials as well as corrugated stock may also be assembled by stitching or stapling to form the corner post of the invention.

An object of the invention is to provide a novel lightweight corner post having a 4 cross-section and a length equal to the height of the box adapted to cushion articles packed in a container, box or crate and also adapted to provide load bearing support within the container to withstand buckling pressures when loaded containers having bulky, heavy articles therein are stacked one on the other.

A further object of the invention is to provide a novel corner post adapted to cushion packaged bulky articles easily damaged by shocks or blows to the outside of the container in which the corner post is made in one piece from a cover in cross-section of the number 4, the lower flaps of the bottom part of the 4 being reinforced with a plurality of laminated strips to build up a rigid supporting post at the base of the 4 shape and the upper triangle parts of the 4 shape being flexible to enhance the cushioning properties of the corner post.

A further object of the invention is to provide a method for manufacture of a novel corner post of 4 shape cross-section having a laminated reinforced rigid projecting portion at the base of the 4 shape and flexible enclosing walls at the upper part of the 4 shape which is simple in character and economical in practice.

A still further object of the invention is to provide a novel blank cover for a corner post support in flattened condition adapted to be upset in the cross-section shape of the number 4 for reinforcing modification by lamination of reinforcing strips to build up a rigid vertical post support portion at the base of projection, the 4-shaped post and a flexible closed triangle part of the 4 adapted to cushion packaged articles at the corners in a container.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others, and the article possessing the features, properties and the relation of elements, which are exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a view partly in elevation and partly in section illustrating a packaged refrigerator utilizing the 4-shaped posts as corner vertical post supports in accordance with the invention;

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FIG. 2 is a sectional view along line 2—2 of FIG. 1;

FIG. 3 is a view partly in section and partly in elevation of the 4-shaped post;

FIG. 4 is a plane view showing blank formed of corrugated stock which is utilized to form the 4-shaped post of the invention by folding along score lines indicated therein;

FIG. 5 is a cross sectional view illustrating an alternate embodiment of 4-shaped rigid vertical posts which embodies a stiff non-cellular sheet material for the rectangular base section of the 4 and which serves as the load supporting post;

FIG. 6 is an elevational view showing stacking of two 4-shaped posts to form a vertical support;

In FIGS. 1 and 2 there is shown a conventional corrugated board container 1 such as is used in the packaging of bulky articles, here illustratively shown as a refrigerator 2, the refrigerator mounted on skids 3 and platform 4 within the box making up the base pallet 5.

One embodiment 10 of the vertical post of figure 4 cross section as used in FIGS. 1 and 2 is illustrated in detail in FIG. 3 and its method of manufacture can be seen from the view of the blank which is shown in FIG. 4. The multi-ply reinforced corrugated paperboard post 10 which is the embodiment illustrated in FIG. 3 is prepared by folding corrugated sheet 11 shown in FIG. 4 at fold lines 12, 13 and 14, the largest rectangular area of the blank bounded by the edge and fold line 12 corresponding to the longest side of the figure 4 as shown in FIG. 3, the side between fold line 12 and 13 corresponding to the triangular upper face of the number 4-shape as shown in FIG. 3 and the score line 14 constituting the inner fold line at the inner section between the base of the triangular upper 4 portion and the vertical inner side of the 4.

The folding of the blank 11 shown in FIG. 4 effectively provides a cover in cross sectional shape of number 4 in which the inner base of the cross section is bounded by fold line 14, the top of the 4 is bounded by fold line 12 and the outer edge of the triangle of the 4 is bounded by line 13. For convenience, the outer panel of the number 4-shaped post is numbered 15 and the inner shorter panel which is at the base of the number 4 cross section is given reference numeral 16, outer panel 15 being parallel to inner panel 16 and being spaced apart therefrom as shown in FIG. 3 by a plurality of strips of double faced corrugated stock, strips 19a, 19b, 19c and 19d.

