# United States Patent

[11] 3,580,471


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[73] Assignee **Union Camp Corporation**
**New York, N.Y.**


[54] **COLLAPSIBLE CELLULAR BOX PARTITIONS**
**1 Claim, 12 Drawing Figs.**


[52] **U.S. Cl.** ..... **229/15,** 217/30
[51] **Int. Cl.** ..... **B65d 5/48,** B65d 85/00
[50] **Field of Search** ..... 229/15, 42, 28, 29, 27; 217/32, 30, 33, 31, 25



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**ABSTRACT:** A collapsible cellular partition unit is formed by spacing parallel sheets and locating therebetween parallel, longitudinally extending wall sheets, each wall sheet having one longitudinal edge secured to one spaced sheet and the other edge secured to the other spaced sheet. For the continuous manufacture of such units, the spaced sheets are formed by two moving webs to which longitudinal glue lines are applied. The wall sheets are formed by webs moving between and with the first webs. The wall sheet webs are slit from a single stock roll and are scored to form longitudinal flaps to adhere to the glue lines on the respective first two webs. The first two webs are scored to form the outer wall portions of the partition unit. A partition structure of desired size may be built up by assembling the required number of partition units, the units being secured to each other by glue areas on their spaced sheets. The partition structure may then be secured in a collapsed position within a collapsed container and both shipped as an integrated package unit for simultaneous setup.

