United States Patent

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[54] **SUSPENDED LOAD SPACER**
7 Claims, 4 Drawing Figs.

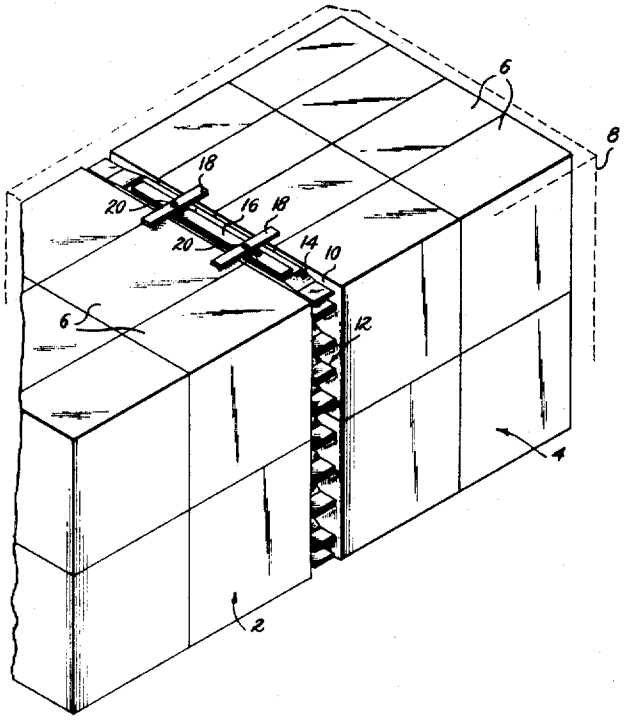
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[51] **Int. Cl.** **B61d 45/00**
[50] **Field of Search** ..... 105/367, 368, 369 B, 369 A, 369 S; 206/65, 243; 85/32; 52/32, 39, 65, 238, 239, 289, 484; 248/317

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ABSTRACT: A spacer for filling spaces, in a freight shipping vehicle or container, between spaced stacks of articles of freight, and being in the form of a lightweight expandable honeycomb structure, expandable in a vertical direction in the space between stacks and suspended therein by means engaging the tops of stacked articles.



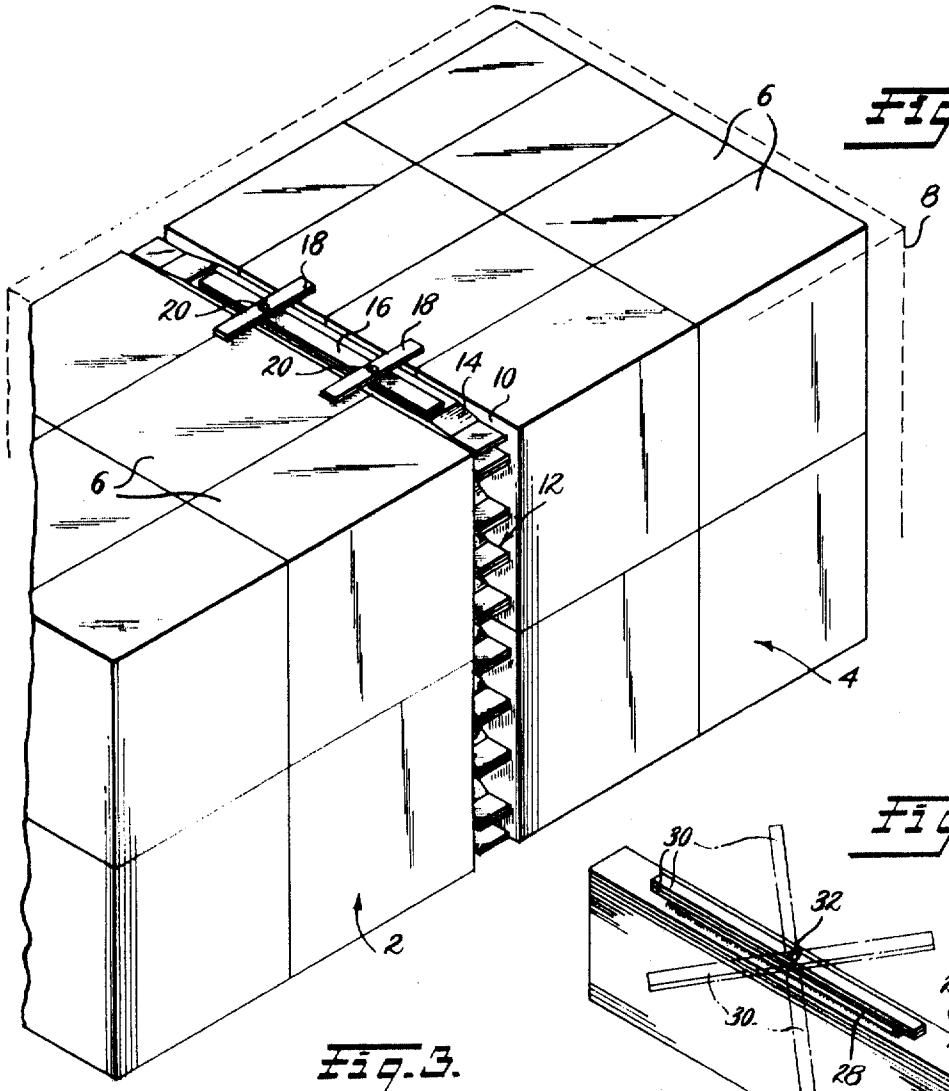


Fig. 1.

