

[54] **TUB FILE**
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 220/7; 211/126

[51] **Int. Cl.:**..... **B65d 5/20**

[58] **Field of Search:**..... **229/16 D, 1.5 R, 30;**
 206/44 B, 74; 211/132, 126; 220/7

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[57]

ABSTRACT

A structure manufactured from a single flat sheet of material which may be folded together into a relatively small, compact packaged configuration for transportation and storage, and assembled together into a convertible box-tub configuration. In the box configuration the structure is generally rectangular. In the tub configuration the sides are splayed outwardly so as to permit easy access to the contents in the interior of the structure.

8 Claims, 14 Drawing Figures

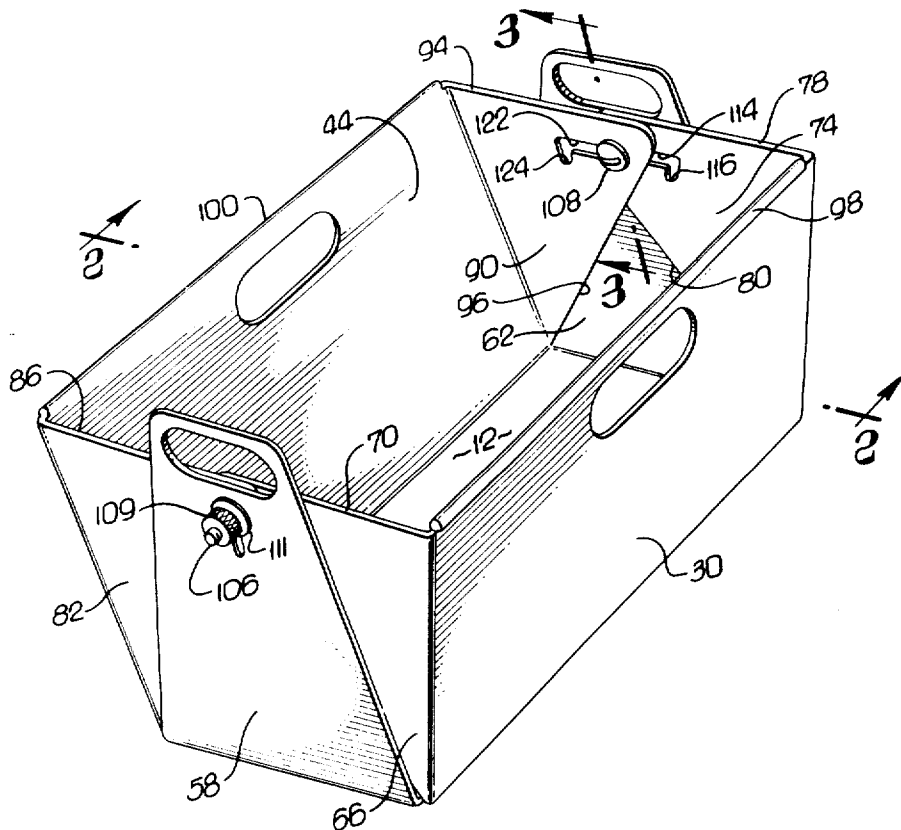


FIG. 1.

