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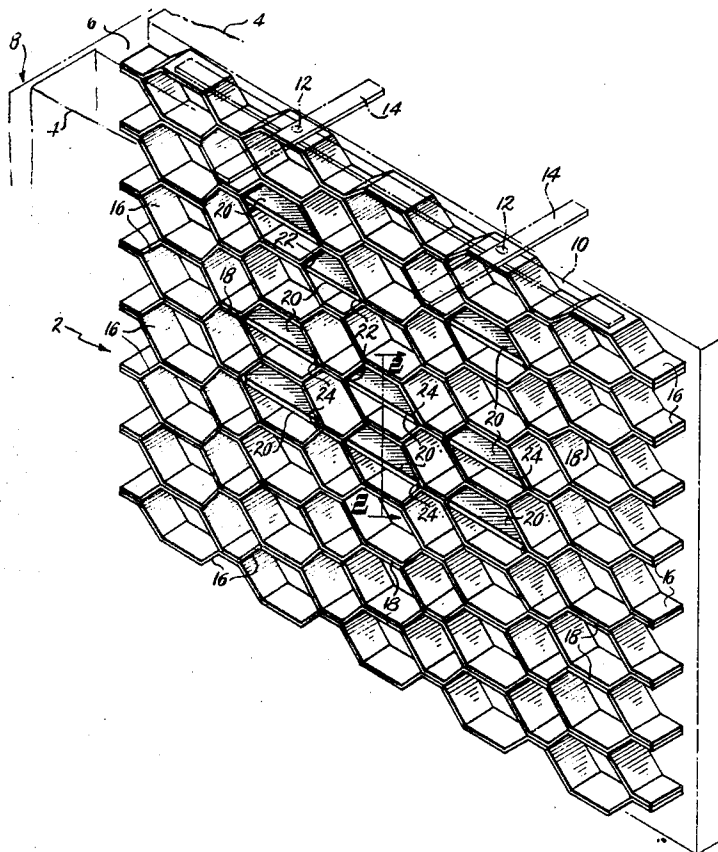
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[54] **REINFORCED LOAD SPACER**
6 Claims, 3 Drawing Figs.

[52] U.S. Cl..... **105/369 B**
[51] Int. Cl..... **B61d 45/00**
[50] Field of Search..... **105/367,**
369 B; 220/83; 160/327, 368; 52/666, 670, 343,
373; 161/68

ABSTRACT: An expandable honeycomb structure, of corrugated paper board, is suspended between a load and an adjacent surface in a freight carrier, to fill the space and prevent load shifting. Transverse rigid members in certain of the cells limits their horizontal contraction and prevents the honeycomb structure from sagging unduly.



