

June 27, 1967

M. E. DORE  
FOLDING CONTAINER

3,327,889

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3 Sheets-Sheet 1

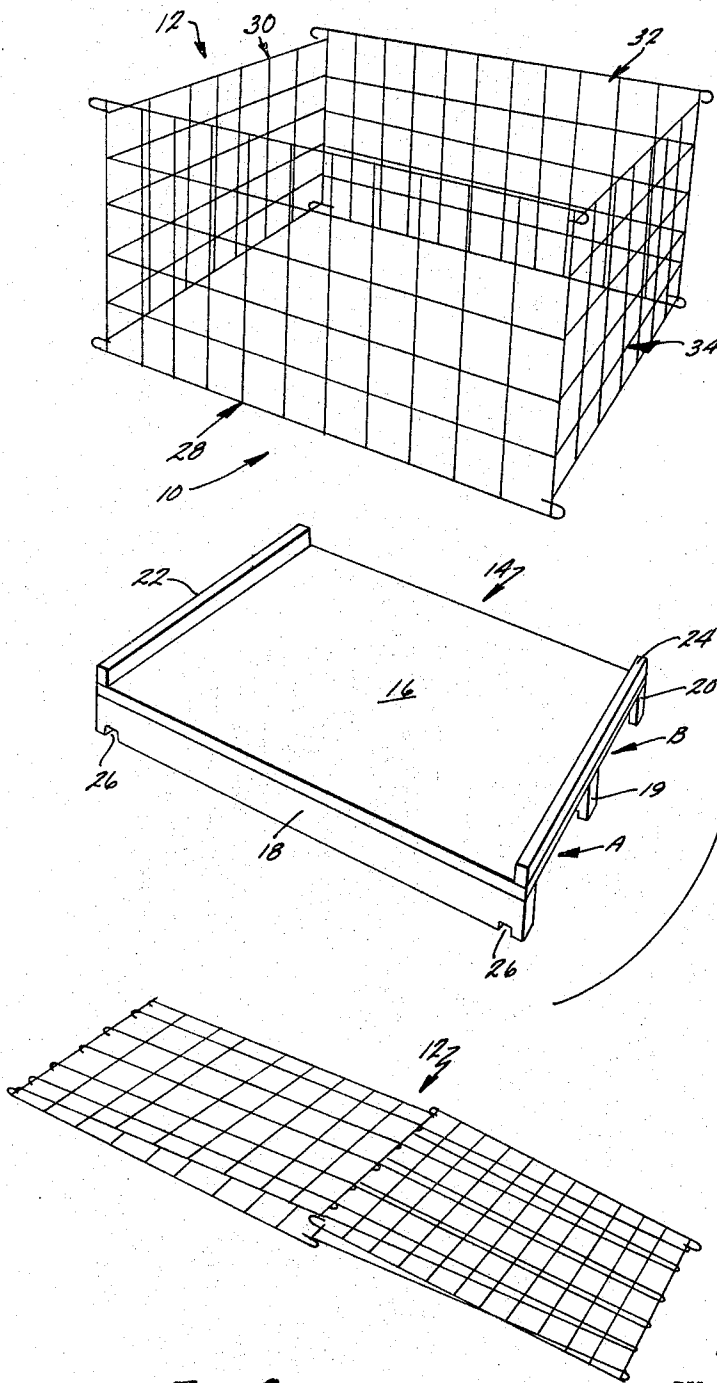


FIG. 4.

