Oct. 5, 1965 J. S. KEAN, SR 3,209,905

COLLAPSIBLE SHIPPING CONTAINER

Filed June 13, 1962 3 Sheets-Sheet 1

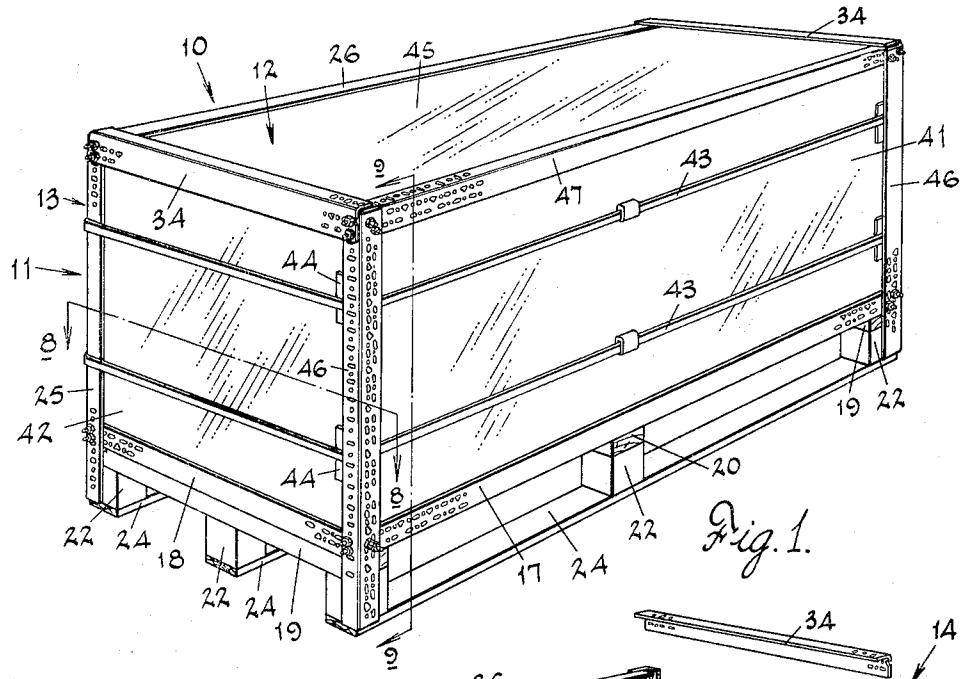

Fig. 1.

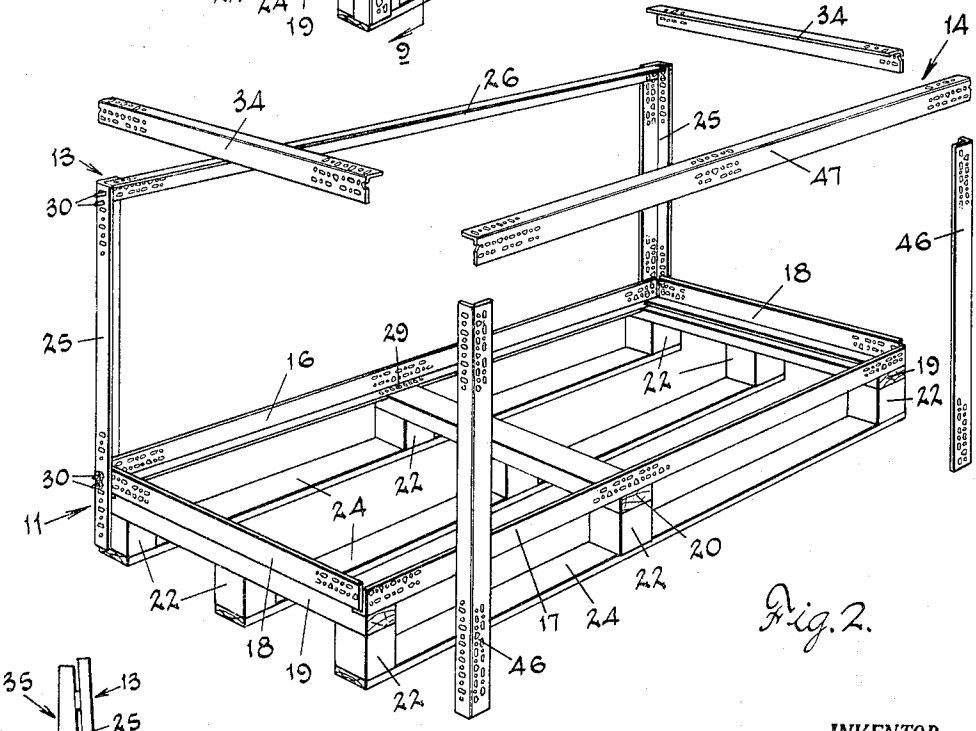

Fig. 2.