In FIG. 5 there is shown an alternate embodiment in which the strips are made of rigid plastic material herein illustrated in the form of strips 21a, 21b, 21c and 21d. The synthetic plastic may be high impact polystyrene made by copolymerizing with acrylonitrile high impact polyethylene, wood strips, masonite strips, plywood strips, fiber cloth impregnated plastic strips or similar rigid structural material.

The purpose of the plurality of strips 19 and 21 shown in FIGS. 3 and 5 respectively, is to provide a displacement of the lower flap panel 16 from outer panel 15 of the 4 cross section which is built up in reinforced rectangular multiple ply laminated cross section, the width of this rectangular section provided by these strips being at least 40% of the length of the bottom flap panel 16 and as shown in FIGS. 3 and 5.

It should be noted that the same parallel relation of panel 15 and panel 16 would be had by building up the number of strips from the 4 strip as shown to 5, 6 or 7 or down to about 3, these variations of width bringing the fold line 14 forward of panel 15 by interposition of additional strips. Conversely, fold line 13 is tucked inwardly to a great extent to panel 16 when a lesser number of reinforcements of laminating strips are employed.

As illustrated in FIGS. 1 and 2, the laminated construction of the base provides a rigid surprisingly strong, vertical post of "container height" (e.g., the full height of the box 1) to give completely adequate vertical strength at the container corners for vertical stacking of

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the heavy filled boxes 1 on each other and to the extent desired in warehousing and shipping operations.

The embodiments of FIGS. 3 and 5 differ in the interposition of additional reinforcing strips. Reinforcing strips 17 and 18 as shown in FIG. 3 are secured with adhesive to the inner triangular faces of the upper part of the 4-shaped cross section of post 10, the strips 17 and 18 shown in FIG. 3 being made of wood although other material such as masonite or plastic of the type shown in strips 21a-21d in FIG. 5 may also be used.

As a result of the reinforcing of the inner triangular faces of panels 15 and 22 by strips 17 and 18 respectively, the open triangular upper part of the 4-shaped post is given additional rigidity. As a result, there is provided in the embodiment 23 illustrated in FIG. 5 a triangular upper portion of the cross section which is more flexible than embodiment 10 which is shown in FIG. 3. In use it will be seen from FIG. 2 that the panel 22 of 4-shaped post 10 defining the outer upper triangle side is in alignment with the corner of the box 1 so that the heavy contents, here refrigerator 2, is effectively cushioned and simultaneously aligned. Similarly, the use of corner-post modification 23 gives a similar cushioning and aligning action for the refrigerator contents 2 but the support is more flexible in the open triangular portion. Accordingly, when one filled container is stacked vertically on another identical container, the vertical posts 10 as in FIG. 3 or 23 in FIG. 5, one at each corner are in vertical load bearing alignment and the strength of the multi-ply laminated strip section is such as will readily support the load even when the loaded containers are stacked 3 or 4 high. Indeed, in certain instances, it may not be necessary to have the post 10, integral along the entire height and as shown in FIG. 6 two posts 23a and 23b may be stacked on each other to constitute the desired container height to secure internal support.

It will be seen from the foregoing detailed description that the corner posts running the full height of the container provide ample stacking strength for refrigerators or heavy appliances in corrugated or similar containers and yet provide effective cushioning of the encased heavy appliance in fixed relation to the container and to prevent damage to the appliance by blows or from careless vertical stacking.

In the embodiment of corner post 10 illustrated in FIG. 3, there are shown the use of staples 24 as well as conventional adhesive (sodium silicate type) for adhering the reinforcing strips 19a, 19b, 19c, 19d, 17 and 18. Obviously, other conventional adhesives of the organic synthetic resin type may also be used, for example, polyvinyl alcohol adhesive, isocyanate adhesive, polyvinylacetate adhesive, etc.