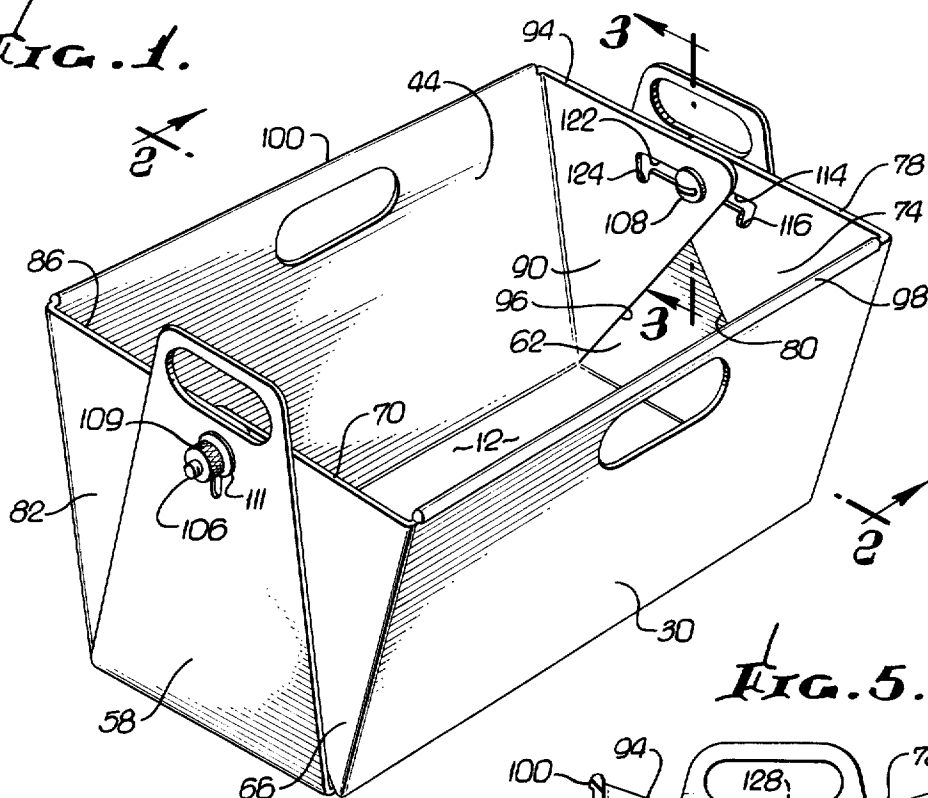


FIG. 5.

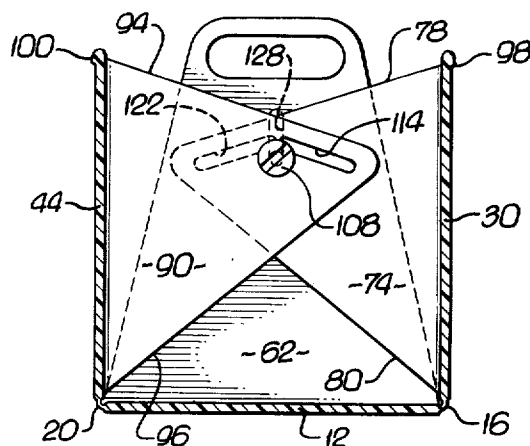


FIG. 4.

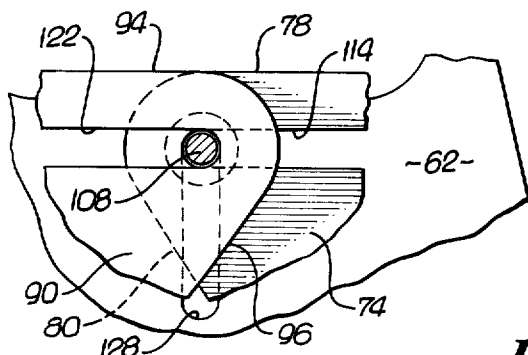


FIG. 2.

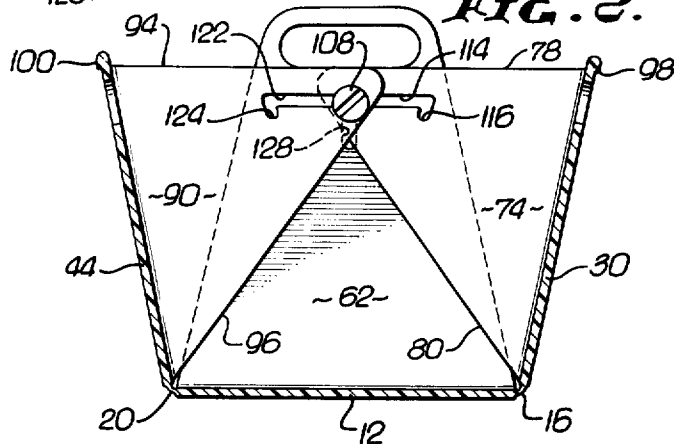


FIG. 3.

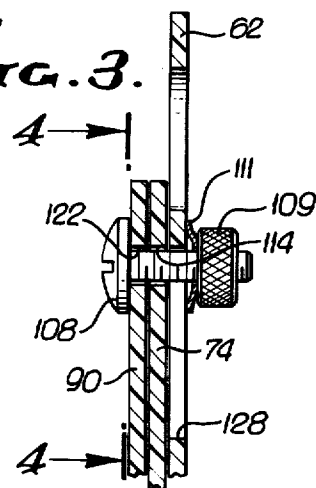


FIG. 7.