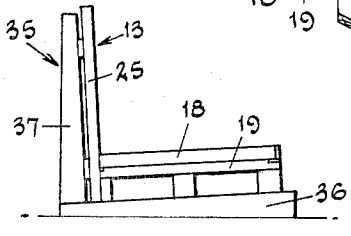

Fig. 3.

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Filed June 13, 1962 3 Sheets-Sheet 2

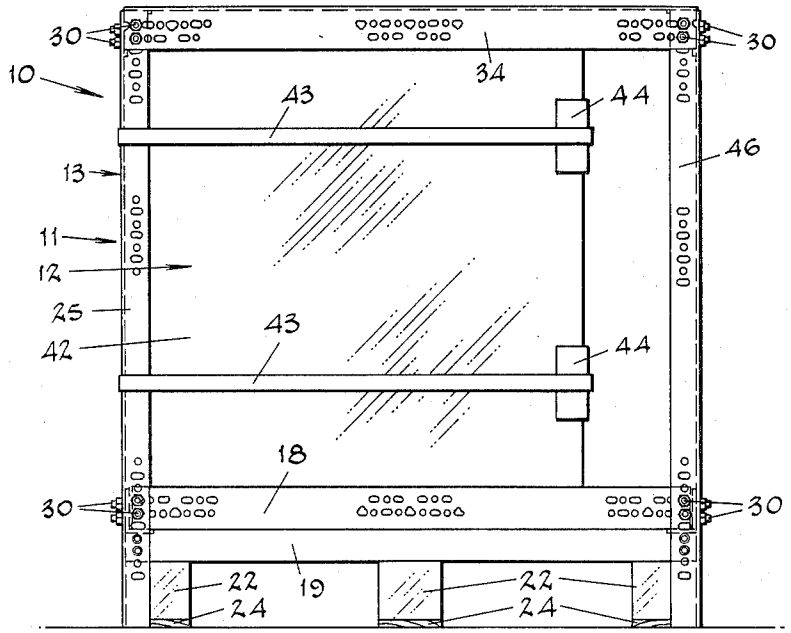

Fig. 4.

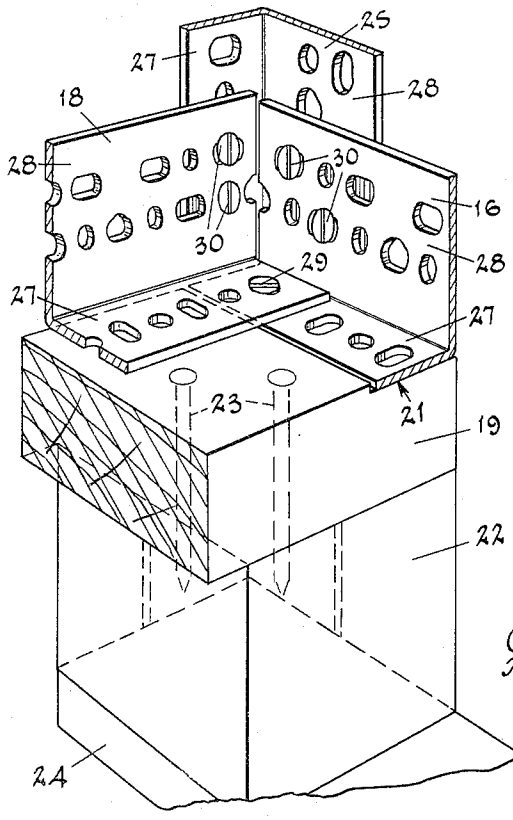

Fig. 5.