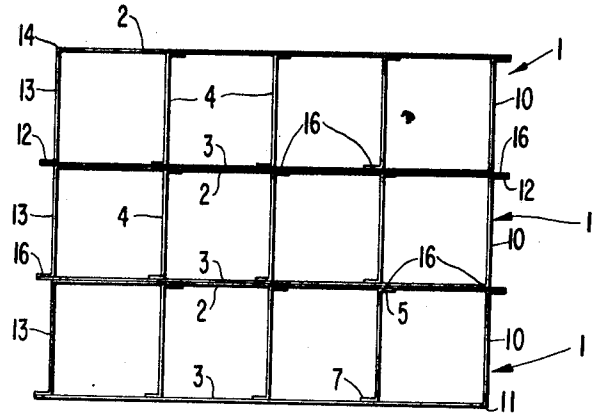



FIG. 1

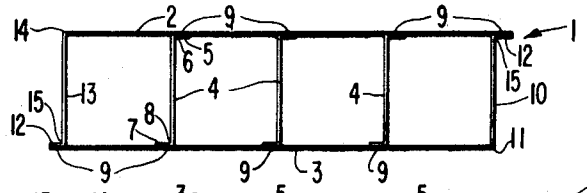


FIG. 2

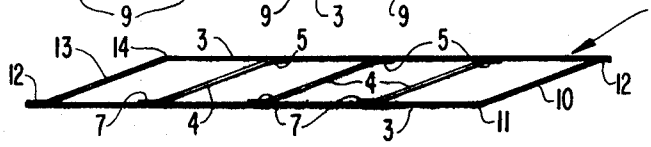


FIG. 3

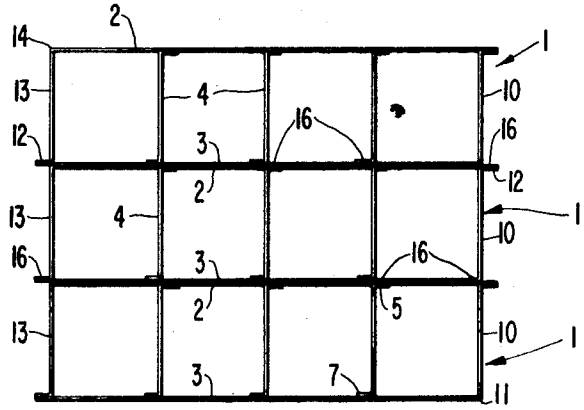


FIG. 4

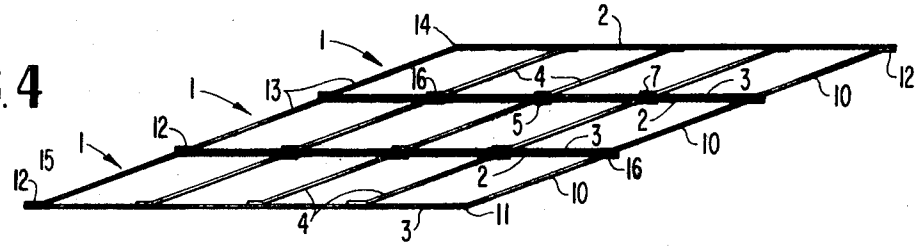


FIG. 5

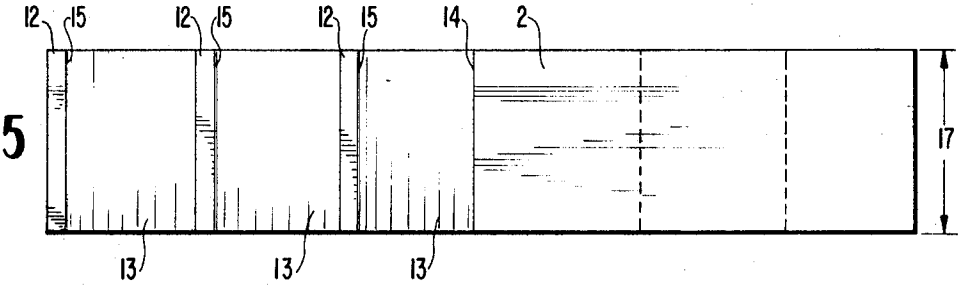
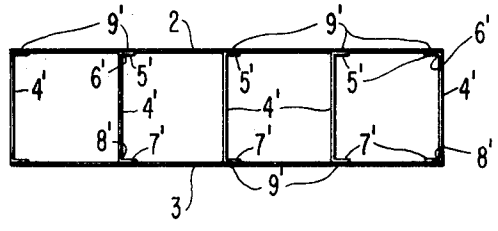


FIG. 8



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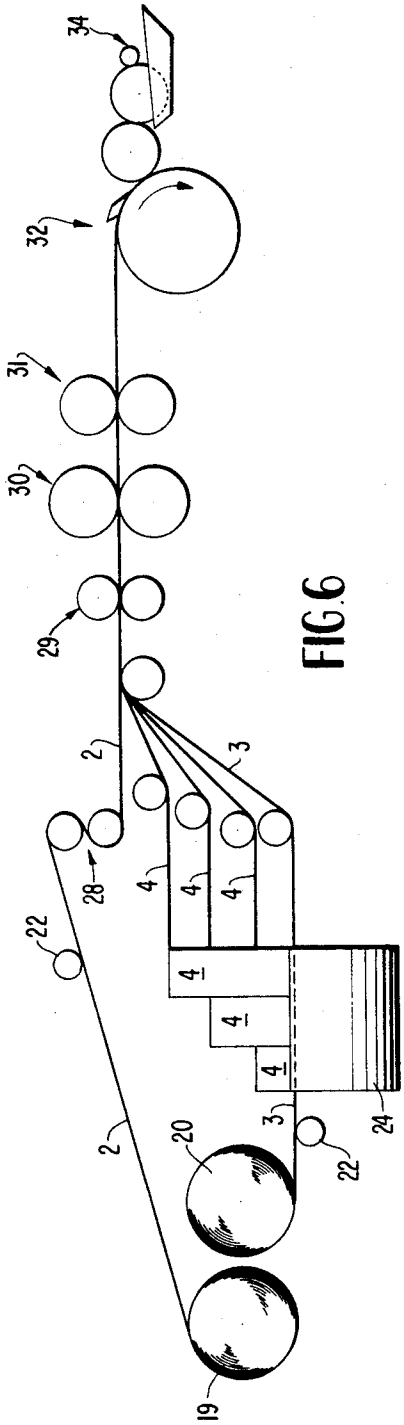



