

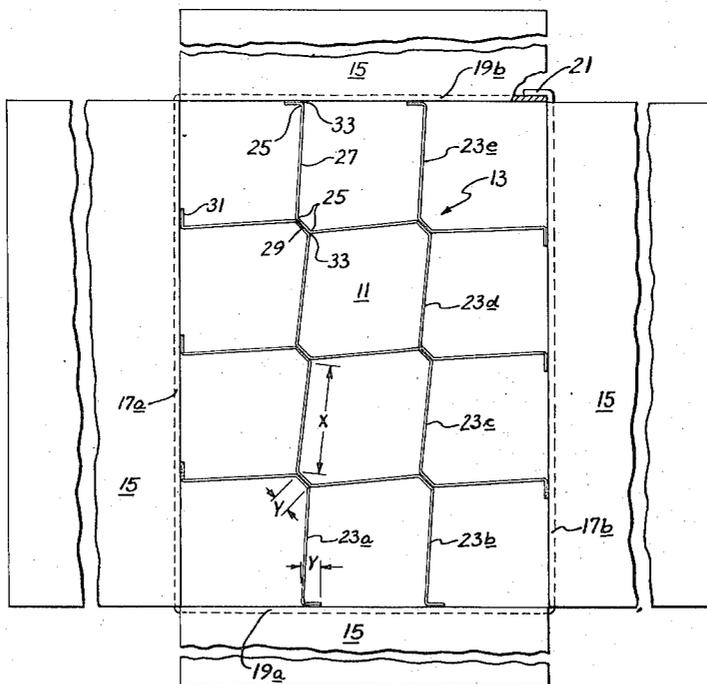
- [54] CONTAINER PARTITIONS
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- [58] Field of Search..... 229/42, 41 R, 27, 15, 28 R, 229/28 BC