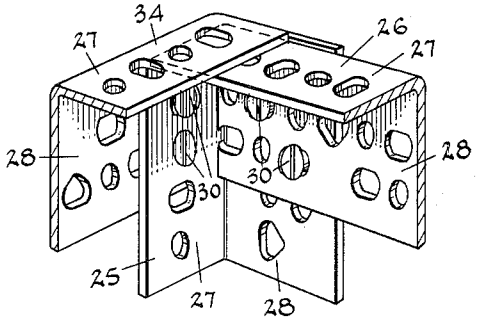

Fig. 6.

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COLLAPSIBLE SHIPPING CONTAINER

Filed June 13, 1962 3 Sheets-Sheet 3

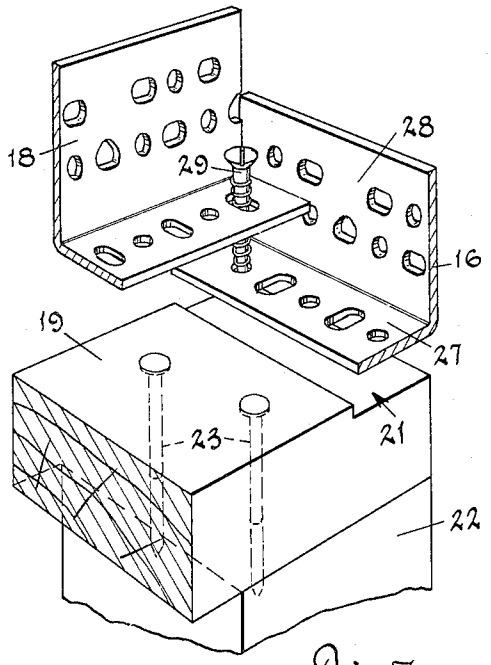

Fig. 7.

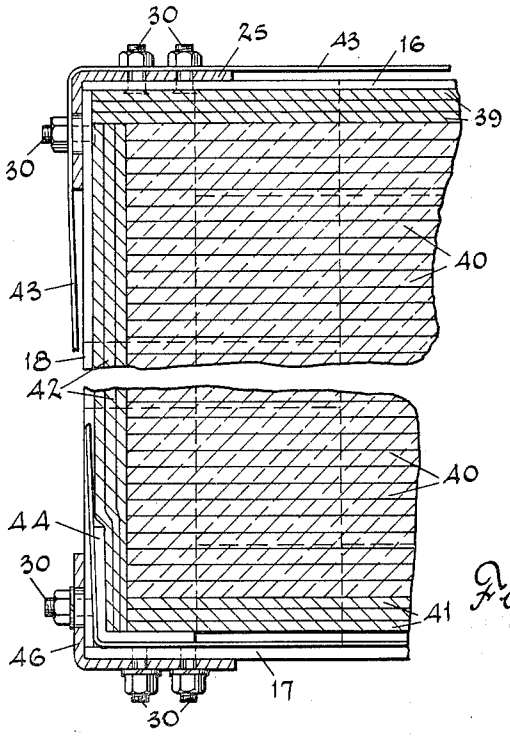

Fig. 8.