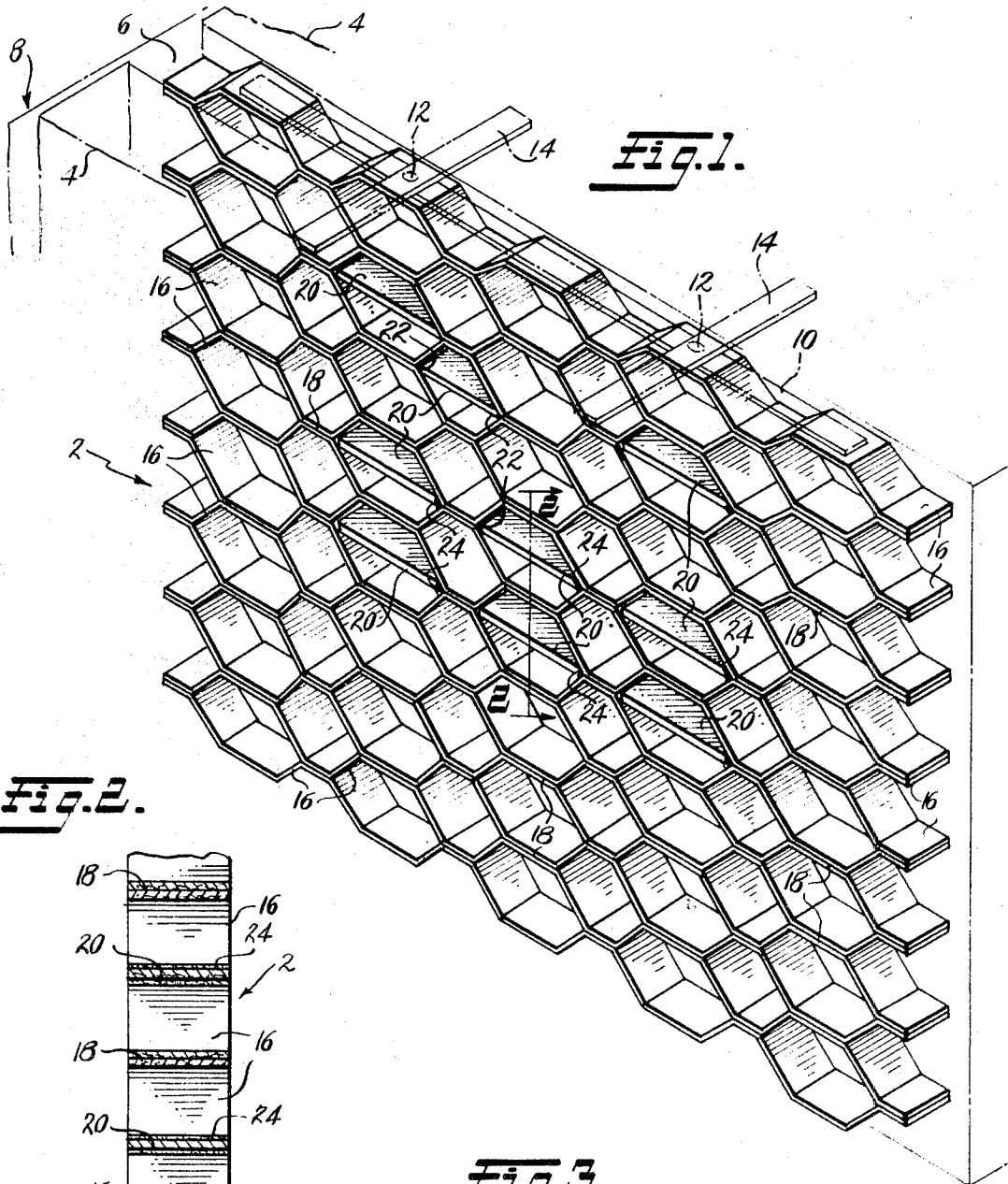


Fig. 2.

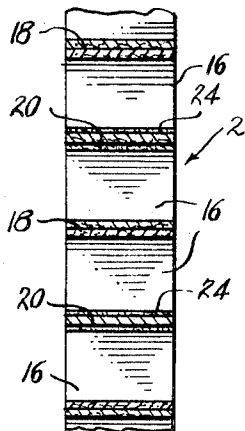
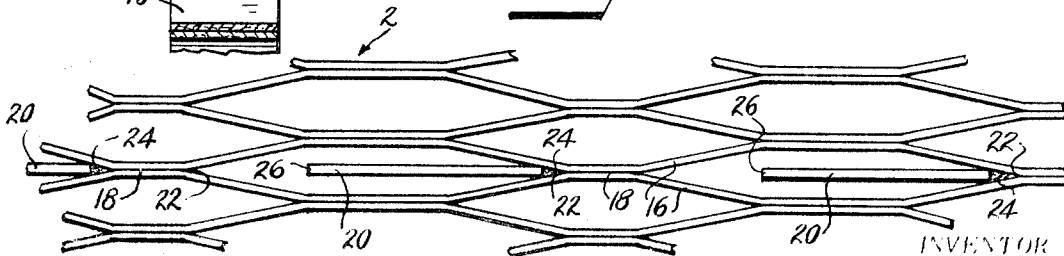


Fig. 3.



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REINFORCED LOAD SPACER

CROSS REFERENCE TO RELATED APPLICATION

This invention is an improvement on the invention disclosed in the copending application of Ronald D. Hees, Ser. No. 747,988, filed July 26, 1968.

BACKGROUND OF THE INVENTION

This invention is in the field of dunnage load spacers for filling void spaces between articles of freight.

The copending application referred to above discloses a load spacer comprising an expandable honeycomb structure suspended between stacks of freight articles. The spacer is suspended between the stacks by pivoted supports, pivotally mounted on an elongated base member secured to the top of the honeycomb structure. When such a spacer structure is suspended from its top, and particularly if it is of considerable depth, the weight of the honeycomb structure tends to elongate at least the upper portion and the cells therein in a vertical direction and thus draw the lateral edges of the structure inwardly to an excessive degree. The present invention seeks to remedy this deficiency.

SUMMARY OF THE INVENTION

This invention relates to means for preventing excessive or undue vertical elongation of the cells of an expandable honeycomb structure when the same is suspended from its upper edge. In general, the invention comprises the positioning of a substantially rigid bracing member in selected cells, particularly near the top of the honeycomb structure, to limit the horizontal contraction and vertical elongation of the selected cells. The rigid member may be either loose and positionable in selected cells at will or may be secured at one end within the selected cell so that it is already in position when the structure is initially expanded.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating the improvement of the present invention;

FIG. 2 is an enlarged fragmentary vertical sectional view taken along the line 2-2 of FIG. 1; and

FIG. 3 is a fragmentary elevational view of an expandable honeycomb structure in substantially fully collapsed condition.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1, numeral 2 designates generally an expandable honeycomb structure in position between spaced stacks of articles of freight, suggested by the dotted lines shown at 4. The stacks of freight articles are separated by a generally planar space 6 and that space is substantially filled by the honeycomb structure 2 to prevent shifting of the load. Numeral 8 generally designates a wall of a freight container which may be a railroad car, truck body or the like. As disclosed in the prior application referred to above, an elongated substantially rigid base member 10 is secured to the top of the honeycomb structure and has pivoted thereto, by pivots 12, support arms 14. When the honeycomb structure is collapsed for storage or shipment, the arms 14 are swung to overlie the base 10 so that the assembly will occupy a minimum of space. When the spacer is installed between the stacks of freight articles, the arms 14 are swung to the lateral position shown in FIG. 1 wherein they rest on the tops of the stacks of articles to suspend the honeycomb structure therebetween.