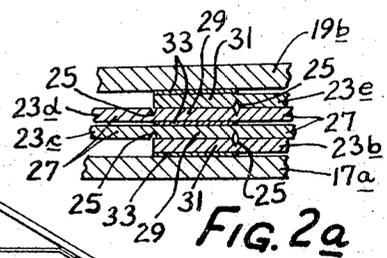
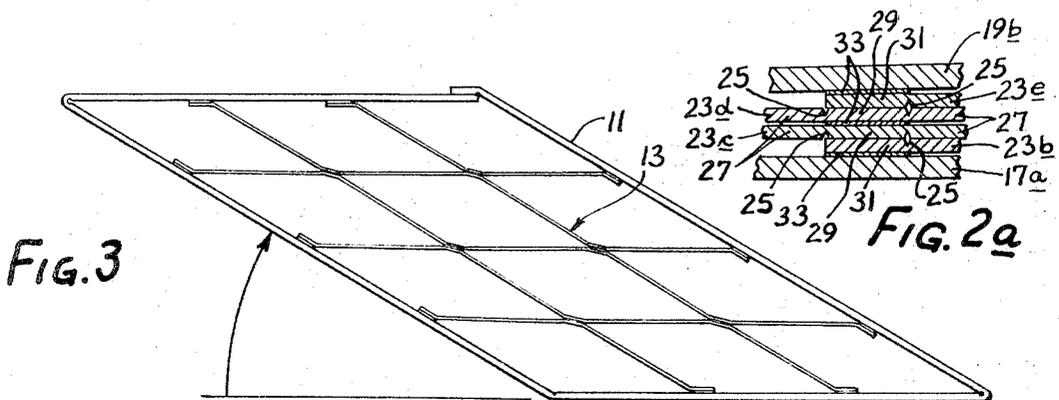
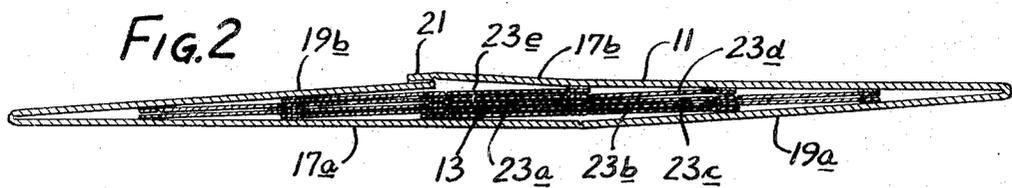
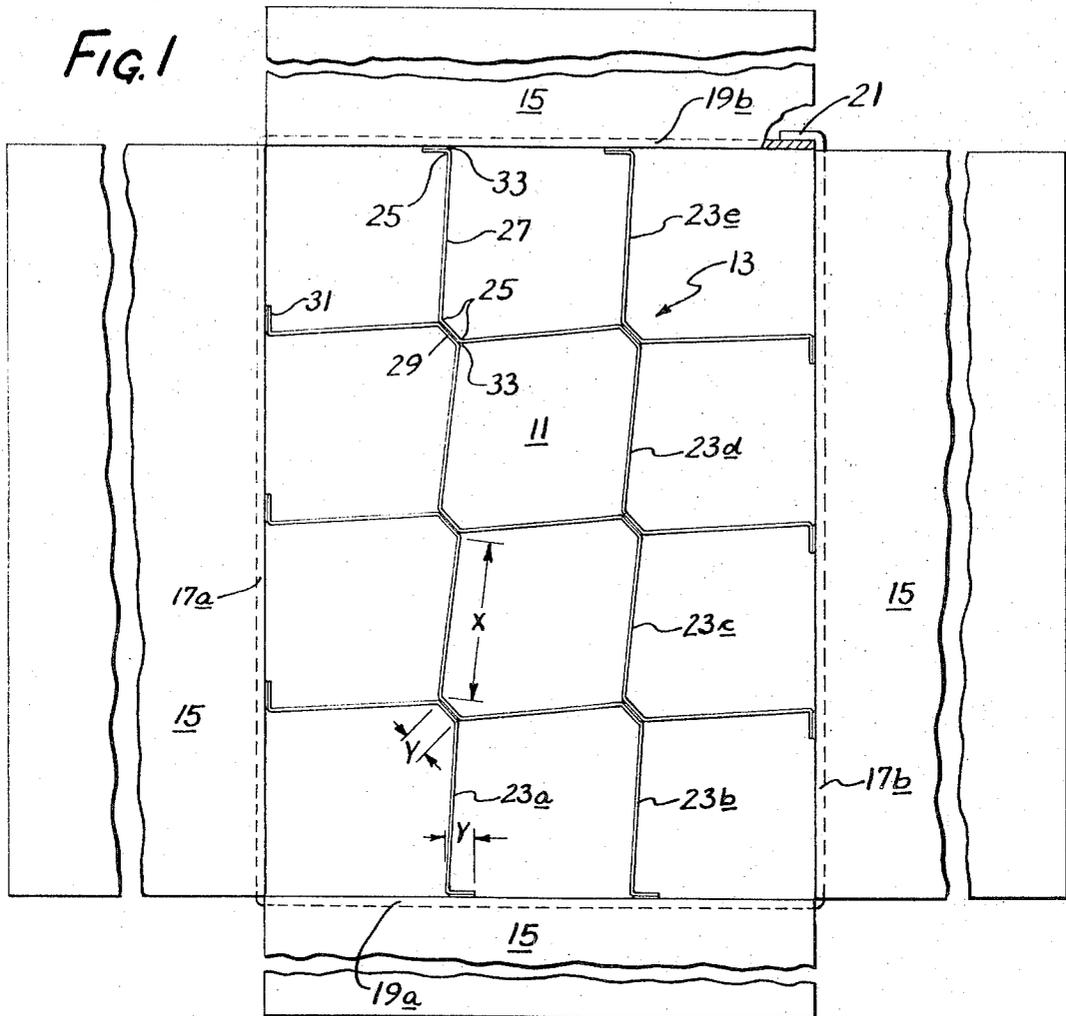
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- [57] **ABSTRACT**  
 Improved cellular partitions which can be preassembled in boxes that may then be shipped to users in a substantially flat configuration.