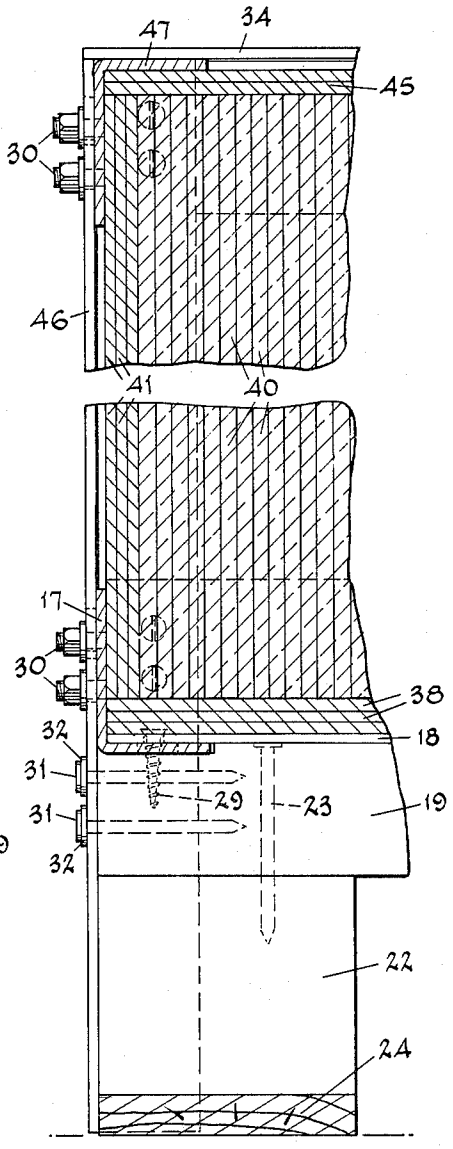

Fig. 9.

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United States Patent Office 3,209,905 Patented Oct. 5, 1965

3,209,905

COLLAPSIBLE SHIPPING CONTAINER

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Filed June 13, 1962, Ser. No. 202,247
5 Claims. (Cl. 206—62)

The present invention relates broadly to the art of shipping containers, and more particularly to improved pallet containers suitable for the storage and transportation of glass sheets and the like, which can be readily assembled and disassembled.

In the packaging of glass sheets by heretofore known methods, it has been conventional practice to stand a plurality of the sheets on edge in face to face relationship upon a previously constructed wooden pallet having three rigidly attached upstanding sides. After the requisite number of sheet have been so stacked, a fourth side and a top are added, and the sheets are then bound securely to the pallet to form a rigid unit for shipment. Although shipping containers of this type avoided excessive breakage of the glass sheets and generally performed very well for their intended purpose, they nevertheless possess certain inherent disadvantages. Thus, the prior art containers generally employ a relatively large amount of lumber and require skilled labor for their construction. Since the containers are usually assembled with nails, they are not readily adaptable to complete disassembly for return shipment, and even if partially disassembled and returned to the manufacturer in sections for reuse, repeated nailing will ultimately cause deterioration to the point where the containers must be replaced.

The wooden containers are also heavy and bulky, and even when partially disassembled are difficult and expensive to handle and transport. Furthermore, the containers are generally designed and built for a specific size of glass sheet and function best when containing a predetermined number of the sheets for which they were intended.

It is therefore an important object of the present invention to provide a strong, relatively light weight shipping container which is capable of receiving and transporting a comparatively large number of sheets of glass or like material.

Another object of the present invention is to provide a shipping container which can be readily assembled and disassembled for repeated use without damage to the components thereof.

Another object of the invention is to provide a shipping container which can be rapidly assembled and loaded without the use of skilled labor.

Another object of the invention is to provide a shipping container which, when disassembled, can be bound into a compact bundle for return shipment and storage prior to reuse.

Still another object of the invention is to provide a shipping container constructed from components which are interchangeable in order to permit the size of the container to be varied according to the size and number of sheets to be packaged.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

In the drawings wherein like numerals are employed to designate like parts throughout the same:

FIG. 1 is a perspective view of a completed shipping container constructed in accordance with the present invention;

FIG. 2 is a perspective view with the top and front portions of the container positioned as for assembly;

FIG. 3 is an end view of the base and rear portion of the container mounted upon a buck for loading or unloading of the glass sheets;

FIG. 4 is an end view of the assembled shipping container showing the manner in which varying numbers of sheets can be securely fastened within the container;

FIG. 5 is a fragmentary enlarged perspective view showing the construction of a lower corner of the container;

FIG. 6 is a fragmentary enlarged perspective view of an upper corner of the container;

FIG. 7 is a fragmentary detailed view of a partially assembled lower corner of the container before the vertical leg is added;

FIG. 8 is a partial horizontal sectional view of a completed container taken substantially on the line 8—8 of FIG. 1; and

FIG. 9 is a partial vertical sectional view taken substantnially along line 9—9 of FIG. 1.

There is shown in FIG. 1 of the accompanying drawings a preferred embodiment of the present invention wherein there is provided a substantially rectangular palletized shipping container, designated in its entirety by the numeral 10, and comprising a skeletal framework 11 within which is carried a package 12 of glass sheets or the like. As best seen in FIGS. 2 and 3, the skeletal framework is divided into two sections, including a rear frame assembly 13 upon which the sheets are loaded and a frame closure assembly 14 adapted to be secured to the rear frame assembly after the requisite number of sheets has been loaded thereon.