FIG. 6

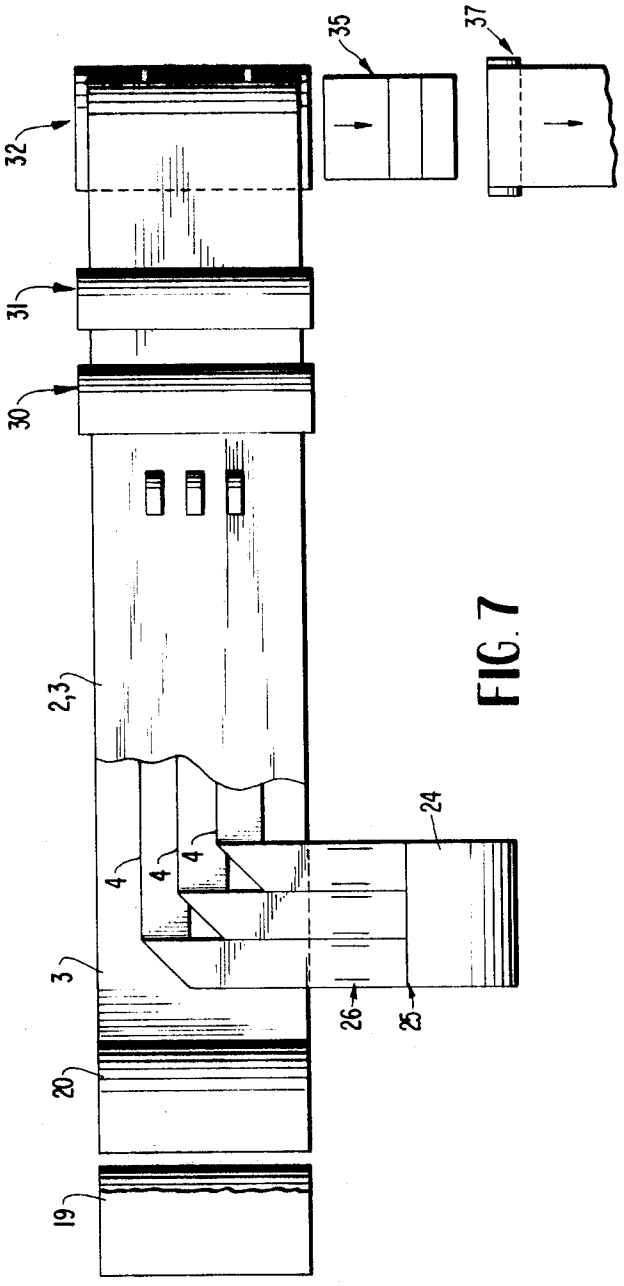



FIG. 7

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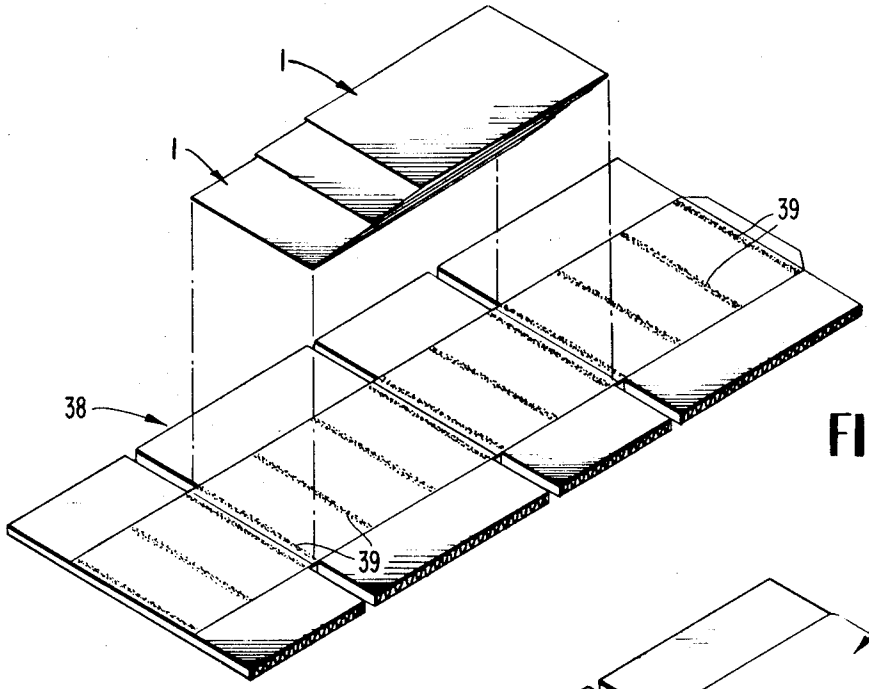