8 Claims, 4 Drawing Figures





## CONTAINER PARTITIONS

This invention relates to partitions for boxes and more particularly is directed toward a cellular partition which may be attached to the interior walls of a box and the pre-assembled partitioned box shipped to the user in a substantially flat configuration.

Boxes with cellular partitions are typically used for shipping fragile items, such as glass containers. The partitions protect the individual fragile items from coming into contact with adjacent packaged items. Additionally, partitions may divide the box for display purposes or provide cells for locating a collection of differing items. In some uses, the partitions are employed to impart stacking strength to the box. A common use of such a partitioned container is to ship glass jars of food items, each jar being in its own individual cell. As these containers substantially decrease breakage during shipment they have become widely accepted. However, these containers are considerably more expensive to use than an unpartitioned box.

Boxes are normally shipped to the user from the manufacturer in a flat, "knocked down" configuration, to defray transportation costs, a significant expense in the box-making industry. The user sets up the box at the intended place of use. For an unpartitioned box this is a rather minor task, for one usually need only open or "square" the flat box and fix the bottom closure flaps in place.

The additional expense involved in using a partitioned box, particularly those larger boxes having more than two rows of cells, occurs during assembly of such a box. It is common practice for a user to purchase the box and the partition as separate entities. The partitions are commonly a plurality of slotted fiberboard strips which are interlocked to form an assembly of rectangular cells. The strips correspond to the width and length dimensions of the box and the assembly completely fills the container. It is the labor involved in manually assembling the partitions and placing it in the box which makes these boxes relatively expensive as compared to an ordinary box.

Attempts to fabricate larger boxes which have preassembled partitions have been for the most part unsatisfactory often because such boxes do not fold sufficiently flat for economical shipment to the user. Intricate partition designs have been achieved which make feasible a pre-assembled partitioned container having more than two rows of cells, however, their manufacture is relatively expensive. Typically, these partitions are formed within a sleeve, with the sleeve later being attached to the interior walls of the box. Such a design requires the use of a significant amount of additional material and necessitates a large number of glued joints to provide the partition.

It is the primary object of this invention to provide an improved partition suitable for use as a part of a preassembled, partitioned box.

It is another object of this invention to provide a preformed, partitioned container which may be shipped in a knocked down configuration.

It is another object of this invention to provide an improved partitioned container which is economical to manufacture.

It is still another object of the present invention to provide an improved container partition to protect breakable items.

These and other objects and advantages of the invention will become more apparent upon reading the following detailed description in conjunction with the accompanying drawings of which:

FIG. 1 is a plan view of a box containing a cellular partition formed in accordance with the present invention with the top flaps of the box opened;

FIG. 2 is a graphic view of the box shown in FIG. 1 reduced in size, shown in section and folded flat;

FIG. 2a is an enlargement of a portion of FIG. 2; and

FIG. 3 shows the box of FIG. 2 in partially squared condition.

Very generally, the present invention provides a box 11 and a cellular partition 13 which is contained within the interior walls of the box.

The box 11 is a regular slotted container having closure flaps 15 at each end and is formed from a single blank of material in a manner well known to the art. The blank has four interconnected rectangular panels, which are termed side panels 17 and end panels 19. Upper and lower closure flaps 15 are attached to each of the panels. In fabricating the manufacturer's joint, the end panel 19b and the side panel 17b are folded over upon the panels 17a and 19a, and a tab 21 attached to the free edge of the panel 17b is glued or otherwise suitably attached to the outer surface of the end panel 19b.

The partition 13 is made from a plurality of elongated strips 23, the exact number and length of the strips depending upon the number of cells desired and the particular configuration to be utilized. The height or depth of the strips 23 will be determined by the particular items to be shipped or the box characteristic desired. In the preferred embodiment, the strips have a depth which is slightly less than the depth of the box. While various features of the present invention are adaptable to various sized boxes and can provide a large variation in the size and number of cells within that box, the discussion will be limited to a box having twelve interior cells, each of which is approximately the same size and arranged in three generally parallel rows of four cells each.

