

[72] Inventor **David H. Blatt**  
**Melrose Park, Pa.**  
 [21] Appl. No. **41,809**  
 [22] Filed **June 1, 1970**  
 [45] Patented **Dec. 14, 1971**  
 [73] Assignee **Walnut Industries Company**  
**Philadelphia, Pa.**

*Primary Examiner*—Bobby R. Gay  
*Assistant Examiner*—Glenn O. Finch  
*Attorney*—Edelson and Udell

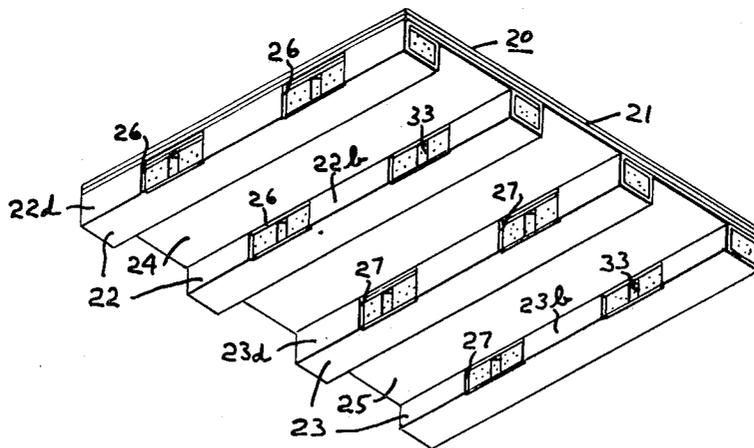
[54] **FOLDABLE EXPENDABLE FOUR-WAY ENTRY PALLET**  
**16 Claims, 11 Drawing Figs.**

[52] U.S. Cl. .... **108/58**  
 [51] Int. Cl. .... **B65d 19/18**  
 [50] Field of Search. .... **108/51-58**

[56] **References Cited**

UNITED STATES PATENTS			
3,026,078	3/1962	Simkins .....	108/56
3,302,593	2/1967	Roberts .....	108/56
2,828,007	3/1958	Foss .....	108/58
2,444,183	6/1948	Chaners .....	108/56
3,216,376	11/1965	Anderson et al. ....	108/56
3,269,336	8/1966	Naylor et al. ....	108/58
FOREIGN PATENTS			
659,213	3/1963	Canada .....	108/51

**ABSTRACT:** A foldable expendable four-way entry pallet, merchandise container or other article carrier constructed of corrugated paperboard including a planar deck and foldable, reinforcing log pockets or sleeves secured to the underside of the deck. Log sleeves are formed in pairs at opposite ends of a piece of double-faced single-wall corrugated board and the entire intervening web is adhesively secured to the underside of the deck. Single or multiple pairs of log sleeves may be used with the log orientation of plural pairs being parallel and the sleeves being foldable flatwise toward the deck when the reinforcing logs are removed. Each log sleeve is provided with a pair of windows having centers spaced apart the proper distance to permit projection therethrough of the fork of a fork lift truck, and the windows of the paralleled sleeves are aligned in rows orthogonal to the log sleeves. The reinforcing logs fit slidably closely within the log sleeves and may be of expanded polystyrene or any other suitable rigid frangible material. The portions of the logs exposed through the windows of the sleeves are notched or otherwise formed to break out cleanly when impacted by the fork of a fork lift truck to permit the fork to pass through the windows, and are also top-notched to provide for passage of banding straps.