The rear frame assembly 13 includes a base 15 upon which the sheets are supported on edge, the base being comprised of rear and front base angle members 16 and 17, respectively, which are interconnected by a pair of end base members 18. The frame members are preferably fabricated from conventional "slotted angle" material, which has a repeating pattern of openings in each flange thereof so that the components may be easily assembled regardless of their length, although it is contemplated that the frame members may be of standard angle stock which is drilled to provide the necessary openings for assembling the container. The angle members 16, 17 and 18 which form the base 15 are positioned with one of their legs extending upwardly and the other extending toward the interior of the base so as to form a continuous, closed, sheet supporting ledge around the periphery of the base.

Wooden stringers 19 extend across the ends of the base beneath the end base angles 18 and one or more intermediate stringers 20 extend between the rear and front base angles 16 and 17, respectively, in between the opposite end base angles 18 to strengthen the base and to provide support for the sheet in the intermediate areas thereof. As will best be seen in FIGS. 5 and 7, the stringers 19 and 20 are rabbetted as at 21 so that the surface of the stringer will be flush with the upper surfaces of the front and rear base angle members. In order to maintain the container a sufficient distance above the supporting surface so that the forks of a conventional lift truck can be inserted thereunder for handling purposes, a plurality of spacer blocks 22 are secured to the stringers 19 and 20 as by nails 23. The spacer blocks permit the forks of the lift truck to be inserted beneath the container from any of its edges, although for loading on conventional railroad cars the forks are preferably inserted from a narrow edge, or end, of the container in which case the forks will lift against both the end stringers 19 and the intermediate stringers 20. Longitudinal slats 24 may be fastened to the lower surface of the spacer blocks in the conventional manner to prevent the individual spacer blocks from catching on the floor and turning or being torn off.

The rear frame assembly 13 is completed by a pair of rear uprights 25 attached to the base 15 at either rear

corner thereof, and a rear top or cover angle 26 connecting the uprights at their upper ends. The rear uprights 25 preferably extend to the supporting surface beneath the spacer blocks 22, particularly where it is contemplated that the containers may be stacked one upon another, although it is only necessary, of course, that they extend upwardly from the junction of the rear base angle 16 and the end base angle 18. Where the uprights extend to the supporting floor, they will transmit any load carried upon the top of the container directly to the floor instead of causing the super-imposed load to be transferred through the lower joint into the base 15 and thence to the floor through the spacer blocks 22.

Turning now to a consideration of the individual structural members which comprise the frame of the present invention, and more particularly to the manner in which these individual members are connected together, it will be noted in FIGS. 5, 6 and 7 that the angle members are provided with a plurality of openings arranged in longitudinal rows along each flange thereof. Further, it will be understood that although for purposes of illustration the openings have only been shown in certain areas of the angle members in FIGS. 1, 2 and 4, such openings generally extend over the full length of the member in a repetitive pattern.

As shown in FIGS. 5, 6 and 7, the narrow flange 27 of each angle member has a single, longitudinally extending row of openings therein, while the wider flange 28 has two such rows of openings. The openings, which are arranged in repeating groups, are also aligned transversely, with certain of the openings in one flange being longitudinally elongated while certain of the openings in the other flange are transversely elongated in a well known manner, the details of which do not form a part of the present invention. Although angle members of the type illustrated are generally sufficiently strong for most shipping purposes, it may be desirable in constructing extremely large shipping containers to employ heavier angle members having wider flanges, in which case the narrow flange may be two or more rows of openings while the wider flange may have three or more rows. There is thus provided an increased number of aligned openings in the joints which permit the angle members to be more securely fastened together.