The number of strips needed to form the cells may be determined by adding the number of cells required along one side of the box to the number of cells required along the transverse side of the box, and subtracting two from the total. In the illustrated example there are four cells along the elongated side of the box and three cells along the minor side of the box; therefore, five strips 23 are used to form the cellular partition.

Generally, these five strips are each pre-cut to have a predetermined length and then scored to provide parallel score lines 25, each score line extending transversely to the strip at predetermined positions along the length of the strip. These score lines 25 provide hinged joints about which the strips 23 may be folded. These score lines define, on each strip, main cell panels 27 of the individual cells, short transitional panels 29 between adjacent main cell panels and tabs 31 on each end. Pairs of score lines are used to define transitional panels 29 therebetween, however in alternate embodiments, a single, wide line may be suitably marked in the fiberboard to define a transitional panel with similar results being achieved. The transitional panels 29 are

suitably interconnected with glue 33 or some other adhesive to join the strips 23 into a cellular partition.

As best may be seen in FIG. 2, the strips 23 are aligned on a box blank in a staggered parallel alignment, one on top of the other and generally across two box panels 17a and 19a of the box blank. It is the intention to position the partition within the box before the other two box panels of the blank are folded over to be joined by the manufacturer's joint. However, in discussing the strips, reference will be made to the strip surfaces which will be adjacent the interior surface of the box after the box panels 17b and 19b have been folded over and joined. While the description of the partition will illustrate assembling the partition strip-by-strip within the box, this is done only to show the relationship of each strip to the box itself. The preferred method of assembly is to first form the partition as a unit remote from the box blank, and then place that unit onto the box blank prior to the manufacturer's joint being formed.

For purposes of explanation, the length of a main cell panel 27 is hereinafter referred to as X and the length of a transitional panel 29 as Y. In the illustrated embodiment, the cells have main cell panels 27 of equal length. The tabs 31 are equal in length (Y) to the transitional panels 29, but such is not necessary as the tabs could be of any length less than X.

The bottom strip 23a (FIG. 2) is approximately two X plus three Y in length, thus providing two main cell panels 27, tabs 31 at each end of the strip and a transitional panel 29 between the two main cell panels. The bottom strip 23a has four transverse, parallel score lines, preferably one on the upper surface of the strip adjacent each end, to provide the tabs at the end of the strip and two score lines on the bottom surface of the strip an equal distance from its center, to provide a transitional panel between the two main cell panels. However, because the partition is not made of corrugated all of the score lines may be on the same side; the thinner paper used in the strips of the preferred embodiment's providing the proper folding pattern regardless of the particular surface scored. Adhesive is applied to the bottom surface of the tabs and to the upper surface of the transitional panel. The transitional panel is located generally over the joint between the two panels 17a and 19a.

The next strip 23b is applied directly over the first strip 23a and is four X plus five Y in length, with a portion equal to one X plus one Y in length extending beyond each of the ends of the first strip. The second strip 23b may be provided score lines and adhesive in a manner similar to the first strip. In this regard, all strips may have a common pattern for the location of their score lines and adhesive. In the preferred embodiment, each set of score lines on an individual strip, in right to left sequence, is on an alternate surface of the strip. For example, on the second strip 23b the score line for the right hand tab is on the upper surface of the strip, the pair of score lines for the transitional panel immediately to the left of the tab are on the bottom surface of the strip, the score lines for the next transitional panel are on the top surface of the strip, the score lines for the next transitional panel are on the bottom surface of the strip, and finally the left hand tab is provided a score line on the top surface of the strip. This is the same pattern as was employed on the first strip and all remaining strips will utilize this pattern, the score lines

alternating between the top and the bottom surfaces of the strip. This will influence the strips, when formed into a partition, to have succeeding main cell panels 27 of the same strip folded alternately clockwise and counter clockwise. The pattern starts with the tab, the tab being formed to have the score line on the surface of the strip opposite that surface of the strip which will be adjacent the inner surface of the fully formed box.