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3 Sheets-Sheet 2

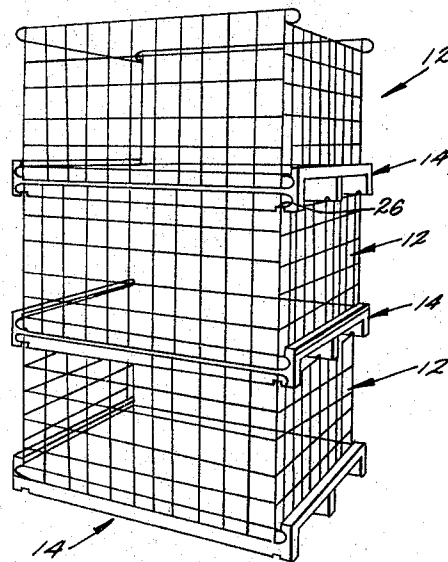
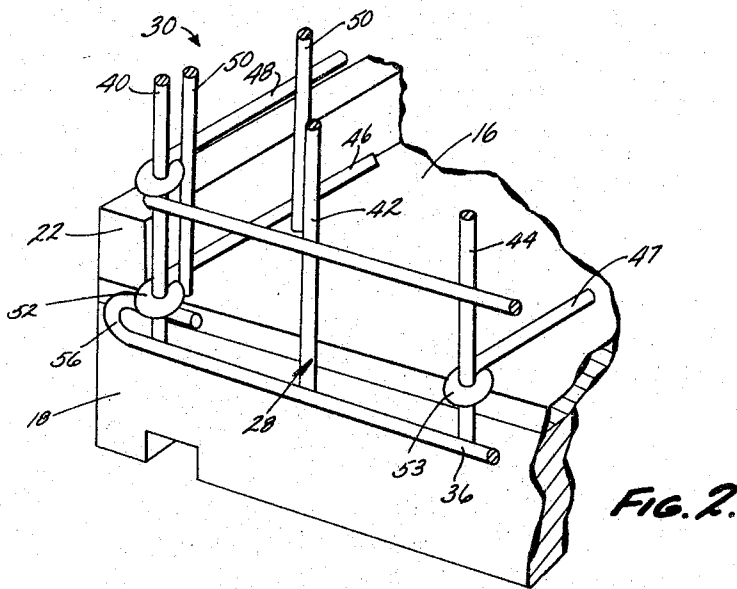


FIG. 3.

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3 Sheets-Sheet 3

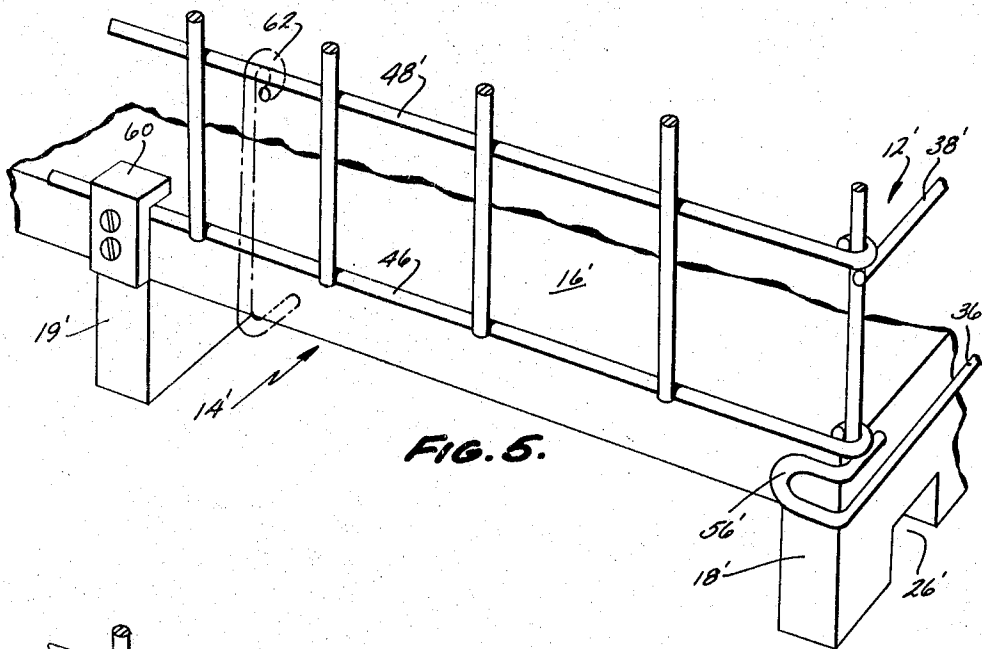


FIG. 5.