FIG. 9

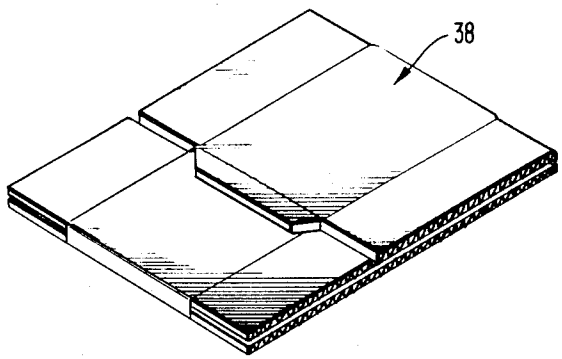



FIG. 10

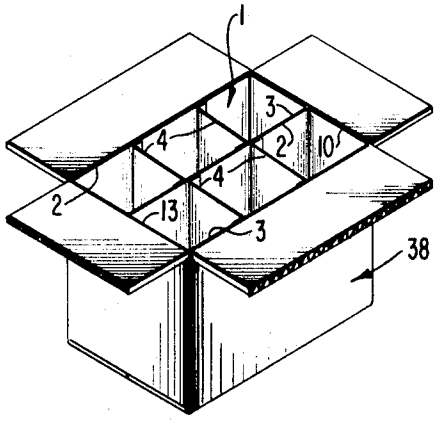



FIG. 12

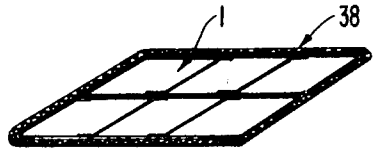



FIG. 11

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# COLLAPSIBLE CELLULAR BOX PARTITIONS

This invention relates to collapsible cellular partition units and the method for continuously making the same.

An object of this invention is to form a collapsible cellular partition unit of suitable weight paper or other flexible sheet material wherein the cells are formed by two spaced sheets and a plurality of wall sheets secured to the spaced sheets.

Another object is to vary the number of cells in a unit by merely varying the number of wall sheets.

Another object is to assemble a partition unit in a continuous process with conventional scoring, gluing, slitting and similar means.

A further object is to secure the wall sheets to the spaced sheets by glue lines and flap means which can be applied and formed by conventional means in a continuous manner.

Another object is to form the partition unit by a continuous process by assembling the several sheets forming the unit in the form of moving infolding webs and, thereafter, cutting off a proper sized unit from the assembled web.

A further object is to use the formed unit as a module to assemble collapsible cellular partition structures of any size or shape. This is accomplished by merely securing the required number of units into the desired size structure. This eliminates the necessity of keeping many separate sizes of partitions.

A further object is to integrate the partition and its container in their collapsed position for ease of shipping and economy in assembling. The integration is accomplished by gluing the outer walls of the partition to the walls of the container whereby it acts as a load-receiving member as well as an article separating member.

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 drawing, in which:

FIG. 1 is a transverse sectional view of a collapsible cellular partition unit in the setup or erected position;

FIG. 2 is a view similar to that shown in FIG. 1, but the unit is in a partly collapsed position;

FIG. 3 shows a sectional view of a partition structure consisting of the assembly of three partition units;

FIG. 4 shows the structure of FIG. 3 in a partly collapsed position;

FIG. 5 shows the top view of the partition assembly of FIG. 4;

FIGS. 6 and 7 show, in elevation and plan respectively, diagrammatic layouts of means which may be utilized to fabricate the partition unit in a continuous process; and,

FIG. 8 is similar to FIG. 1 but shows a modification in the structure of the partition unit;

FIG. 9 shows the manner of securing the partition assembly to a box blank;

FIG. 10 shows a view of a collapsed box and partition assembly;

FIG. 11 shows a sectional view of a box and partition assembly; and

FIG. 12 shows a view of a box and partition assembly ready to receive products in the cells of the partition.

FIGS. 1 and 2 disclose the structure of a collapsible cellular partition unit made in accordance with the invention. While a unit or module 1 of four cells is shown, the unit structure may be made of any desired number of cells by merely increasing the number of wall sheets.

The unit comprises top sheet 2, bottom sheet 3 and a plurality of wall sheets 4 secured to sheets 1 and 2. The terms "top" and "bottom" are merely relative and are used for descriptive purposes only. The longitudinal edges of a wall sheet 4 terminate in flaps 5 and 7 along score lines 6 and 8, respectively. As shown in the FIGS. flaps 5 and 7 extend in opposite directions and form a Z formation with the body of wall sheet 4.