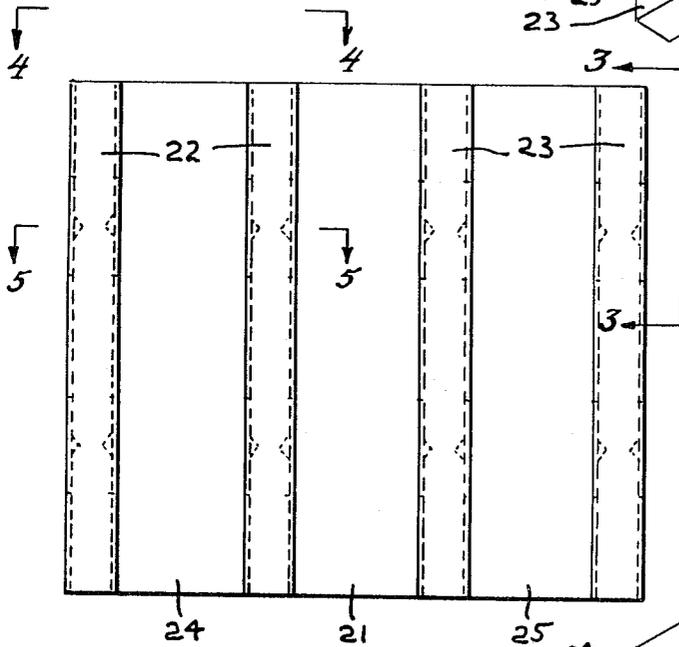
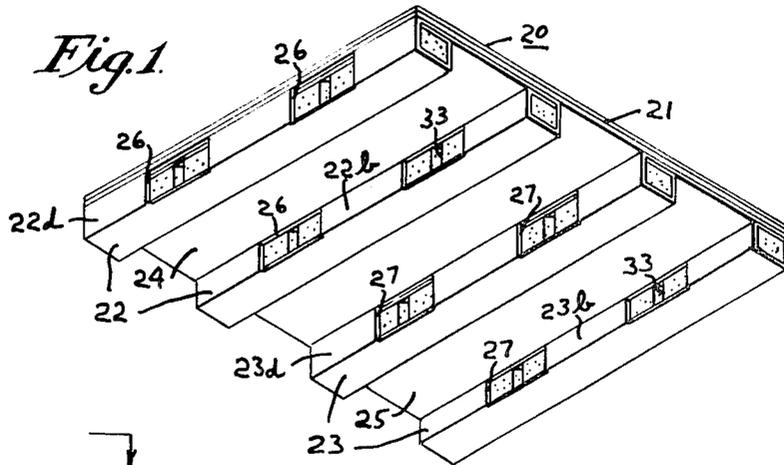


Fig. 2.

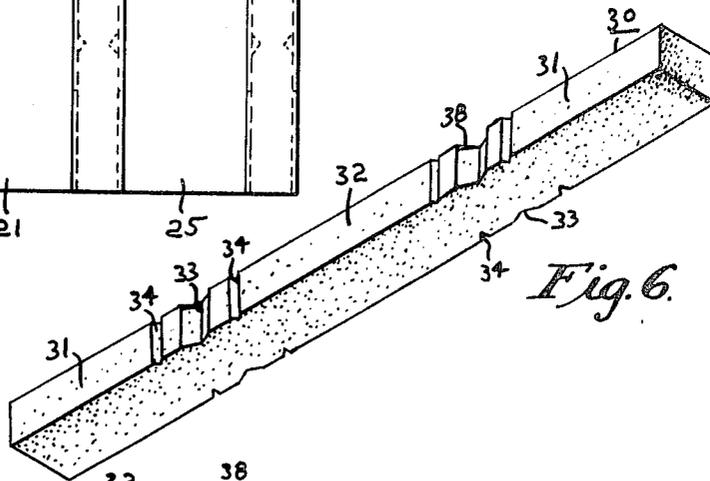


Fig. 6.

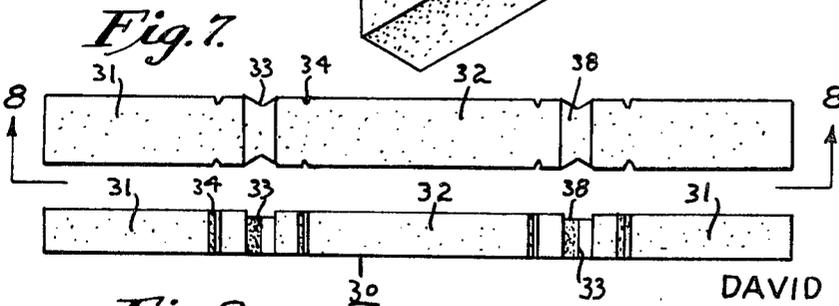


Fig. 7.

Fig. 8.

INVENTOR.  
DAVID H. BLATT  
BY  
Edelson and Udell  
ATTORNEYS.