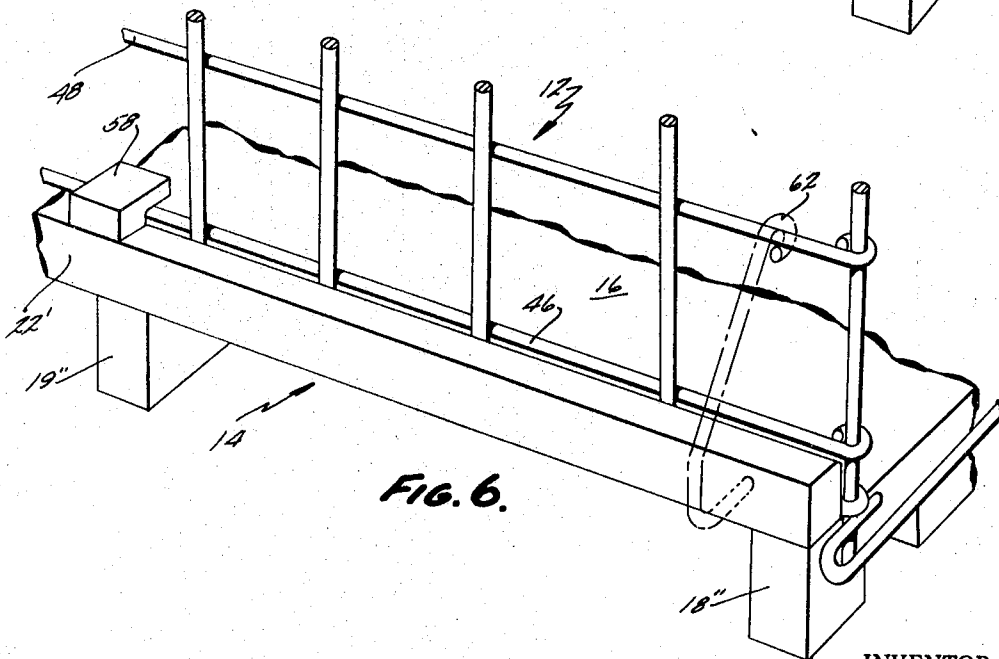


FIG. 6.

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3,327,889

**FOLDING CONTAINER**

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5 Claims. (Cl. 220-6)

This invention relates generally to containers, especially containers for storing large numbers of loose, small packages or bulk articles, and more particularly to containers of this nature which may be collapsed or folded for more compact storage when not in use.

Containers of this general nature have existed in the past, and have many features which are to be desired. For example, they are easily handled, either manually or by forklift trucks, and will safely store enormous bulk loads with a maximum economy of labor and floor space, since when in use they will store several times the quantity of space required to store the containers themselves when they are not in use. Such containers are often made of wire mesh material and hence they provide for a visible inventory of their contents. Containers having mesh sides also are self-cleaning and contamination-free, since dirt and contaminants fall through the open spaces in the mesh and do not collect in the containers.

Along with their many good features, previous containers have all included seemingly inherent undesirable features, however. For example, although such containers are designed to be more or less collapsible, their sides are usually held together by a variety of locking means which are required in order to give the containers the necessary structural rigidity their use demands. One such locking means is a helical steel wire which must be painstakingly manually threaded through the openings in the wire mesh each and every time the container is to be assembled, and by carrying out the opposite laborious operation each time the container is to be disassembled and stored.

Other typical locking means include various intricate wire latches and sliding bolt and eyelet devices. These are faster and easier to operate than the helical fasteners, but they do not have their structural strength. Consequently, some containers used both types of locking means in order to attempt to compromise the best features of each.