The wall sheets are secured by flaps 5 and 7 to sheets 2 and 3 at areas 9. The securing means may assume any form but preferably is formed by a suitable glue line or pattern along sheets 2 and 3 at areas 9; that is, the areas at which flap 5 contacts sheet 2 and flap 7 contacts sheet 3. Thus, as sheets 2, 3 and 4 pass through the assembly machine, as will be later described, the several sheets are secured together as shown in FIGS. 1 and 2. The longitudinal dimension of the unit, i.e., the depth of the cells, is determined by the length of the packaged articles. The individual units are cut to the desired longitudinal dimension of the assembled web of sheets 2, 3 and 4.

To complete a unit, bottom sheet 3 terminates along a longitudinal edge in a wall portion 10 along a score line 11. The top sheet 2 has a similar wall portion 13 along a score line 14. Wall portions 10 and 13 terminate in flaps 12 along score lines 15. As shown in FIGS. 1 and 2, flaps 12 are secured, as by glue lines, to the portions of the other cover sheet lying opposite the respective flaps, whereby wall portions 10 and 13 become the outer wall sheets of the partition unit.

The longitudinal dimension 17 (see FIG. 5) of a partition unit, i.e., the depth of the cells, is determined by the length of the packaged article, the individual units are cut off from the web assembly of sheets 2, 3 and 4 as it emerges from the fabricating machine. The cutoff unit 1 is in collapsed position as shown in FIG. 2. FIG. 1 shows it in the erected position, wherein the article receiving cells are formed by sheets 2, 3 and 4.

To form a collapsible cellular partition structure of any desired size, the necessary number of units or modules are superimposed, collated and secured together to form the desired size partition structure. FIGS. 3, 4 and 5 show an assembly of the units. Units 1 are secured to each other by glue lines along areas 16 between sheets 2 and 3 of the several units. The glue pattern may assume any size, area or shape. It depends upon the size and weight of the packaged articles, the amount of support required and the strength of the container. The showing of glue areas 16 in FIGS. 3 and 4 is merely exemplary and comprises the area covered by a pair of adjacent flaps 5 and 7. The end glue area may be the extent of a single flap.

In superimposing units 1 on top of each other, it is necessary to offset each unit one cell from the unit below it. This is clearly shown in FIGS. 4 and 5 wherein the middle unit 1 is offset a distance of a cell from the bottom unit, and the top unit is similarly offset from the middle unit. Thus, when the assembly is brought to the erected position shown in FIG. 3, the assembly assumes a rectangular shape with straight walls.

Now reference is made to FIGS. 6 and 7 showing a preferred form of method for forming the unit. There are machines available on the market which may be utilized to fabricate the collapsible cellular partition unit 1, and the disclosed arrangement is merely an exemplary embodiment. Cover sheet 2 is drawn from a roll 19 of suitable material which may be a heavy kraft paper. At 22, a score mechanism of any desired form forms score lines 14 and 15 in sheet 2. Bottom sheet 3 is furnished by a roll 20 and may be of paper stock similar to that of sheet 2, and a similar score mechanism 22 forms score lines 11 and 15 in bottom sheet 3. Wall sheet 4 is supplied by a single roll 24 carrying the proper type of paper stock. Slitter means 25 slit the single sheet of paper stock into the required number of wall sheets, which number in this exemplary embodiment is three, whereby a four-cell unit is formed. Each slitted web or sheet 4 is scored by conventional score means 26 to form score lines 6 and 8. After score means 26, the sheets are turned by well known means substantially 90° so that their movement is generally parallel to and within moving sheets 2 and 3. Before sheets 2 and 3 enter the forming portion of the machine, conventional glue means 28 apply a glue line or glue pattern to portions of sheets 2 and 3, which

portions comprise the securing areas 9 to which flaps 5, 7 and 12 of the several walls 4, 10 and 13 adhere. Thus, as sheets 2 and 3 enfold sheets 4 and the several sheets are pressed together by the draw 29 and other rolls of the machine, the several sheets 4 are secured to top sheet 2 by flaps 5 adhering to the glue pattern or areas 9 of sheet 2, and sheets 4 are secured to bottom sheet 3 by flaps 7 adhering to the glue areas 9 on sheet 3. Flaps 12 of wall portions 10 and 13 adhere to the areas 9 formed on the adjacent portions of opposing sheets 2 and 3.