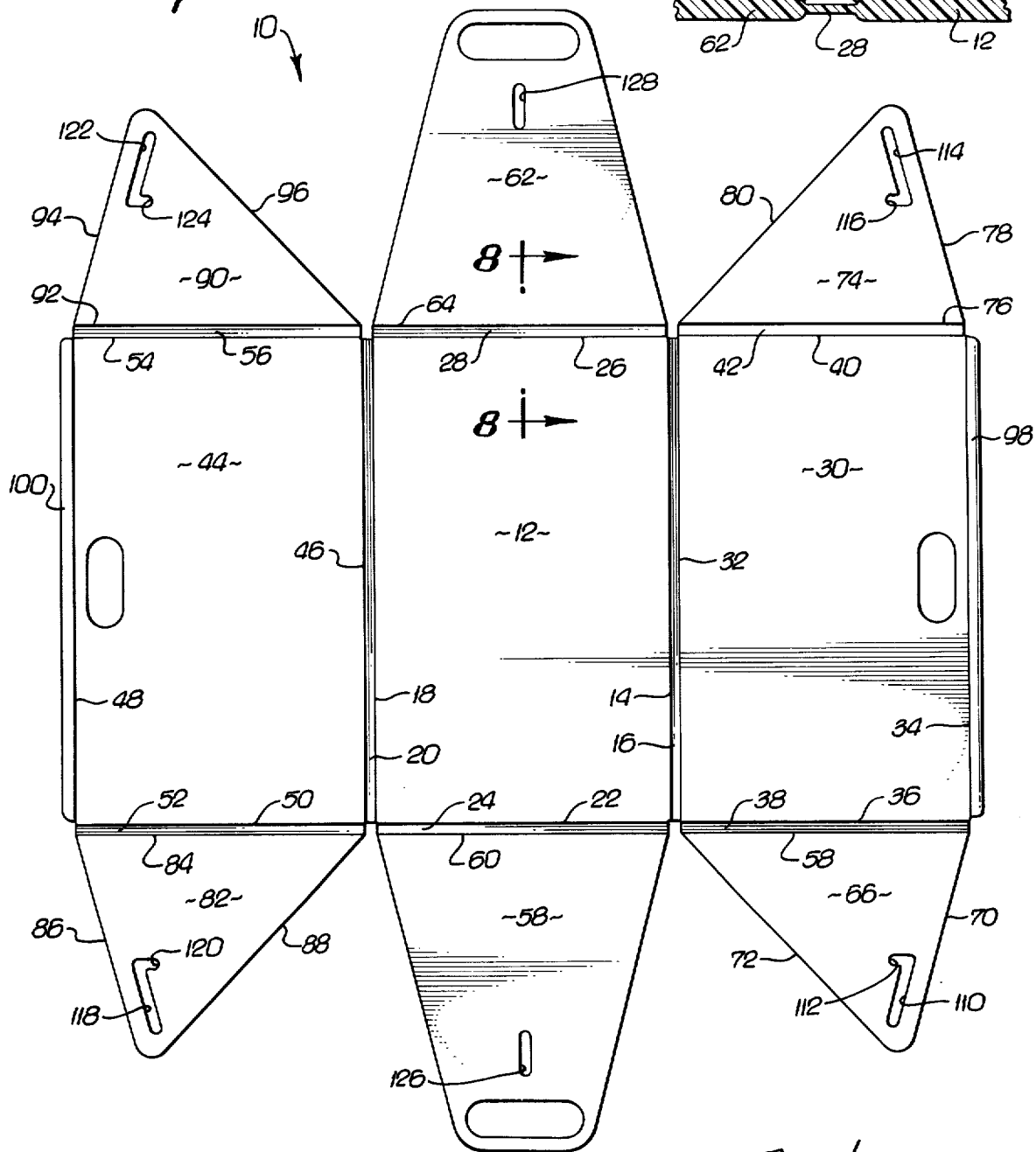


FIG. 8.