Thus, although the containers are said to be readily collapsible, they in fact are not, since they require a considerable amount of painstaking and laborious effort each time it is desired to change their form. Moreover, the usual rough handling over a period of time, including bumps and jolts from the forklift trucks used in connection with them, often bend, flatten, dent, or produce misalignment of the various locking means, so that before long the containers that are locked in position cannot be collapsed for storage at all. Thus, most of their advantage is lost.

Furthermore, even when it is possible to collapse the containers in the designated manner, their sides merely fold downward against their bases and they remain just as heavy as they are in the assembled state. In any but the smallest containers, this weight is enough to prevent the average man from lifting and handling the containers, even though their physical size is then small enough to permit it. Thus, in the end, the previous containers provided only a saving in space and actually added certain labor costs. Finally, the savings in space was only temporary, since before very long the side-locking mechanisms become inoperative due to typical hard usage.

Another important limitation of previous containers of the type having sides which are permanently hinged to the base portion for pivoting along a horizontal axis to

fold flat against the base, is that the sides cannot be greater in height than the minimum width dimension of the base, or else the flat folding of these parts is rendered impossible. This is a severe dimensional limitation which prevents the user from optimizing the requirements of his operation by forcing him to fit the job to the container, rather than the preferred opposite.

Accordingly, it is an object of the present invention to provide a container of the general type described having a unique construction for securely locking the sides together, which construction is not in any way impaired by the most rigorous usage.

Another object of the present invention is to provide a container whose sides are instantly separable from the base structure, so that either part may be handled by one man and may be used separately if desired, and yet whose sides are locked to the base when in use to prevent inadvertent separation thereof.

Still another object of the present invention is to provide a container with separable side and bottom structures, whose individual sides are joined together in a manner which permits the side structure to instantly be folded for compact storage when it has been separated from the base, and yet which, when not so separated, is held rigidly in both a predetermined shape and a predetermined position relative to the base.

A further object of the invention is to provide a unique type of completely foldable container which folds by hinging about vertical axes and is not limited in height by the size of the base involved.

A still further object of the present invention is to provide a container of the type described, the bottom of whose base structure is designed to interengage the top of the side enclosure, such that several assembled containers may be stacked one upon another in an interengaging and interlocking manner which adds structural rigidity to the entire stack.

These and other desirable objects achieved by the present invention, together with many advantages made possible by its utilization, will become increasingly apparent following a consideration of the ensuing specification and its appended claims, particularly when taken in connection with the accompanying illustrative drawings setting forth a preferred embodiment of the invention.

In the drawings:

FIG. 1 is an exploded perspective view of the novel container, showing its two basic parts;

FIG. 2 is an enlarged fragmentary perspective view of a corner portion of an assembled container, showing certain details thereof;

FIG. 3 is a perspective view of several of the containers, showing the manner in which they stack upon each other;

FIG. 4 is a perspective view of a folded enclosure, showing the manner in which it may be stored;

FIG. 5 is an enlarged, fragmentary perspective view of a corner portion of a further embodiment of the container, showing additional details thereof; and

FIG. 6 is an enlarged, fragmentary perspective view of a corner portion of another embodiment of the container showing additional details thereof.

Briefly stated, the foldable or collapsible container of the present invention first includes an enclosure structure having at least four sides which are preferably formed from a mesh material composed of slender steel rods or stiff wire. Each of the several sides of the enclosure are joined to another at corresponding ends with a pivotal connection. The resulting enclosure structure is designed to rest upon and be supported in a predetermined position by a pallet, which provides a base for the container. Means are provided for holding the enclosure in both a prede-

terminated shape and also in a predetermined placement as it rests upon the base, whereby the base and the enclosure form a single container structure having great strength and structural rigidity and integrity as well. The pallet or base further includes means on its bottom side for engaging the top portion of another like enclosure structure in the same position in which each such structure is held atop its associated base. Thus, assembled containers may be stacked one upon another in a manner which actually augments the structural integrity of the entire stack and of each separate container within the stack. Finally, the enclosure structure and base of each container are rapidly separable from each other, and when so separated each enclosure may instantly be folded by pivoting its sides relative to each other at their mutual interconnections to form a flat and compact storage shape.