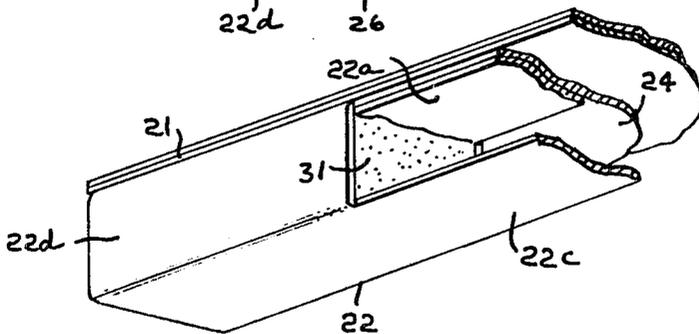
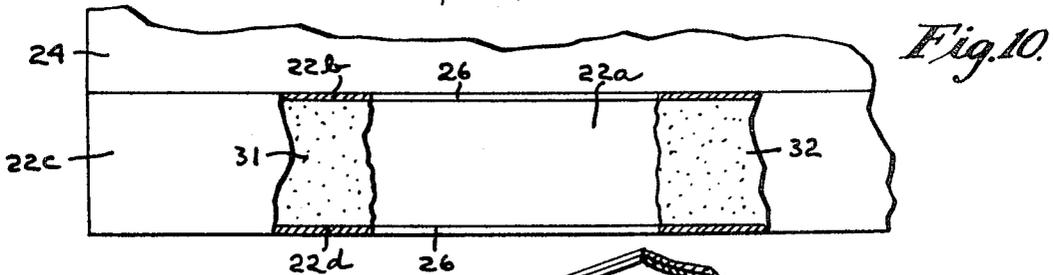
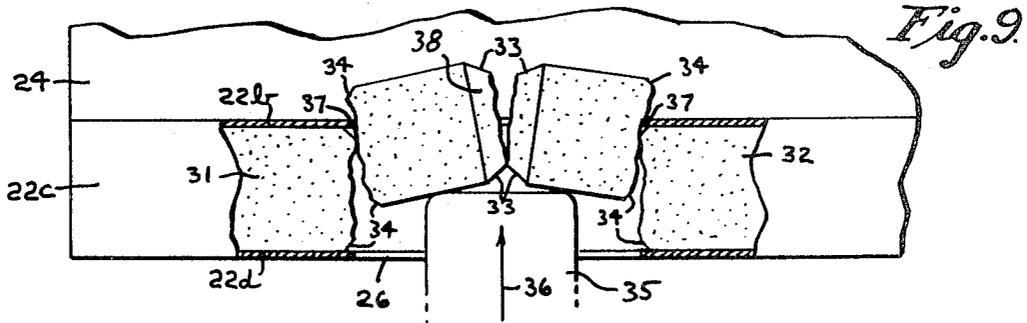
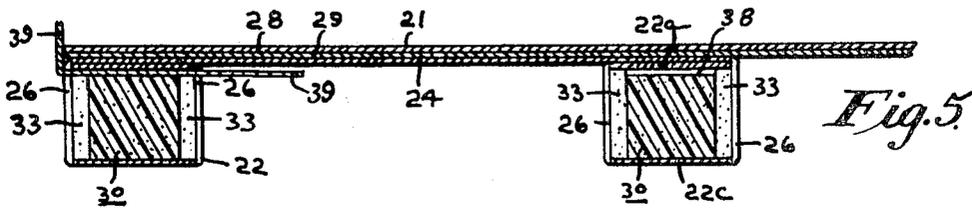
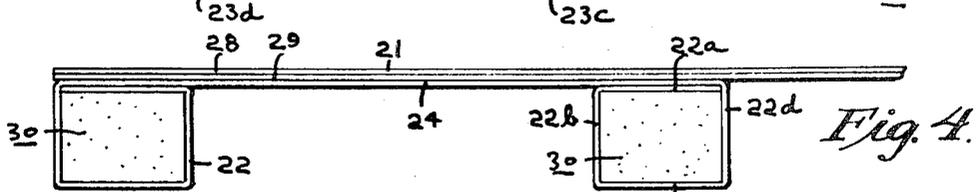
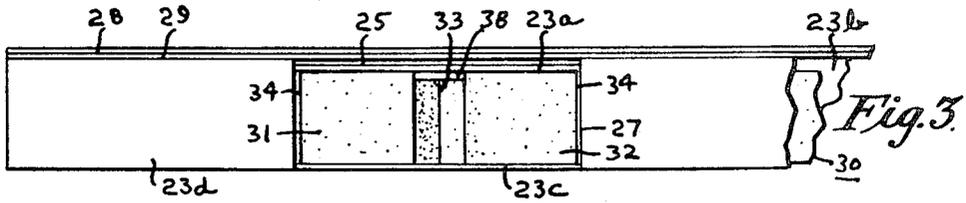


Fig. 11.