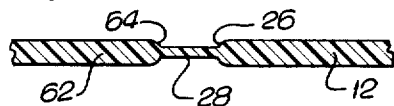


FIG. 6.

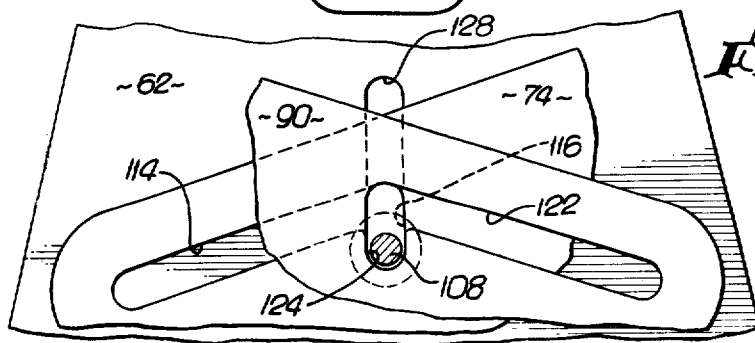


FIG. 9.

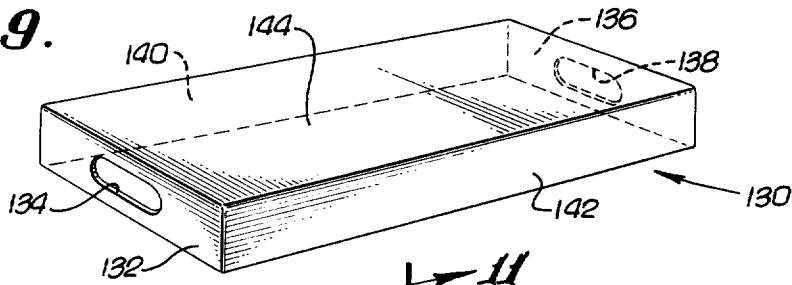


Fig. 10.

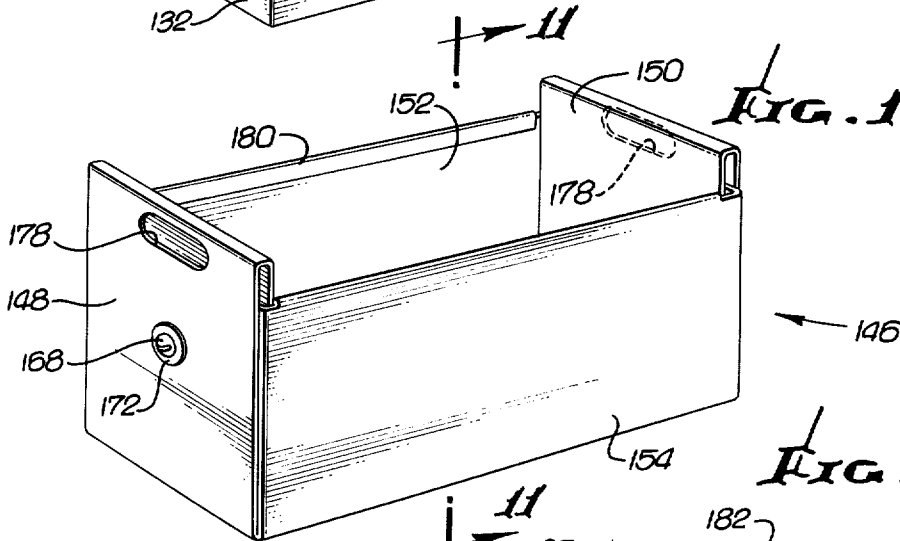


FIG. 11.