Referring now in more detail to the drawings, in FIGS. 1 and 2, the novel container 10 is seen to comprise basically two parts. These are an enclosure structure 12, and a pallet 14 which forms a base for the enclosure structure. The pallet 14 is basically a platform with a horizontal supporting surface 16, upon which articles may be rested. The pallet or base 14 includes certain other features, however, which particularly facilitate its interengagement with the enclosure 12.

These features include flat side surfaces 18 and 20 which depend perpendicularly downward from horizontal surface 16 and are coplanar with the straight sides thereof. Further, a pair of curbing projections 22 and 24 are positioned at opposite ends of the surface 16, and they preferably extend completely across the ends and rise above the said horizontal surface a brief distance. The flat side surfaces 18 and 20 form legs upon which the pallet 14 may rest, and it is to be noted that an additional leg 19 may be added generally centrally of the structure for added strength, if so desired.

The legs 18, 19 and 20 space the horizontal platform 16 above the floor on which they rest, so as to provide a pair of access openings A and B, bounded by the inner sides of the legs. These openings are particularly useful in receiving the lifting arms of fork-lift trucks, but also find use in other types of handling. It should be noted that each of the side surfaces or legs 18, 19 and 20 have a relieved detent or notch 26 formed at either end thereof, generally in alignment with the inner edge of the curbing projects 22 and 24. The pallets 14 are preferably made of hardwood, since it is readily available, relatively inexpensive, and provides a pallet of entirely adequate strength. Other materials, including metal, may also be used if desired.

The preferred enclosure structure 12 is seen to include four sides 28, 30, 32 and 34 which are joined together at corresponding ends to form a generally rectangular basket-like enclosing structure. As has been stated, the enclosure 12 is preferably formed from a mesh or lattice-work of slender steel rods or the like which are electrically welded at points of intersection to form a strong and rigid structure. The preferred material has certain advantages which have been noted previously, but the underlying concept of the container is not limited to this precise material, and in its broader aspects could include practically any adequately strong and economically feasible stock.

The sides 28, 30, 32 and 34 are joined to each other by a pivotal connection. When the preferred steel mesh is used to form the sides, such a connection is preferably made in the manner shown in FIG. 2. In this figure, it may be seen that side 28 (which is identical with side 32) is composed of longitudinal ribs such as 36 and 38 and upright or transverse ribs 40, 42 and 44, which cross the longitudinal ribs substantially orthogonally and are firmly welded thereto at all points of intersection. The ends of the longitudinal ribs such as 38 terminate at their point of intersection with the last upright rib in the side, such as that designated 40. The side 30 of the enclosure (which is identical with its opposite member 34) is also

made of longitudinal ribs such as 46 and 48 and upright ribs such as those designated 50, these ribs being similarly fastened at points of intersection.

It will be immediately apparent that longitudinal ribs 46 and 48 do not terminate at the point of contact with the last upright rib in the side, but extend beyond this rib and are reversely curved at their ends to form loops or eyelets 52 and 54 about the last upright rib 40 of side 28, the eyelets preferably being moderately snug about the upright rib 40 and lightly gripping the same. As may be seen from the other figures, each of the longitudinal ribs in each of the sides 30 and 34 are formed like those just noted, and encircle and grip the corresponding last upright rib in each of the sides 20 and 32. Consequently, it will be perceived that the four sides are pivotally connected to each other, since each of the eyelets such as 52 and 54 may easily pivot about the upright rib which they encircle. The four sides thus form an enclosure having a generally rhomboid form, whose angles may be changed by pivoting its sides relative to each other from almost zero degrees to almost 180 degrees, including the substantially right angles at which the enclosure is preferably mounted upon the pallet.