INVENTOR.  
DAVID H. BLATT  
BY  
Edelson and Udell  
ATTORNEYS.

## FOLDABLE EXPENDABLE FOUR-WAY ENTRY PALLET

This invention relates to foldable, expendable four-way entry pallets or article carriers, and more particularly relates to such pallets made of corrugated paperboard, and so constructed that the pallets may be folded substantially flat for shipping and storage.

Pallets have been used for a considerable length of time as the bases upon which various items are stacked so that they may be moved in bulk by power equipment such as fork lift trucks and the like. In the past, most pallets have been made of wood, the usual form of pallet including a flat deck to the underside of which are secured a plurality of rigidifying beams which also function as vertical spacers to allow the fork of a lift truck to move in under the deck and thereby lift the pallet with its contents for transportation to storage or loading area. Wooden pallets of this type are fairly expensive, and do not have a high density packing factor when such pallets are stored or shipped in bulk by truck or railway car. The shipping, storing and handling costs of the pallets according to the invention are approximately one tenth of the cost associated with wooden pallets because they require only one tenth of the space required by wooden pallets.

Materials other than wood have been utilized in the construction of pallets, but there have been disadvantages and difficulties encountered. For example, metal pallets are even more expensive than wood and weigh more while providing no storage or shipping advantages whatever. Foamed plastics have been tried but in general these devices do not withstand the rigorous use to which pallets are subjected, and provide no advantages in storage or shipping.

The foldable expendable four-way entry pallet according to the invention overcomes all of the aforementioned disadvantages in that it is light in weight, of relatively low cost, foldable substantially flat to provide a high density storage and shipment factor attended by great cost reductions in these areas, and is sufficiently strong and tough to provide for repetitive use. The cost factor is sufficiently low that pallets made according to the invention may often times be disposed of after a shipping use from one point to another instead of being shipped back for a subsequent use. Accordingly, it is a principle object of the invention to provide a foldable four-way entry type pallet made of corrugated paperboard which is relatively inexpensive, is adapted for manufacture by automated equipment, has a high density packing factor for storage and shipment, is strong and durable, and incorporates a novel reinforcing log and sleeve construction to provide four-way entry.

Another object of the invention is to provide a novel foldable pallet as aforesaid which includes a main support deck to the underside of which are secured a plurality of windowed reinforcing log holder pockets or sleeves adapted to receive reinforcing logs slipped endwise thereinto when the pallet is erected for use, and which log holders are collapsible into substantially flat form with the logs removed when the pallet is to be stored or shipped, each log sleeve being provided with a pair of windows spaced apart the proper distance to permit projection therethrough of the fork of a fork lift truck, and the windows of the paralleled sleeves being aligned in rows orthogonal to the log sleeves.

Yet another object of the invention is to provide a novel pallet as aforesaid of the four-way entry type in which portions of the reinforcing logs exposed through the windows of the sleeves are notched or otherwise formed to break out cleanly when impacted by the fork of a fork lift truck to permit the fork to pass through the windows.

A further object of the invention is to provide a novel pallet as aforesaid in which the reinforcing logs are formed of expanded polystyrene or other substantially rigid frangible material characterized by the ability to break along a substantially straight line.

Yet another object of the invention is to provide a novel foldable four-way entry pallet as aforesaid in which the pallet forms an integral part of a shipping container for an article of merchandise.

The foregoing and other object of the invention will become clear from a reading of the following specification in conjunction with an examination of the appended drawings, wherein:

FIG. 1 is a perspective view from below of a pallet according to the invention showing the windowed log holder sleeves with the logs exposed therethrough;

FIG. 2 is a bottom plan view of the pallet seen in Figure 1;

FIG. 3 is an enlarged fragmentary side view of a pallet according to FIG. 2, the invention as would be seen when viewed along the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary end view of the pallet and log holders as would be seen when viewed along the line 4—4 of FIG. 2;

FIG. 5 is an enlarged fragmentary vertical sectional view through the pallet and log holder sleeves according to the invention as would be seen when viewed along the line 5—5 of FIG. 2;

FIG. 6 is a perspective view of a typical reinforcing log made of a suitably rigid frangible material;

FIG. 7 is a plan view of the log shown in FIG. 6;

FIG. 8 is a side elevation of the reinforcing log as seen along line 8—8 of FIG. 7;

FIG. 9 is an enlarged fragmentary bottom view of a log sleeve in the window region with the sleeve bottom broken away to disclose the breakout of a reinforcing log by a truck fork;

FIG. 10 is a view similar to FIG. 9 but with the sleeve window cleared; and

FIG. 11 is a perspective view looking into the window of the sleeve shown in FIG. 10.