Adhesive is provided on the tab surface which is adjacent the inner surface of the box, and adhesive is provided between contacting transitional panels that are vertically aligned and have their respective score lines on the strip surface opposite their contacting surfaces. It is not necessary that adhesive be provided on both surfaces of the contacting transitional panels which are fixed together. Adhesive on one of the surfaces of the contacting transitional panels is sufficient.

The third strip 23c is in an end to end abutting relationship with the right hand end of the second strip 23b and is of a length five X plus six Y, the additional length of one X plus one Y extending beyond the left hand edge of the second strip. The strip is scored and provided adhesive as previously described.

The fourth strip 23d is of the length four X plus five Y and is in an end to end abutting relationship with the left hand end of the third strip 23c, therefore being indented from the right hand end of the third strip the distance one X plus one Y. It is scored and provided adhesive as were the other strips.

Finally the fifth strip 23e is applied over the fourth strip 23d and is indented from both ends of the fourth strip the distance one X plus one Y; the fifth strip being two X plus three Y in length. It too is scored and provided adhesive as were all the other strips.

With the five strips 23 positioned as described the two remaining panels 17b and 19b of the box may be folded over and the two box panels 17b and 19b joined by means of the tab 21. The box containing the partition may then be passed between calendar rollers or the like to insure the glued joints are firmly joined.

By such an arrangement of the strips, all of the tabs and transitional panels are in vertical alignment, and the tabs of the strips are spaced along the walls of the box being approximately the distance X from either the corners of the box or from each other.

One of the most important advantages of the box to the user is the ease with which it can be set up. To ready the box for use (after shipment to the user), the box need only be squared, and the partitions will unfold into place automatically.

Shown in FIG. 3 is the box of FIG. 2 being unfolded (the box end flaps are not shown). As the box is squared the partition automatically assumes its proper shape, the glued joints as scored, influencing the main cell panels to fold alternatively clockwise and counter clockwise with each main cell panel of a given strip being at substantially a right angle to the adjacent main cell panel of the same strip. To complete assembly of a completely squared box the user need only fix together the bottom closure flaps as done with a common box. After the box has been filled with the items that are to be shipped, the top closure flaps may be folded over and joined together in the usual manner.

In the preferred embodiment of the present invention, corrugated fiberboard is used to form the box, and recycled chipboard is used for the strips. However,

other materials may be utilized. In this regard, in certain applications, as when a high quality material such as heavy kraft paper is used to form the partition, it may be possible to eliminate the score lines. In such a construction, the glued surface joints by themselves may sufficiently influence the strips to cause them to fold in the proper manner when the container is squared without the need to provide lines of weakness. Conversely when low quality material such as recycled stock is utilized to form the partition, it may be preferable to partially perforate the material to form the lines of weakness, rather than using score lines.

The tabs 31 are made shorter than the length of a main cell panel 27 to insure no portion of any strip is adjacent the corners of the box. As the tabs do not extend to overlap each other, there is no continuous rigid surface along the interior walls of the box. The partition per se causes no significant force, in its flat configuration, which would tend to prevent the box from being folded flat. The pre-assembled box will fold as flat as the combined thickness of the strips will permit. As these strips are made from relatively thin material, a container formed in accordance with the present invention is capable of being knocked down into a very satisfactory, flat configuration.

The transitional panels 29 provide a relatively wide area of joinder between adjacent strips to add strength to the partition and influence the partition to unfold into its proper shape. The width of the transitional panel changes in accordance with various factors, such as the size of the box, strength desired, and shape of contents. In general, the transitional panel should have a width which is as small as is practical. For a typical partition, the width of the transitional panel should be no less than  $\frac{1}{4}$  inch, whereas a width exceeding 25 percent of the diagonal dimension of an individual cell in its squared, or set-up configuration is considered inefficient and generally impractical for a cellular container. In the preferred embodiment the transitional panel has a width which is about 15 percent of the width of an individual cell. As the transitional panels do have a significant width the partitions do not extend in a straight line but rather define a zig-zag wall as viewed from the top. In this manner, each cell is not square, but is provided with an irregular shape, with intersecting main cell panels not being precisely perpendicular to one another.