In assembling the rear frame assembly 13, the rear base angle 16 and front base angle 17 are selected of a length slightly longer than the sheets which are to be packaged so that the sheets, when placed upon the rear frame assembly in a manner to be hereinafter described, will rest upon the inwardly turned horizontal or narrow flanges 27 of the end base angles 18. The length of the end base angles will be determined by the number and thickness of sheets to be packaged. The narrow horizontal flange of the rear base angle 16 and front base 17 is fittted onto the rabbetted portions 21 of the end stringers 19, and an end base angle 18 is placed along the stringers 19 perpendicular to the front and rear base angles, with at least one pair of openings in the overlapping flanges thereof in alignment. The overlapping flanges are secured to the stringer, and to each other, by one or more screws 29 driven into the stringer through the aligned openings. The heads of the screws 29 are preferably countersunk to avoid damage to the edges of the sheets which may subsequently rest thereon. The intermediate stringers 20 are attached to the front and rear base angles at suitable locations in the same manner.

The rear uprights 25 are attached to the end base angle 18 and the rear base angle 16 by bolts 30 having substantially flat, countersunk heads so as to avoid damage to sheets carried in the container. Due to the spacing of the openings in the flanges and the elongated nature of certain ones thereof, at least two bolts can be employed in securing each base angle to the upright 25 as shown in FIG. 5. The end stringers 19 may be fastened to the uprights 25 by nails 31 driven into the stringers through suitably located ones of the openings in the uprights as is apparent in FIG. 9, the nails having washers 32 thereon to prevent the head from pulling through the openings in the flange of the upright. The length of the uprights will be dependent upon the width, or height, of the sheets to be carried within the container. The rear cover angle 26 which connects the upper ends of the rear uprights 25 completes the wall 33 of the rear frame assembly for receiving sheets in a manner to be hereinafter described. As illustrated in FIG. 6 for a typical upper corner assembly, the rear cover angle 26 and an end top or cover angle 34 are connected to the rear upright 25 by bolts 30.

In use, the rear frame assembly 13 is placed upon a loading buck 35 having a slightly inclined supporting surface 36 and a support wall 37 perpendicular thereto, which causes the rear frame assembly 21 to tilt the rear wall 33 thereof. A protective liner 38 consisting of several layers of cardboard or a similar material is then placed upon the bottom of the rear frame assembly so as to rest around its periphery upon the inwardly turned horizontal flanges of the rear, end and front base angles 16, 18 and 17 respectively. A similarly constructed rear wall liner 39 fits onto the ledges of the rear wall 33 created by the inwardly turned flanges of the rear base angle, uprights and top angle 16, 25 and 26 respectively. Sheets of glass 40 are stacked on edge upon the bottom liner 38 beginning at the rear wall liner, with the sheets at either end extending onto the horizontal flange of the end base angles 18 for support. Since the loading buck 35 causes the rear frame assembly to tilt somewhat rearwardly while providing support for the rear wall, the sheets may be stacked parallel to and leaned against the rear wall without danger of falling forward.

An important feature of the present invention is that any number of sheets 40, up to the full capacity of the container, may be placed in the container for shipment without alteration of the skeletal framework 11 in any way. Thus, a front wall liner 41 is placed adjacent the last sheet 40 whether the container partially filled as in FIG. 4, or completely filled as in FIGS. 1 and 8, and end liners 42 protect the aligned sheets at either end. Banding straps 43 surround the package 12 and rear uprights 25 to hold the sheets against movement relative to one another and to fasten the package securely to the rear uprights. The corners of the package 12 are reinforced at 44 to prevent injury to the ends of the sheets by the banding straps.

Assembly is completed by placing a liner 45 over the top of the sheets and attaching the frame closure assembly 14 to the rear frame assembly 13. Included in the frame closure assembly are a pair of front uprights 46 which are attached to the base 15 in the same manner as are the rear uprights 25. The end top angles 34 and a front cover top or cover angle 47 are connected to the front uprights in the same manner as the upper rear corner assembly shown in FIG. 6 to thereby form a framework completely surrounding the package 12. The horizontal flanges of the end top angles 34 fit over the ends of the sheets to restrain them against vertical movement, while the vertical flanges of the end base angles 18 and top angles 34 restrain the sheets against longitudinal movement. The container is then ready for handling by fork lift truck for transportation in the conventional manner.

The container is preferably unloaded and disassembled in the reverse order of its assembly. Thus, the loaded or filled container is placed upon a loading buck 35 by fork lift truck and the frame closure assembly 14 is removed to provide access to the package 12. The banding straps 43 and the protective liners 41, 42 and 45 are then removed after which the individual sheets 40 are easily accessible for removal.