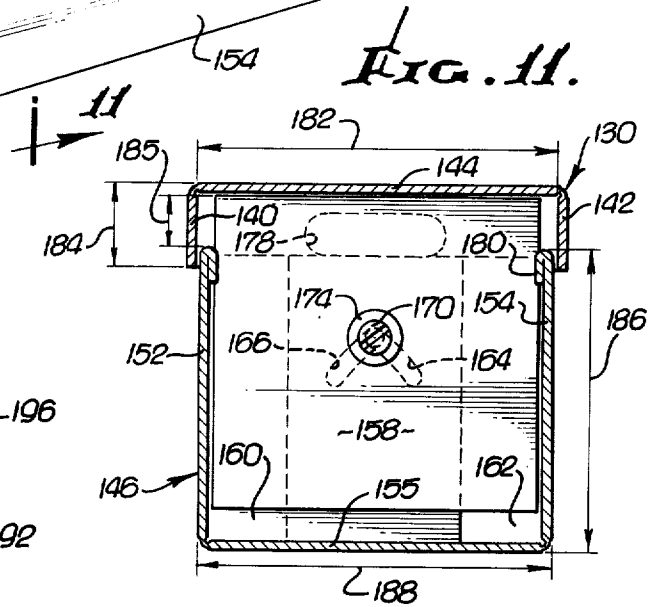


FIG. 14.

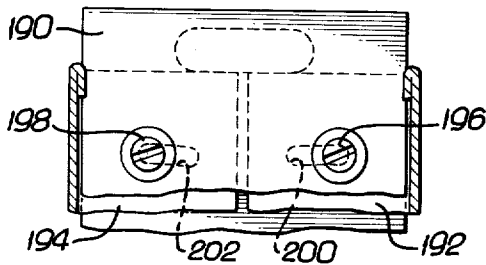


Fig. 12. $\leftarrow 13$

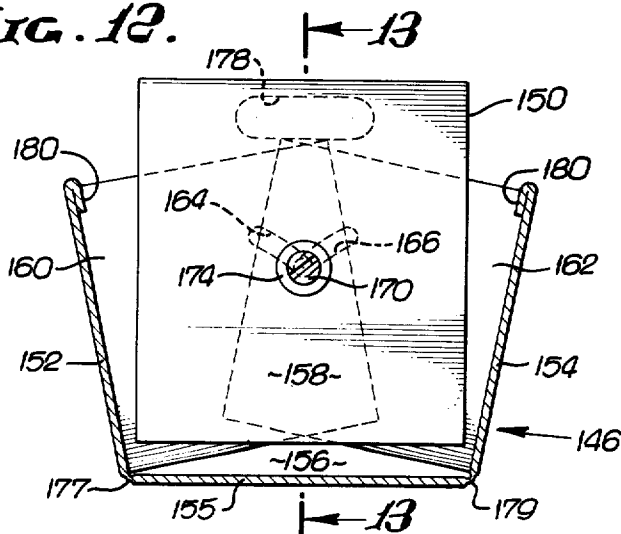
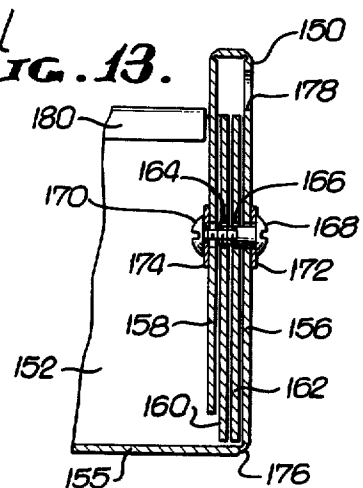


FIG. 13.



TUB FILE

Most businesses require the storage for extended periods of time of inactive papers and files. Some containers must be provided for storing such papers and files so as to permit organized access to these inactive documents as well as to protect them from loss and deterioration. Often the empty storage containers occupy as much space when they are empty as they do when they are full, which creates a serious problem in the storage and transfer of such containers. Also, generally, such containers have a rectangular configuration which provides the most desirable configuration for packing a plurality of such containers into an available storage space. However, when it is desired to gain access to the contents of the rectangular storage container, difficulty is encountered if the container is packed to its full capacity with files and papers.

In most business and professional operations records often appear on more or less standard sized sheets of paper. For convenience, light cardboard filing folders are often used for segregating, identifying, and storing of limited groups of papers. Collections of filing folders are typically stored in multidrawer filing cabinets, or in transfer cases or boxed when in dead storage.

It is often desirable to keep one or more groups of such folders conveniently available in a suitable container. This facilitates quick finding of a given folder, easy examination of its contents, and its expeditious return to its logical place or sequence in a group.