Finally, it is to be noted that the upper and lower edges of each of the four sides forming the enclosure 12 are not coextensive, that is the four sides are not all of the same height. Opposite sides of the enclosure are the same, as has been stated, but sides 28 and 32 extend beyond sides 30 and 34 both at the top and at the bottom thereof. This is particularly observable from FIG. 2, where it is clearly seen that longitudinal rib 36 of side 28 extends below longitudinal rib 46 of side 30 by a distance C. Furthermore, for safety and convenience in handling, the uppermost and lowermost longitudinal ribs in each of the sides 28 and 32 do not abruptly terminate at their point of intersection with the end upright ribs in sides 30 and 34, but instead extend beyond them and are reversely curved backward to form rounded knees 56.

As will be appreciated by those skilled in the art to which the invention pertains, the unique form of foldable enclosure structure has many desirable potential modes of use other than the one detailed herein. For example, the features of the pallet required to hold the enclosure securely in the desired shape and placement thereupon (i.e., the flat sides 18 and 20 which are coplanar with the sides of the horizontal platform 16, and the curbing projections 22 and 24 on the upper surface of the platform) might well be constructed upon the flat bed of a truck, trailer, wagon, or railroad car or the like. If so, the appropriate size of enclosure structure could readily be constructed, and a very handy foldable mobile containing structure would result, which would have the same desirable storage attributes possessed by the novel container 10 disclosed herein.

Also, certain features of the invention may be added or modified in order to facilitate its use in environments which are somewhat different than the most typical one set forth herein. For example, it may often be the case that one desiring to utilize the features of this invention will already own a great many pallet structures which are not equipped with the preferred curbing projections 22 and 24, but have a completely flat, planar upper support platform. In such a case, the enclosure structure of this invention may be used with the existing pallets, but it will be desirable to provide an alternate means for preventing lengthwise sliding movement of the enclosure relative to the flat pallet.

One such means is shown in FIG. 5, where an enclosure structure 12' is seen mounted upon a flat pallet 14'. The enclosure 12' of this figure is very much like the enclosure 12 of the previous figures, having longitudinal ribs 36', 38', 46', and 48', which are directly analogous to the like members numbered 36, 38, 46, and 48, in the other figures. It will be apparent, however, that the rounded knee 56' of the enclosure 12' is somewhat elongated in comparison

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to its counterpart 56 in FIG. 2, and is bent substantially normal to the plane of longitudinal member 36', so as to extend around the corner of the base 14', thereby closely flanking the base at two of its four side portions. Clearly, if each corner of the enclosure 12' has a knee portion 56' of the type indicated, the enclosure will be securely retained in position atop a flat pallet in the desired manner.

Furthermore, in instances where the containers are not to be stacked atop each other, it may be desirable to include means for preventing the enclosure portion from being inadvertently lifted or otherwise raised away from the pallet or base part of the container. In the case where the pallet is of the flat type shown at 14' in FIG. 5, which has no raised curbing projections at the opposite ends thereof, a retaining angle plate 60 may be attached directly to each end of the platform 16' in the manner indicated, such that the inwardly-directed portion of the angle plate extends over and retains in position the lowermost enclosure rib 46', thus retaining the entire enclosure structure 12'.

A structure directly analogous to the retaining plate 60 may also be utilized in the preferred embodiment of the pallet which includes the curbing projections at each end. This is illustrated in FIG. 6, wherein a retaining element 58 is illustrated engaging the rib 46 of the typical enclosure 12 to retain the latter in position atop a pallet structure 14" having a raised curbing projection 22'. In this embodiment, the retaining element 58 may be made integrally with the curbing projection, or may if desired be a separate member which is secured in place upon the curbing.