In the several figures, like elements are denoted by like reference characters.

Considering first the FIGS. 1 to 5 of the drawings there is seen a pallet designated generally as 20 having a deck structure 21 and two pairs of parallel reinforcing log holder pockets or sleeves, one pair of sleeves being designated 22 while the other pair of sleeves is designated as 23. As best seen from the showings of FIGS. 1, 4 and 5, the pair of sleeves 22 is formed from a single piece of material designated generally as 24 while the pair of sleeves 23 is formed from a different similar piece of material 25. As best seen from the showing of FIGS. 4 and 5, each of the sleeves 22 is formed by folding the terminal end portion of the piece of material 24 about longitudinally extending fold or hinging lines to form the sleeve walls designated as 22a through 22d, the upper sleeve wall 22a being adhesively fixedly secured to the underside of the planar web portion of the piece of material 24. Similarly, the log sleeves 23 are formed by folding the end portions of the piece of material 25 about longitudinally extending fold or hinging lines to define the sleeve walls 23a through 23d with the upper sleeve wall 23a being fixedly secured to the underside of the planar web portion of the piece of material 25.

As best seen in FIGS. 1 and 9 to 11, each of the sleeves 22 has its sidewalls 22b and 22d rectangularly apertured as at 26 so that the reinforcing log contained within the sleeve is exposed. In a typical 42 inch by 48 inch pallet the rectangular apertures or windows 26 could be 2½ inches high and 8 inches long, and the edge of the window closest to the edge of the pallet would be spaced inward substantially 8 inches from the pallet edge. Similarly, as seen in FIGS. 1 and 3, the sleeves 23 are provided with rectangular windows 27 cut through the sleeve sidewalls 23b and 23d, the windows 27 being of the same size and positioning as the windows 26 so that all of the windows 26 and 27 are longitudinally aligned and spaced endwise inward by the same distance from the opposite edges of the pallet 20 along the lines which are orthogonal to the directional extent of sleeves 22 and 23.

The pieces of material 24 and 25 are typically made of high Mullen test double-faced single-wall corrugated paperboard construction to provide foldability with high resistance to impact and scuffing. The deck 21 may be made of double-faced single-wall or outer faced multiple wall corrugated construction, and may be of single-ply or multiple-ply construction. For illustrative purposes, and as is most clearly seen in the

showing of FIGS. 3, 4 and 5, the deck 21 is formed of two plies 28 and 29 of corrugated paperboard laid cross-ply to one another and adhesively secured throughout their surface contacting extent with the longitudinal direction of the corrugate flutes in the cores of the lower ply 29 disposed cross-ply to the direction of the corrugate flutes in the immediately below lying log pocket forming pieces of corrugated 24 and 25. It should also be understood that sleeves such as 22 or 23, singly or in pairs, can be affixed to an end or side of a shipping carton or container to form a pallet-integral container, and when reference is made herein to a pallet it is intended to cover such a container or other article carrier as well.

Referring now to FIGS. 6, 7 and 8, there is seen a reinforcing log designated generally as 30 of rectangular cross section, and in a typical case being approximately 3½ inches wide by 2½ inches high and corresponding of course to the inside width and height of the sleeves 22 and 23. Each of the logs is divided into a pair of opposite end sections 31—31 and a central section 32 by the V-shaped notches 33, which in a typical case might be 1½ inches wide by one-half inch deep. In the case of a 42 inch log to be used with the aforementioned typical 42 inch by 48 inch pallet as shown in FIG. 1, the center of the notch 33 is located 12 inches from the end of the log so that the notches 33 are centered in the sleeve windows 26 and 27. Although not mandatory, in some cases it may be of benefit to provide the secondary log notches 34 spaced at opposite sides of each of the V-shaped notches 33 at the proper distance so that these secondary notches 34 fall at each end of the windows 26 and 27, all as will be explained hereinafter.