This type of operation is aided by a container which is conveniently described as a desk-top tub file. Such a file is generally an open top box of a width accommodating a given folder size. It has vertical end panels and slanted front and back panels. These permit tilting the folders, individually or by groups, forward or backward, since the front-to-back dimension of the top opening is greater than that of the bottom. This aids easy reading of the captions on the folder tabs and convenient examination in situ of the contents of individual folders. Also, removal of a chosen folder leaves a V-shaped space to which it may be quickly returned, preserving its sequential relationship within the group.

This kind of tub file occupies approximately 60 percent more space than that required by the number of folders it will accommodate as a full load. Such tub files typically include no provision for covering to exclude dust. Such tub files are generally rigid structures which occupy as much area when empty as when full. In general these tube files are unsuitable for use as long-term storage containers.

These and other difficulties of the prior expedients have been overcome according to the present invention which provides a structure which can be folded into a compact packaged configuration for transportation and storage and which can be assembled together rapidly by inexperienced personnel into a convertible box-tub configuration. In the box configuration the structure has the rectangular shape which is most desired for storage, and in the tub configuration the sides of the structure are pivoted outwardly along their lower edges so that the top of the structure is much wider than the bottom. This permits the container to be packed full in the box configuration so as to secure the maximum storage capacity, while at the same time permitting easy access to and handling of the contents of the structure in the tub configuration. In general, a cover or box top is provided for the structure in the box configura-

tion. This prevents dust from settling into the contents of the structure through the open top. The box top also provides a convenient container for the structure in the compact packaged configuration. Also, the rectangular box top provides a broad supporting surface upon which other storage containers may be stacked when the structure is in the box configuration.

The structure is arranged so that it may be formed from a single sheet of material. When so fabricated, hinge and fold lines are defined in the single unitary panel so as to define various subpanels. The side subpanels are hingedly mounted to the opposed edges of the base subpanel so as to permit the pivoting of the side subpanels between the box and the tub configurations. Flap subpanels project outwardly from the opposed transverse edges of the side subpanels, and end subpanels are attached to the opposed end edges of the base subpanels. The transverse edges of the side subpanels and the end edges of the base subpanels are generally coextensive so that when the flap subpanels and the end subpanels are folded together in a right angle relationship with respect to the subpanels to which they are attached, one end of the convertible box-tub configuration is defined by the combination of two of the flap subpanels and one of the end subpanels while the other end of the convertible box-tub structure is defined by the remaining two flap subpanels and the remaining end subpanel. Slots are provided in the flap subpanels which register with one another in the convertible box-tub configuration. A pin element is passed through the slots and through the end subpanels so that the structure is held together in the convertible box-tub configuration. The slots permit the flap subpanels to move in their own planes relative to the pin and parallel to the plane of the end subpanel. Since the flaps are projected at approximately right angles to the side subpanels, movement of the flaps, as accommodated by the slots, permits the side subpanels to pivot about the hinge line defined between the side edge of the base subpanel and the longitudinal edge of the side subpanel. This results in opening the open top of the convertible box-tub configuration outwardly so that the structure assumes the tub configuration.

Handholds are provided as desired by cutting them into the single flat, shaped unitary panel of which the structure is composed. If desired, the edges of the side subpanels may be stiffened by the addition of suitable stiffening structures.

The panel from which the structure is formed may conveniently be corrugated cardboard or synthetic plastic. When corrugated cardboard is employed, the fold and hinge lines are conveniently defined by creasing the corrugated board. When synthetic polymeric plastic materials, such as polyethylene or polypropylene, are utilized to form the sheet, the fold and hinge lines may be defined by thinning the sheet at the locations where fold and hinge lines are desired or thickening where added stiffness is desired.

In the embodiments illustrated in the drawings:

FIG. 1 is a perspective view of one embodiment of the invention in the tub configuration;

FIG. 2 is a cross-sectional view taken along line 2—2 in FIG. 1;

FIG. 3 is a cross-sectional view taken along lines 3—3 in FIG. 1;

FIG. 4 is a partial elevational view taken along line 4—4 of FIG. 3 showing a portion of the structure in the box configuration;

FIG. 5 is a cross sectional view similar to FIG. 2 showing the structure in the box configuration;

FIG. 6 is a view similar to FIG. 4 showing the structure in the tub configuration;

FIG. 7 is a plan view showing the structure as a single, unitary flat panel;