Although the various flat sheets in the sample are assembled with an adhesive, it will be well to provide that these sheets may be assembled with staples or a combination of adhesive and staples. The post of the invention may be used by shipping this post to the customer as a flat sheet scored in the proper places as shown in FIG. 4, then stitched together at the customer's plant with the tail of the piece folded around to cover the stitching. In addition, in the built-up section of the post where the sample shows corrugated board, it is also contemplated to use honeycomb, plastic or other materials, or combinations thereof to get the required thickness.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A vertical corner post made of corrugated paperboard for insertion into the corners of a straight sided flexible container and adapted for cushioning the straight corners and edges of packaged bulky heavy articles along

the full height thereof in paperboard and wooden boxes and also adapted for the stacking of the packaged articles on each other without damaging the container, said post having an outer covering of corrugated paperboard in the cross section of the number 4 with two bottom flaps forming the base of the 4 and a length which runs the full height of the container, the longest straight side of said number 4 cross section shape coming in face-to-face contact with the inner side of the container with the upper vertex of 4 cross section shape extending into the inner corner of said container side with the corner of the article bearing against both the inner bottom flap of 4 cross section and the bottom of the angular upper face of the 4-shape so that any shifting position of the corner of the article will wedge the back face and the top vertex of the 4 cross section into the inner corner of the container, said bottom flaps being adhered to and separated by a plurality of laminated strips running the length of said post and forming a rectangular cross section at the base of the 4, said rectangular cross section having a width which is at least about 40% of the height of the bottom flap whereby the major vertical support is provided on the edges of said laminated reinforcing strips.

2. In a lightweight flexible container having straight sides for packaging bulky and heavy articles, having generally straight corners and edges, vertical corner posts made of corrugated paperboard for cushioning and substantially straight corners and edges of said bulky heavy articles along the full height thereof, each of said posts having an outer covering of corrugated paperboard folded in the cross section of the number 4 with the fold line at the top vertex of the 4 and the bottom flaps remote from the folded vertex forming the base of the 4, said outer covering having a length which runs the full height of the container and said bottom flaps being adhered to a reinforcing corrugated sheet running the full length of the covering, the longest straight side of the 4 cross section coming into face-to-face bearing contact with an inner side and a corner of the container along its entire height and the vertex of the figure 4 shape extending into the inner corner of the container, and the angular upper face of the figure 4 cross section extends from the inner corner of the container to a point which is around and beyond the corner edge of the heavy article to thereby cushion both edges of the article through direct bearing contact of the edges, one through the inner bottom flap of the 4-shaped corrugated paperboard post and the other through the bottom of the angular upper face of the 4 cross section of said vertical corner post whereby any shifting position of the contacting edges of the articles

relative to the corner post wedges the back face and the top vertex of the 4 cross section into the corner of the container.

3. A full length integral corner post comprising an elongated rectangular corrugated paper sheet folded along the width thereof in the cross section of the number 4 with the two free edge flaps along the width bearing against each other to form the bottom portion of the long straight side of the number 4 section and the upper vertex of the number 4 section being sharply folded at the edge opposite said flaps to run the full length of said post for insertion into the inner corner of a container requiring reinforcement by said post, and the transverse face of said 4 cross section along with the inner flap of said cross section adapting the full length post to come into face to face bearing relation with a straight edge and adjacent sides of an article packaged in the container, whereby shifting of the article is cushioned by the figure 4 post along the entire length within the container due to wedging the back face of the post along one side of the container and the top vertex of the post into the corner.

4. A corner post as claimed in claim 1 wherein the upper triangular part of said 4-shaped cross section is fitted on each inner surface with a reinforcing strip running the length of said part.

5. A corner post as claimed in claim 4 wherein said reinforcing strips on said inner surfaces of the triangular upper cross section are nailed.

6. A corner post as claimed in claim 4 wherein said reinforcing strips on said inner surfaces of the triangular upper cross section are adhesively secured.

7. A corner post as claimed in claim 3 wherein said reinforcing strips are formed of corrugated board.

8. A corner post as claimed in claim 3 wherein said reinforcing strips are formed of plastic.

9. A corner post as claimed in claim 3 wherein said reinforcing strips are formed of wood.

10. A corner post as claimed in claim 3 wherein said reinforcing strips are formed of masonite.

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