As previously mentioned, the logs 30 may be made of any suitable rigid frangible material, and expanded polystyrene has been found to be excellent for this purpose. Expanded polystyrene combines the highly desirable properties of being light in weight, sufficiently rigid, and characterized by breakage along a substantially straight plane when subjected to transverse impact. The notching arrangement provided in the logs according to the invention facilitates controlled breakage of the logs in desired planes.

For example, the pallet may be used so that the fork of a fork lift truck may be passed beneath the pallet parallel to and between the pallet reinforcing log holder sleeves from either of two directions to thereby provide two-way entry. On the other hand, when it is desired to pick up the pallet with a fork lift truck by approach at right angles to the log holding pallet reinforcing sleeves to thereby provide the additional two-way entry it is necessary that the forks of the fork lift truck pass through the sleeve windows 26 and 27. Obviously, the forks of the fork lift truck cannot pass through the sleeves if the latter are obstructed by the reinforcing logs 30.

This problem is overcome by virtue of the aforescribed breakout characteristics of the logs 30 which permits the forks of the fork lift truck to impinge against the sides of the reinforcing logs 30 at the notches 33 and thereby cause the logs to fracture in a controlled manner such that the fork is able to fracture the log and push it clearly out of the window to permit passage of the fork therethrough. This action is illustrated in FIGS. 9 and 10 of the drawings wherein a fork 35 of a fork lift truck is illustrated as moving sideways against a log 30 through window 26 in the direction shown by the arrow 36.

The mechanics of the breakout action result from the force exerted against the log by the fork 35 at the notch 33 combined with the resistance to movement of the log in the direction of the fork 35 which is provided by the walls of the sleeve 22, in particular, the wall 22b and the side edges 37 of the window 26. Bending and shear forces are set up which cause the log 30 to crack across its planes of minimum strength, which of course include principally the plane joining the two V-shaped notches 33 across the width of the log and the two laterally spaced planes at the opposite side edges of the window 26. While it has been found when using expanded polystyrene that the secondary notches 34 at the side edges of the windows are not requisite to obtaining a satisfactory breakout of the windowed portion of the logs 30, these sec-

dary notches 34 do provide a more positive location of the side fracture planes and are of definite value when other log materials are used which do not have the same desirable fracture characteristics as that of the expanded polystyrene.

The breakout feature of the logs 30 is very significant in that a pallet can be erected very quickly by merely unfolding the sleeves and slipping a log 30 into the sleeve for its full length, the orthogonal entry of a fork lift truck being provided at the time when such use is desired in the manner already described. If a nonfrangible log were used, then it will be appreciated that in the illustrated case, each log holder sleeve would require the careful placement therewithin of three individual log sections, or a total of 12 such sections for the pallet shown in FIG. 1. The time required for erecting such a pallet would therefore be vastly increased as compared with the very rapid assembly made possible by the log structure according to the invention. Additionally, where only a two-way entry were required, some reinforcing strength would necessarily have been sacrificed by the use of three small log sections instead of one continuous reinforcement.

Finally, as seen in FIGS. 3, 5 and 6 to 9, the logs 30 are provided with banding notches 38 which extend the full width of the log immediately above each of the notches 33, and typically are on the order of 1½ inches wide and one-fourth inch deep. As best seen in FIGS. 3 and 5, these banding notches 38 are disposed at the upper surface of the log so that banding straps 39 may be projected therethrough for the purpose of securing merchandise to the pallet.

It should be noted that the pallets are particularly resistant to knockoff of the underlying log supports because of the manner in which the log sleeves are formed, and the fact that the log sleeves are integrally formed with a web of corrugated paperboard which is surface adhered to the immediately above lying structure. A blow delivered by the front edges of the forks of a fork lift truck against the unwindowed parts of the sides of the log holder sleeves by reason of an incorrect positioning of the fork for entry beneath the pallet is strongly resisted by the sleeve structure and will, except under the most severe circumstances, prevent separation of the log and sleeve from the pallet.

Having now described my invention in connection with a particularly illustrated embodiment thereof, it will be appreciated that modifications and variations of the invention may now occur from time to time to those persons normally skilled in the art without departing from the essential scope or spirit of the invention, and accordingly it is intended to claim the same broadly as well as specifically as indicated by the appended claims.