Fig. 2.

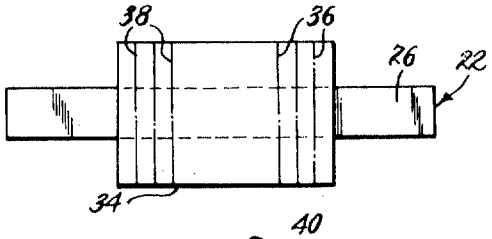


Fig. 3.

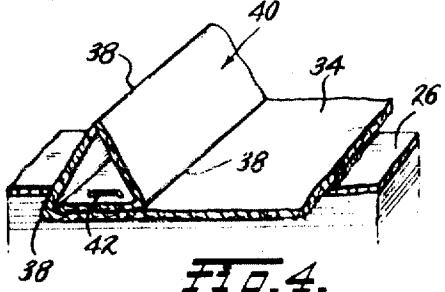


Fig. 4.

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SUSPENDED LOAD SPACER

SUMMARY OF THE INVENTION

The present invention comprises a load spacer for use between stacks of articles of freight and embodied in the form of a collapsible honeycomb structure, formed principally of corrugated paperboard or the like so that it may be collapsed to a compact package for shipment or storage but can be readily expanded to fill generally planar spaces of different dimensions. In general, the invention comprises such a collapsible honeycomb structure having suspension means pivoted to one edge of the structure to lie within the lateral confines thereof for shipment or storage and which pivoted means may be swung to extend transversely of the honeycomb structure to engage the tops of freight articles on opposite sides of the space to be filled. The honeycomb structure then expands or is pulled downwardly in a generally vertical direction to the bottom of the stack and serves to fill the space and prevent load shifting. In another form the suspending means, engageable with the top of the articles, is in the form of a folded sheet material attachment folded to define a transversely extending rigid tubular structure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a typical load arrangement having the spacer of the present invention applied thereto;

FIG. 2 is an isometric view of a collapsed honeycomb structure adapted for use as in FIG. 1 but showing a modified form of suspending means;

FIG. 3 is a top plan view of a further modification of the honeycomb structure of the type shown in FIG. 2; and

FIG. 4 is an enlarged perspective view of a portion of the structure of FIG. 3 after folding to form for use.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, numerals 2 and 4 indicate generally a pair of stacks of discrete articles of freight 6 shown for convenience in the form of cubical boxes or the like arranged in a freight container, indicated by broken lines 8. As shown, the articles 6 do not completely fill the container 8 but leave therein a space 10 between the stacks 2 and 4, which space 10 is of generally planar form bounded by the stacks 2 and 4. An expandable honeycomb structure 12 is positioned in the space 10 in the manner shown. The honeycomb structure is of a collapsible an expandable nature and comprises strips of sheet material, such as double-faced corrugated paperboard or the like, with the strips arranged in a stack and being secured to adjacent strips at spaced and staggered positions whereby such stack may be expanded to define a honeycomb slab having a multiplicity of cells, the walls of the cells extending transversely across the space 10. Such expandable honeycomb structures per se are known and need not be further described.

In the embodiment illustrated, however, the upper or top strip 14 of sheet material has secured thereto, such as by gluing or the like, and elongated rigid strip or base member 16. The strip or base member 16 may be a wooden slat or the like and has pivoted thereto a pair of rigid suspension members 18, pivoted to the strip 16 by a suitable pivot means 20 at spaced positions along the length of the strip 16. As shown in FIG. 1, suspension members 18 have been pivoted about pivot 20 to extend transversely across the space 10 and they are long enough to engage the tops of adjacent articles 6 to be supported thereby. As clearly evident, the spaced members 18 support the uppermost strip of material 14 in a generally horizontal position, almost coincident with the tops of the stacks 2 and 4. The remainder of the honeycomb structure is expanded downwardly to the bottom of the stacks or to a position adjacent the bottom and serves to fill the space 10 in the manner already referred to.

When collapsed for storage or shipment, the elements 18 are pivoted to overlie strip 16, thus minimizing the space occupied by the collapsed structure.