FIG. 8 is a cross-sectional view taken along line 8—8 in FIG. 7;

FIG. 9 is a perspective view of a box top;

FIG. 10 is a perspective view of a further embodiment of the structure in the box configuration;

FIG. 11 is a cross-sectional view taken along line 11—11 in FIG. 10;

FIG. 12 is a cross-sectional view similar to FIG. 11 except that the structure is in the tub configuration;

FIG. 13 is a cross-sectional view taken along line 13—13 in FIG. 12; and

FIG. 14 is a fragmentary side elevational view partially in cross section of a further embodiment wherein two fastening devices are used at each end of the structure.

Referring particularly to the drawings, there is illustrated generally at 10 a flat, shaped panel composed of a single unitary sheet (FIG. 7). The structure is provided with a plurality of subpanels. A rectangular base subpanel 12 is provided with a first side edge 14 which is attached to flexible hinge 16. Second side edge 18 of rectangular base subpanel 12 is attached to flexible hinge 20. First end edge 22 of rectangular base subpanel 12 is attached to flexible hinge 24, and second end edge 26 of rectangular base subpanel 12 is attached to flexible hinge 28. First side subpanel 30 is attached at first longitudinal edge 32 to flexible hinge 16. Third longitudinal edge 34 of first side subpanel 30 is reinforced with edge stiffener 98. First transverse edge 36 of first side subpanel 30 is attached to flexible hinge 38, and second transverse edge 40 of first side subpanel 30 is attached to flexible hinge 42.

Second side subpanel 44 is provided with second longitudinal edge 46 which is attached to flexible hinge 20. Fourth longitudinal edge 48 of second side subpanel 44 is reinforced with edge stiffener 100. Third transverse edge 50 of second side subpanel 44 is attached to flexible hinge 52, and fourth transverse edge 54 of second side subpanel 44 is connected to flexible hinge 56.

Flexible hinges 16, 20, 24, 28, 38, 42, 52, and 56 are generally coextensive with the edges to which they are affixed. In the embodiment illustrated in FIGS. 1 through 8, the respective flexible hinges are formed by thinning a section of the panel, as is illustrated by typical flexible hinge 28 in FIG. 8.

First and second side subpanels 30 and 44, respectively, are constructed so that they have generally the same width and length, and they are attached to opposed side edges of the rectangular base subpanel 12.

First end subpanel 58 is attached at first base edge 60 to flexible hinge 24. Second end subpanel 62 is attached at second base edge 64 to flexible hinge 28.

First flap subpanel 66 is connected by attached edge 68 to flexible hinge 38. The perimeter of first flap subpanel 66 is defined by attached edge 68, first free edge 70, and second free edge 72. Second flap subpanel 74 is connected at attached edge 76 to flexible hinge 42. The perimeter of second flap subpanel 74 is defined by

attached edge 76, first free edge 78, and second free edge 80. Third flap subpanel 82 is secured at attached edge 84 to flexible hinge 52. The perimeter of third flap subpanel 82 is defined by attached edge 84, first free edge 86, and second free edge 88. Fourth flap subpanel 90 is connected by attached edge 92 to flexible hinge 56. The perimeter of fourth flap subpanel 92 is defined by attached edge 90, first free edge 94, and second free edge 96.

Second end edge 26 of rectangular base subpanel 12, second transverse edge 40 of first side subpanel 30, and fourth transverse edge 54 of second side subpanel 44 are generally colinear with one another. Likewise, first end edge 22, first transverse edge 36, and third transverse edge 50 are generally colinear with one another.