What is claimed is:

1. An article carrier comprising in combination,
  - a. a deck having an upper surface for receiving merchandise, and an undersurface,
  - b. a plurality of parallel spaced-apart reinforcing log holder sleeves secured to and depending from said deck, each of said sleeves having sidewall regions which are provided with at least a first pair of aligned windows lying in planes extending transversely to said deck, and
  - c. a plurality of reinforcing logs each of substantially the same cross-sectional size and shape as that of the log holder sleeves and being slidable into an associated log holder sleeve to thereby rigidify said sleeve, each said log being made of a rigid frangible material and a portion of said log being exposed on opposite side thereof through the aforesaid aligned windows of said associated log holder sleeve.
2. An article carrier as described in claim 1 wherein each of said sleeves sidewall regions is provided with at least a second pair of aligned windows lying in planes extending transversely to said deck, said first and second pairs of windows being spaced apart longitudinally along said sleeve a distance equal to the fork-to-fork spacing of the forks of a forklift truck.
3. An article carrier as described in claim 1 wherein each of said reinforcing logs is provided with fracture assisting means

operative to cause said log to completely fracture transversely to the log length when the log is subject to transverse impact through said sleeve windows, whereby, at least a portion of said log within the said sleeve windows is separable from said log and displaceable from said sleeve through said sleeve windows.

4. An article carrier as described in claim 1 wherein each of said reinforcing logs is provided with at least one region of reduced cross-sectional area operative to cause said log to completely fracture transversely to the log length when the log is subjected to transverse impact through said sleeve windows, whereby, at least a portion of said log within the said sleeve windows is separable from said log and displaceable from said sleeve through said sleeve windows.

5. An article carrier as described in claim 1 wherein each said sleeve comprises a plurality of flat surfaces extending longitudinally of the sleeve length with at least some of said flat surfaces being movable about hinging lines to selectably compact said sleeves substantially flatwise by movement toward said deck or to open out said sleeves to their log receiving cross section by movement away from said deck.

6. An article carrier as described in claim 1 wherein said log holder sleeves are formed in parallel spaced apart pairs at opposite ends of a piece of corrugated paperboard, and wherein the area of the latter between said log holder sleeves is secured fixedly against the undersurface of said deck.

7. An article carrier as described in claim 1 wherein said reinforcing logs are made of expanded polystyrene.

8. An article carrier as described in claim 1 wherein the upper surface of said reinforcing logs is recessed downward for the full width of said log within that portion of the log which is exposed through each of said windows, whereby a banding strap may be passed through each of said windows and said log upper surface recess for securing articles to said article carrier.

9. An article carrier as described in claim 2 wherein each of said reinforcing logs is provided with fracture assisting means operative to cause said log to completely fracture transversely to the log length when the log is subjected to transverse impact through said sleeve windows, whereby, at least a portion of

said log within the said sleeve windows is separable from said log and displaceable from said sleeve windows.

10. An article carrier in claim 3 wherein said log fracture assisting means is positioned within said sleeve window when said log is within said sleeve.

11. An article carrier as described in claim 3 wherein said log fracture assisting means comprises at least one region of reduced cross-sectional area positioned substantially centrally within said sleeve window when said log is within said sleeve, and a pair of regions of reduced cross-sectional area positioned substantially at the opposite side edges of said window.

12. An article carrier as described in claim 9 wherein each said sleeve comprises a plurality of flat surfaces extending longitudinally of the sleeve length with at least some of said flat surfaces being movable about hinging lines to selectably compact said sleeves substantially flatwise by movement toward said deck or to open out said sleeves to their log receiving cross section by movement away from said deck.

13. An article carrier as described in claim 9 wherein said log fracture assisting means comprises at least one region of reduced cross-sectional area positioned substantially centrally within said sleeve window when said log is within said sleeve, and a pair of regions of reduced cross-sectional area positioned substantially at the opposite side edges of said window.

14. An article carrier as described in claim 11 wherein the upper surface of said reinforcing logs is recessed downward for the full width of said log at the said at least one region of reduced cross-sectional area positioned substantially centrally within said sleeve window, whereby a banding strap may be passed through each of said windows and said log upper surface recess for securing articles to said article carrier.

15. An article carrier as described in claim 12 wherein said log fracture assisting means comprises at least one region of reduced cross-sectional area positioned substantially centrally within said sleeve window when said log is within said sleeve, and a pair or regions of reduced cross-sectional area positioned substantially at the opposite side edges of said window.

16. An article carrier as described in claim 15 wherein said reinforcing logs are made of expanded polystyrene.

\* \* \* \* \*

45

50

55

60

65

70

75