In applying the spacer, usually stack 4 will be assembled first and in many instances may be placed in position by a single pallet or the like moved to position in the container 8 by a fork truck. After the stack 4 is in position, the honeycomb spacer 12 is applied against the end face of stack 4 with the members 18 turned to the position shown. Usually the weight of the strips of material in the honeycomb structure will cause downward expansion thereof, although it is usually necessary to complete the downward movement of the lower strips manually. It is contemplated that suitable weights may be provided on the bottom strip, if desired, so that the honeycomb structure will be self-expanding and held in expanded position by gravity. After the spacer is in position as described, the second stack 2 may be moved against the face of the honeycomb structure to complete the load. Alternatively, the stacks 2 and 4 may be both positioned in the container 8 leaving the space 10 therebetween and the honeycomb structure 12 may be applied from the top of the space 10 thereafter. In such instance, however, the transverse width of the spacer structure 12 would have to be somewhat less than the width of the space 10 to permit downward expansion of the structure.

FIG. 2 shows an alternative form of spacer wherein numeral 22 designates a collapsed honeycomb structure having the individual strips 24 adhered together in the manner already described. The upper strip 26 of the stack has adhered or otherwise attached thereto an elongated rigid base member 28 having the characteristics already described with reference to element 16 of FIG. 1. A pair of rigid suspension members 30 are pivoted to the base member 28 by a single pivot member 32 whereby the members 30 may be pivoted outwardly to the oblique positions shown in dotted line and thus serve to engage the tops of adjacent stacks at points spaced along the length of the space to be filled to thereby not only support the honeycomb structure but to prevent undue tilting of the upper strip 26.

FIG. 3 illustrates a further modification in plan view, wherein the upper strip 26 of the collapsed honeycomb stack 22 has secured thereto a sheet 34 of sheet material preferably in the form of corrugated paperboard similar to that employed in forming the honeycomb strips. The sheet 34, however, extends laterally beyond both sides of the stack 22 and is adhered to the upper strip 26 only in an intermediate region between groups of score lines 36 and 38. Each group of score lines in the form shown consists of three parallel score lines adjacent opposite ends of the sheet 34 and extending completely thereacross transverse to the strip 26. In collapsed form the modification shown in FIG. 3 can obviously be stored in a minimum of space and when it is desired to install the same in such manner as shown in FIG. 1, the ends of the sheet 34 are folded along the respective score lines 36 and 38 to form generally tubular rigid structures designated at 40 in FIG. 3. Suitable fastening means 42 are contemplated to hold the device in folded condition whereby the tubular portion 40 defines a rigid structure extending transversely across the honeycomb structure and beyond the sides thereof serving to engage the upper surface of stacks of freight articles and support the spacer in the manner already described with reference to FIG. 1.

Obviously the thickness of the honeycomb slab can be varied according to the particular installation, by cutting the same from bulk stock material or stacks. Also, the assembly of strip 16 and elements 18, strip 28 and elements 30, or sheet 34 may be secured to the honeycomb spacer at the place of manufacture or alternatively, at the place of use just prior to installation.

The disclosed and described embodiments are merely illustrative of the principles of the invention, the scope of the patent being limited only by the appended claims.

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 two adjacent stacks of articles with a generally planar space therebetween bounded on op-

posite sides by said articles; and 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; and at least one elongated substantially rigid suspension member at the top portion of said honeycomb structure, pivotally secured thereto about a vertical axis, extending transversely across said space and bearing on the upper surface of articles of said stacks on opposite sides of said space whereby to suspend said honeycomb structure in said space while being swingable to lie within said space and permit said honeycomb structure to contract.

2. The combination of claim 1 including a rigid base member fixed to the top portion of said honeycomb structure, said suspension member being pivotally mounted on said rigid base member.

3. The combination of claim 2 wherein a plurality of said suspension members are pivoted to said rigid base member spaced along the length of said space.

4. The combination of claim 2 wherein at least two of said suspension members are pivoted to said rigid base member on a common pivot axis.

5. An expandable honeycomb structure comprising: a stack of strips of sheet material, the strips of said stack being 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; and elongated substantially rigid suspension member pivoted to an outer strip of said stack and swingable between positions where it lies between the edges of said outer strip, and where it extends transversely of said outer strip and laterally outwardly of the side edges thereof.

6. A structure as defined in claim 5 including a rigid base member secured to said outer strip, said suspension member being pivotally mounted on said base member.

7. An expandable honeycomb structure comprising: a stack of strips of sheet material, the strips of said stack being 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; a sheet of foldable material having a portion secured to an outer strip of said stack and extending laterally outwardly of the side edges of said strip; a plurality of parallel score lines extending across said foldable sheet, transversely of said outer strip, in a region of said sheet free of securement to said outer strip, whereby said sheet may be folded along said score lines and secured in folded condition to define a substantially rigid and generally tubular support means extending transversely across and outwardly of said stack.

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