It will be apparent that the empty rear frame assembly may quickly and easily be completely disassembled for return shipment. The structural components

for each individual container can be banded together into a compact bundle, or the components from several containers may be similarly banded together into a compact bundle. The angle shaped components of the dismantled containers are preferably nested one within another to thereby require much less space than the heretofore conventional wooden pallet type containers. Since the amount of lumber required for the container is relatively small, in certain instances it may even be economically justifiable to discard the stringers **18** and **19**, spacer blocks **20** and slats **24** instead of returning them for reuse.

Due to their interchangeability, stocks of components of different lengths can be maintained at the point of assembly so that containers for sheets of practically any dimensions can be assembled from a relatively small stock of standard parts. For certain containers wherein the standard parts are not satisfactory, components can be readily cut to any desired length since the angle stock contains repeating groups of openings spaced uniformly throughout its length.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention.

I claim:

1. In a collapsible shipping container for sheets of frangible material, a base including a rectangular frame comprising end, rear and front angle shaped members, said frame members having one of their legs extending upwardly and the other of their legs extending toward the interior of the base to form a continuous closed ledge around the periphery of said base, a package comprising a plurality of sheets in vertical, face to face relationship supported upon said continuous ledge, members maintaining said base spaced from a supporting surface to permit entry of lift forks beneath said base, an upstanding rear wall affixed to said base, said rear wall including an angle shaped upright secured to each rear corner of said base with one leg of each said rear upright being parallel to an end of said base and the other leg parallel to the rear edge thereof, and an angle shaped rear top member connecting the upper ends of said rear uprights, one leg of said rear top member extending downwardly and the other extending inwardly, at least one banding strap surrounding the package and the rear wall and urging said package against said rear wall, said banding strap being substantially parallel to said base, and a closure assembly secured to said base and said rear wall, said closure assembly including an angle shaped upright secured to each front corner of the base, one leg of each said front upright being parallel to an end of said base and the other leg thereof being parallel to the front edge of said base, an angle shaped front top member joining the upper ends of said front uprights with one of its legs extending downwardly and the other extending inwardly, and an angle shaped end top member joining the upper end of each said front upright to the upper end of the corresponding rear upright with one leg of each said end top member extending downwardly and the other leg thereof extending inwardly.

2. A collapsible shipping container for frangible sheet material as claimed in claim **1**, wherein each surface of said package is covered by a protective liner, each said protective liner abutting around its periphery against a continuous ledge formed by coplanar legs of the angle shaped members forming said base, said rear wall and said closure assembly of said shipping container.

3. A collapsible shipping container for frangible sheet material as claimed in claim **2**, wherein said members for maintaining the base spaced from a supporting surface comprise a stringer secured beneath each said end base member, at least one intermediate stringer extending transversely between said front and rear base member, a plurality of spacer blocks attached to the underside of each said stringer, and longitudinally extending slats secured to the bottom of said spacer blocks.

4. A collapsible shipping container for frangible sheet material as claimed in claim **1**, wherein the angle shaped members forming said base, said rear wall and said closure assembly have repeating patterns of openings uniformly spaced along each of their legs for facilitating assembly of said container.

5. In a shipping container for sheets of frangible material, a base, a plurality of sheets supported upon said base in vertical, face to face relationship, members maintaining said base spaced from a supporting surface to permit entry of lift forks beneath said base, an upstanding rear wall affixed to said base, a banding strap surrounding the sheets and the rear wall and urging said sheets against said rear wall, said banding strap being substantially parallel to said base, and a closure assembly attached to said base and said rear wall to provide front, top and end walls for said container for restraining said sheets against vertical and longitudinal movement, said rear wall including a pair of rear uprights and said closure assembly comprising an angle shaped upright secured to each front corner of the base with one leg of each said front upright being parallel to an end of said base and the other leg of each said front upright being parallel to the front edge thereof, an angle shaped front top member joining the upper ends of said front uprights, one leg of said front top member extending downwardly and the other leg thereof extending inwardly toward the interior of said container, and an angle shaped end top member joining the upper end of each said front upright to the corresponding rear upright, one leg of each said end top member extending downwardly and the other leg thereof extending inwardly.

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