Although twelve cells are formed, at only ten points are the strips glued to the box and at only six points are the strips glued to each other.

The only areas in which there is a double thickness of material are where the tabs are attached to the panels of the box and where two transitional panels are joined together. Thus, the utilization of the material forming the partition is very efficient. Although a partitioned container formed in accordance with the present invention utilizes less, and lighter weight materials than the partitioned containers of the prior art, experiments have shown that it is surprisingly effective in eliminating breakage of fragile items being shipped therein.

From the foregoing description it is apparent that embodiments of the present invention may be manufactured utilizing automated fabrication methods. The box itself is assembled in the same manner as presently employed by the art. The partition is formed from a series of flat strips that are positioned one on top of an-

other with no slotting or hand fitting being necessary. The preparation of the strips may be accomplished in a regular, re-occurring pattern, and finally, it should be noted that a series of strips may be prepared separate from the box, and the stack of strips fixed together and placed as a unit on a box blank prior to the folding of the blank into its completed flat configuration. Every step in the assembly of the partitioned box of the present invention may be accomplished mechanically; the individual steps needing only to be combined to form an automated operation.

While a particular embodiment has been shown and described it should be apparent that various modifications may be made therein without departing from the scope of the invention.

Various of the features of the invention are set forth in the claims which follow.

What is claimed is:

1. A collapsible box having four interconnected side-walls, closure means, an interior cellular partition, said partition comprising a plurality of elongated strips, each of said strips having a hinged tab at each end, each of said strips having transverse lines of weakness at predetermined intervals to define main cell panels therebetween, said strips being folded alternately counter clockwise and clockwise along their length about said lines of weakness to position adjacent main cell panels of the same strip at substantially a right angle to one another, said strips being arranged to form a plurality of individual substantially rectangular cells, and means connecting said strips with said lines of weakness of one strip lying generally adjacent said lines of weakness of the next adjacent strip, and means attaching said end tabs to the interior surfaces of said interconnected side-walls.

2. The box of claim 1 wherein said strips each have a pair of spaced lines of weakness at said predetermined intervals to provide a short transitional panel therebetween and with said transitional panel of one strip lying in surface contact with said transitional panel of the next adjacent strip.

3. The box of claim 2 wherein said contacting transitional panels are adhesively connected over a major portion of their contacting surfaces.

4. The box of claim 2 wherein the longitudinally extending dimension between said pair of spaced lines of weakness is between about  $\frac{1}{4}$  inch and about 25 percent of the diagonal dimension of an individual cell.

5. A collapsible box in accordance with claim 1 which is rectangular in cross section and wherein said substantially rectangular individual cells are arranged side-by-side in aligned rows extending parallel to the length and to the width of said box.

6. A collapsible box having four interconnected side-walls, closure means, and an interior cellular partition, said partition comprising a plurality of elongated strips, each of said strips having tabs at each end and having alternating main cell panel sections and transitional panel sections, each of said strips being folded alternately counter clockwise and clockwise at the pairs of junctions between said main cell panel sections and each of said transitional panel sections, each transitional panel section of each of said strips being adhesively connected in surface contact with a transitional panel section of an adjacent strip, thereby defining a plurality of substantially rectangular cells arranged in

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rows, and said end tabs being adhesively connected to the interior surfaces of said interconnected sidewalls.

7. A collapsible box in accordance with claim 6 which is rectangular in cross section and wherein said substantially rectangular individual cells are arranged side-by-side in aligned rows extending parallel to the length and to the width of said box.

8. A box in accordance with claim 6 wherein the longitudinal dimension of said transitional panels is at least about 1/4 inch and not greater than about 25 percent of the diagonal dimension of said substantially rectangular cell.

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