Alternatively, regardless of whether the particular pallet used includes curbing or not, a latch structure of the type shown at 62 in both FIGS. 5 and 6 may be used to provide essentially the same retaining function as the plates 58 and 60. As illustrated, the latch 62 may consist of a rod having a hook formed at one end thereof to extend under the platform portion 16 or 16' of the pallet structure, while the other end of the rod is pivotally secured to one of the rib members such as 48 or 48' of the enclosure structure. The latch type of retaining means clearly is easily engaged and disengaged, and this is also true of the retaining elements 58 and 60. All that is needed to engage or disengage the latter device with the enclosure rib is a modest inward force exerted against the end of the enclosure. This momentarily deforms the end by bowing it slightly inward past the inward end of the retaining element, and when the deforming force is removed the enclosure springs back into its normal position, with the rib in place beneath the retaining portion of the angle element.

Having now carefully and completely described the structure of my novel folding container, the manner in which it principally is used should be quite apparent. A pallet 14 is first placed upon a supporting surface such as a floor in the position shown in FIG. 1. An enclosure structure 12 is then raised and oriented above the pallet in the position seen also in FIG. 1. The enclosure structure is then brought downward into contact with the pallet and rested thereupon. In this position, it will be noted that the curbing projections 22 and 24 closely abut the lowermost longitudinal rib (such as 46 seen in FIG. 2) of each of the sides 30 and 34, thereby preventing the enclosure from being slid in an endwise horizontal direction off the upper surface 16 of the pallet or base, while simultaneously helping to maintain the four pivoting sides of the enclosure in the desired rectangular shape. In this position, the lowermost end of each of the other sides 28 and 32 extends downward over the sides 18 and 20 of the pallet, which as stated are flush with the ends of the horizontal surface 16. Consequently, the bottom of each upright rib in these two sides of the enclosure, and the lowermost longitudinal rib as well are held in position by the two side surfaces or legs 18 and 20 of the base. This

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further holds the enclosure 12 in the desired shape, and also prevents it from being moved in a sidewise horizontal direction off the top of the surface 16 of the pallet.

It will be quite apparent that when each enclosure is placed into position upon a suitable base in this manner, a substantially rigid container structure has been assembled in the briefest possible time. The container may now be filled with any desired type of article and will maintain excellent structural integrity. Indeed, independently-conducted tests show that an enclosure four feet long by three feet wide by twenty inches high made from three-eighths inch diameter steel rod may be fully loaded with practically any known substance of even the most dense character, without appreciable deformation of the unit and with no problems whatsoever. If, however, it is necessary that the enclosure maintains its exact size and shape under very extreme loads, while showing no perceivable deformation, it is to be noted that additional ribs such as that shown at 47 in FIG. 2 may be added, parallel to each other and to rib 46, which they directly resemble, to the central portion of the structure. Such additional ribs are to have eyelets 53 at their ends identical to those shown in this figure at 52 and 54, and consequently they will pivot with the rest of the structure when it is desired to fold the latter flat for storage. Thus, they will serve to absolutely prevent the sides of the enclosure from any bowing out whatever, if this should be an absolutely rigid requirement of the container.

As containers are assembled and filled with articles for storage, the access openings A and B noted previously, which are formed by the legs 18, 19, and 20 on the bottom side of the pallet 14, readily admit loading apparatus such as the lifting arms of fork-lift trucks and the like. In this manner, the containers may be stacked one upon another for storage when they are filled. In connection with stacking the containers, it should be pointed out that since the sides of the enclosure are substantially planar, the base of one container may be placed directly atop the enclosure of another, where it will fit in a manner directly analogous to the way in which that enclosure fits its own base. That is, the ends of the pallet will extend beyond ends 30 and 34 of the enclosure, and the upper ends of enclosure sides 28 and 32 will lie alongside the lower portion of each of the sides or legs 18 and 20 of the pallet being lifted on top of that enclosure. This is readily apparent from FIG. 3, which also shows that the notches 26 in the bottom of each of the pallets 14 are formed to coincide with the upper edge of each of the sides 30 and 34 of an enclosure, and that consequently when a pallet is placed atop an enclosure, the uppermost longitudinal rib of each of these sides is received within the corresponding notch in each leg and retained therein against horizontal movements of the upper pallet. Clearly then, each succeeding container which is placed atop another actually serves to help maintain the lower enclosure in the desired shape, and also maintains itself in the proper position upon the lower container, thereby materially contributing to the structural integrity of the entire stack.