The honeycomb structure itself is fully described in the prior application referred to and preferably comprises strips 16 of double-faced corrugated paper board or the like superimposed to define a stack of strips with adjacent strips being adhered at spaced staggered positions 18 so that the stack may be expanded to the honeycomb configuration illus-

trated. Such honeycomb construction is well known. When such a structure is suspended in the manner described, and particularly if the vertical dimension is considerable, the weight of the material forming at least the lower portion of the structure is sufficient to unduly stretch the cells in a vertical direction and thus draw opposite side edges of the spacer structure inwardly more than is desired. To prevent such excessive distortion of the cells, transversely extending substantially rigid reinforcement members 20 are positioned in selected cells. Those reinforcement members may be made of the same corrugated paper board material as the honeycomb structure itself and are so dimensioned that they will engage opposite side edges 22 of their respective cells when those cells have expanded vertically to the desired degree, and thus prevent further or undue vertical elongation of those cells. As is obvious, the reinforcement members 20 need not be positioned in all of the cells but need only be dispersed through the upper portion of the spacer structure in a few scattered cells, and this will adequately support the structure in its desired configuration.

The reinforcement members 20 may be loose and selectively positioned in their cells when the spacer is installed in the freight container or they may be permanently secured to the honeycomb structure by adhering one edge thereof to an adjacent sidewall of the stack of strips forming the honeycomb structure, as illustrated generally in FIG. 3. In this FIG. 3 the reinforcement members 20 are shown as being adhesively secured, at 24, to one side edge 22 of their respective cells and adjacent an adhered area 18 between strips 16. As clearly apparent, from FIG. 3, the horizontal length of the reinforcements 20 is considerably less than the corresponding dimension of the respective honeycomb cells when the structure is collapsed so that the cells may be expanded in a vertical direction until the free edges 26 of the reinforcements 20 engage the opposite edges 22 of their respective cells, at which time further vertical expansion is arrested.

As shown, the width of the reinforcements 20 is substantially equal to the thickness of the honeycomb structure and these reinforcement members thus further serve to assist in holding the stacks 4 of articles in spaced relation. However, the invention contemplates that the strips may be narrower than shown and in fact may comprise relatively narrow elongated strips of material as long as they have sufficient rigidity to limit vertical expansion of the cells.

While a limited embodiment of the invention has been described, it will be obvious that other modifications may be adopted.

I claim:

1. The combination comprising: a freight container; a plurality of discrete articles of freight in said container, said articles being arranged in at least one stack of articles with a generally planar space between said stack and an adjacent vertical surface; an expandable honeycomb structure of sheet material substantially filling said space with the sheet material thereof extending transversely across said space, said honeycomb structure being expandable and contractable in a vertical direction; means at the top of said honeycomb structure, supported adjacent the top of said stack of articles to suspend said structure between said stack and said adjacent vertical surface; said honeycomb structure defining a multiplicity of cells having foldably joined bounding walls whereby said cells may be expanded to horizontally elongated shape or to vertically elongated shape; and substantially rigid means in certain of said cells, extending horizontally therein and bearing against opposite sides thereof to limit horizontal contraction and vertical elongation of said cells.

2. The combination defined in claim 1 wherein said rigid means each comprises a sheet of material selectively removable from said cells.

3. The combination defined in claim 1 wherein said rigid means each comprises a sheet of material secured at only one side to the corresponding side of its cell whereby said honeycomb structure may be collapsed in a vertical direction without removing said rigid means.

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4. An expandable honeycomb structure comprising: a stack of strips of readily foldable sheet material, the strips of said stack being foldably secured to adjacent strips at spaced and staggered positions whereby said stack may be expanded to define a honeycomb slab having a multiplicity of cells; elongated substantially rigid members in certain of said cells, each member being of less length than the collapsed length of its cell, whereby to engage opposite sides of said cell when said structure is expanded and thereby limit the extent of expan-

sion of said structure.

5. A structure as defined in claim 4 wherein said rigid members are loose in their cells and readily removable therefrom for positioning in different selected cells.

6. A structure as defined in claim 4 wherein each of said rigid members is secured, at one end, to the adjacent end of its cell adjacent one of said spaced positions.

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