The mutual folding and securing of the sheets are shown in FIG. 2, wherein the assembled unit is shown in a partly collapsed position.

The proper height of the cellular structure, represented by character 17 on FIG. 5, depends upon the size of the article and extent of engagement therewith. A conventional cutoff means 30 is adjusted to cut off individual units 1 from the fabricated web assembly. The severed unit 1 is delivered by pin rolls 30, or similar means, to a turning drum means 32 which changes the direction of movement of unit 1 to deliver the unit to an index or gathering station 35. At station 35, several units 1 are collated and superimposed upon each other in the proper pattern to form the partition assembly shown in FIGS. 3, 4 and 5.

At turning drum station 32, glue is applied by conventional means 34 to portions of the outer side of sheet 2 corresponding to glue areas 16. At station 35, units 1 arrive with the desired glue pattern of areas 16 on the outside of either top sheet 2 or bottom sheet 3, or, if desired, on both sheets. At station 35, the units 1 are superimposed upon each other, with each unit offset to the extend of one cell from its lower unit, as explained in connection with FIGS. 3, 4 and 5 above. When the proper number of units desired for the partition structure (three in the exemplary embodiment of FIGS. 3—5) are assembled, the assembly is transferred to a conventional pressure exerting means 37, whereby the units are caused to adhere to each other at areas 16 to form an integral collapsible partition.

While wall sheets 4 and their flaps are shown to be of Z formation, it is apparent that the relation of the flaps to the body of a wall may be varied. Thus, FIG. 8 shows a slight variation, wherein a wall sheet 4' has flaps 5' and 7' extending in the same directions. The changes involved are merely adjustments in the means forming score lines 6' and 8' and the securing areas 9'. The last end walls 4' of the row may close off the unit, as shown in FIG. 8, so that top and bottom sheets 2 and 3 need not be scored and joined to each other in the manner shown in connection with FIGS. 1 and 2.

FIG. 9 illustrates the manner of securing the partition assembly to a box blank 38. Adhesive lines 39 are applied to all four panels of the blank after which the partition is placed over two of the panels and the other two panels are superimposed over the partition. Thus the partition is secured to all four panels of the blank as shown in FIGS. 10 and 11. In this form the combination box blank and partition is in knockdown collapsed condition for shipping. The customer receiving this combination merely has to set up the box, secure the bottom flaps (FIG. 12), insert the product in the cells, and fold and secure the top flaps.

The gluing in of the partition all along the walls integrates the partition as a load-carrying member of the container unit. Furthermore, the wall sheets act as tie members between the outer walls of the container so that such walls will not bulge outward when the container is filled. Thus, the partition adds to the strength and to the rigidity of the overall package.

Coming assembled with the collapsed container, the disclosed partition arrangement saves time in carton setup, saves storage space and offers other obvious advantages over the arrangement wherein the partitions and containers are separately shipped and assembled.

Of course, if desired, the instant partition assembly may be shipped and used separately from the container in the usual manner.

It is to be understood that the above-described arrangements are illustrative of the application of the principles of the invention. Numerous other arrangements may be devised by those skilled in the art without departing from the spirit and scope of the invention.

Since certain changes in carrying out the above process, and certain modifications in the article which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

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:

We claim:

1. A collapsible cellular partition unit comprising: a plurality of cellular longitudinal rows, each row consisting of two spaced flexible sheets forming top and bottom surfaces of said cellular longitudinal row; a plurality of substantially parallel equidistant wall sheets forming cells in said cellular longitudinal row; each wall sheet having a body portion and longitudinal edges terminating in top and bottom flaps which extend in opposite directions to give the sheet a Z-shape; the top and bottom flaps of each of said longitudinal edges in each wall sheet being secured to the respective top and bottom spaced sheets along substantially parallel glue lines; said plurality of adjacent rows being bonded along said spaced sheets to form a double thickness of the intermediate spaced sheets of said partition unit; and one end wall of each row being integral with the top sheet and extending downwardly and parallel to the wall sheets and outwardly to form a flange secured to the end of the flexible bottom sheet of the longitudinal row while the other end wall of the row is integral with the bottom sheet and extends upwardly parallel to the wall sheets and outwardly to form a flange which is secured to the end of the flexible top sheet of the longitudinal rows.