When the containers are not in use they are readily stored in a space that is only a fraction of the volume filled by each assembled container. All that need be done when a container is emptied is to grasp the enclosure and pull it upwardly away from its base, which is easily accomplished. The sides of the enclosure will then readily pivot upon each other at their corner connections, and the entire structure may be folded substantially flat as shown in FIG. 4. This is true regardless of the relative size of enclosure and pallet, and consequently the enclosure may have sides which are as high as desired. As has been stated, this is not true of previous containers and is a decided advantage. The pallets will interfit when stacked upon each other by placing one in an inverted position and another atop the first, their legs being positioned adjacent each other. Thus, labor costs are reduced markedly from previous containers, both by the ease of

assembly and disassembly, and by the fact that each separate enclosure and pallet may be readily handled by a single man, whereas when two of these are assembled, they are relatively heavy and cumbersome.

Although I have throughout this specification described those embodiments of the invention most preferred by me, the invention is a very versatile one and accordingly, certain variations and modifications in specific detail may occur to those skilled in the art once they have considered the true nature of the container and the inventive concept underlying it. All such modifications and alterations as embody the spirit of the invention and which do not depart from its concept are to be considered as a part of it, unless the claims appended below by their language expressly state otherwise.

I claim:

1. A foldable, stackable container for storing goods, comprising: a generally rectangular base; a generally rectangular wire mesh enclosing structure adapted to removably rest upon said base and having at least four upright side pieces pivotally joined to each other at corresponding upright ends; one pair of opposite sides of said enclosing structure being longer than the corresponding parallel measurement of said base, whereby the other pair of opposite sides at least in part overhangs the adjacent edges of said base; the other pair of opposite sides of said enclosing structure being shorter than the corresponding parallel measurement of said base, whereby said one pair of opposite sides rests upon said base; said other pair of opposite sides having sections thereof depending below at least some of the bottom edges of said one pair of sides, so as to extend below the upper surface of said base and lie adjacent the sides thereof to restrict movement of said enclosure structure relative to said base in a direction parallel to said first pair of opposite sides; said other pair of opposite sides also having sections thereof extending above at least some of the top edges of said one pair of sides, so as to extend above and lie adjacent to the lowermost extremities of the base of a like container stacked atop said enclosure and resting on at least portions of the top edges of said one pair of sides; said base having a bottom configuration defining a pair of elongated parallel recesses spaced apart sufficiently to receive and thereby engage said top edge portions of said

one pair of sides; said extending upper sections of said other pair of sides restricting movement of the base of said stacked container in a direction parallel to said one pair of sides, and said engaging base recesses and top edge portions of said one pair of sides restricting movement of the base of said stacked container in a direction parallel to said other pair of sides; and means coacting between the lower extremities of said enclosing structure and the base upon which such enclosing structure rests for restricting movement of said enclosure relative to such base in a direction parallel to said other pair of opposite sides.

2. The container as set forth in claim 1 wherein said restricting means comprises upstanding curbing members affixed to said base adjacent said one pair of opposite sides of said structure, said members extending above and abutting those sections of said one pair of opposite sides resting on said base.

3. The container as set forth in claim 1 wherein said restricting means comprises extensions on said depending sections of said other pair of opposite sides, said extensions curving around each of the corners on the sides of said base.

4. The container as set forth in claim 1 which further comprises means for vertically retaining said enclosure structure on said base.

5. The container as set forth in claim 4, wherein said retaining means comprises a hook member pivotably affixed to said enclosure structure, said hook member having an engaging section adapted to engage said base when said hook member is pivoted downwardly.

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