In order to convert the planar structure depicted in FIG. 7 into the structure depicted in FIG. 1, the panel is assembled together. In this assembly procedure each of the flap subpanels 66, 74, 82, and 90 is folded upwardly out of the plane of FIG. 7 through an arc of approximately 90°. End subpanels 58 and 62 are likewise folded upwardly out of the plane of FIG. 7 through an angle of approximately 90°. Folding accommodated by flexible hinges 22, 28, 38, 42, 52, and 56. Side subpanels 30 and 44 are then folded upwardly out of the plane of FIG. 7 through an arc slightly less than 90°. Fasteners 106 and 108 are then inserted to hold the structure in the convertible box-tub configuration. As illustrated in FIG. 3, each of fasteners 106 and 108 is provided with a nut 109 and a spring 111. This provides a frictional locking mechanism for holding the structure in the desired configuration. Expansion slots 110, 114, 118, and 122 are provided in the respective flap subpanels, and arcuate movement accommodation slots 126 and 128 are provided in the respective end subpanels. In the convertible box-tub configuration, the fastener 106 passes through expansion slot 110, 118 and arcuate movement accommodation slot 126. Fastener 106 acts as a pin which holds one end of the structure together and also in cooperation with the terminal portion of the expansion slots limits the arcuate movement of the respective side subpanels as they move in the convertible box-tub configuration between the box configuration and the tub configuration. Fastener 108 serves the same function with expansion slots 114 and 122 and arcuate movement accommodation slot 128.

Each of expansion slots 110, 114, 118, and 122 is provided at the terminus of the slot which is closest to the attached edge of the flap subpanel in which the expansion slot occurs with short angular slots 112, 116, 120, and 124, respectively. These angular slots provide, in combination with fasteners 106 and 108 and slots 126 and 128, a locking device to hold the structure in the box configuration. To accomplish the locking function, the side subpanels 30 and 44 are brought to the box configuration, as illustrated particularly in FIGS. 4 and 5, and the fastener is moved into the angular slots. The arcuate movement accommodation slots 128 and 126 are extended so as to permit this movement. When the fasteners 106 and 108 are in the angular slots, it is impossible to pivot the side subpanels 30 and 44 about their respective longitudinal edges 32 and 46. To release the structure from this configuration, the fasteners 108 and 106 are raised upwardly until they are positioned in the expansion slots.

The embodiment illustrated particularly in FIGS. 1 through 8 is particularly adapted for construction from

a sheet of synthetic polymeric material, such as polypropylene. This embodiment may be conveniently formed by injection molding. The embodiment depicted particularly in FIGS. 9 through 13 is especially adapted to be constructed from corrugated board.

Referring particularly to FIGS. 9 through 13, a rectangular cover or box top is indicated generally at 130. Box top 130 is provided with a first end 132 through which a handhold 134 has been cut. Second end 136 is also provided with a handhold 138. First side subpanel 140, second side subpanel 142, and top panel 144 complete the structure of box top 130. Box top 130 is adapted to be placed over the open top side of the convertible box-tub structure indicated generally at 146, when it is in the box configuration. The convertible box-tub structure 146 is assembled from a single panel of material as has been previously described in reference to FIG. 7. The box-tub structure 146 is provided with first and second ends 148 and 150, respectively, and first and second sides 152 and 154. First end 148 is substantially identical in structure to second end 150. Also, first side 152 is substantially identical in structure to second side 154. The box-tub structure 146 is generally symmetrical about a plane passed longitudinally through the midpoint of the structure parallel to the sides and also about a plane passed the midpoint of the structure parallel to the ends. Bottom panel 155 closes the bottom of box-tub structure 146. The ends of box-tub structure 146 will be described only with reference to second end 150 since it is substantially identical to first end 148. Outer end subpanel 156 projects upwardly in a generally perpendicular relationship from bottom panel 155. Outer end subpanel 156 is folded over at its upper terminus so that it extends longitudinally toward first end 148 for a short distance and is then folded again so that it extends downwardly toward bottom panel 155 in a generally parallel relationship with outer end subpanel 156. The downwardly extending portion is identified as inner end subpanel 158 which terminates short of bottom panel 155. Together, outer and inner end subpanels 156 and 158 define a deep U-shaped channel which guides and frictionally controls movable subpanels 160 and 162. A first movable subpanel 160 projects in generally perpendicular relationship from first side 152 into the space defined between outer end subpanel 156 and inner end subpanel 158. Second movable subpanel 162 projects generally perpendicularly from second side 154 into the space defined between outer end subpanel 156 and inner end subpanel 158. Thus, in the receptacle defined between outer end subpanel 156 and inner end subpanel 158 first movable subpanel 160 overlaps second movable subpanel 162. Thus, in large slot 164 in first movable subpanel 160 and in large slot 166 in second movable subpanel 162 are brought into registration with one another so that internally threaded screw 168 and externally threaded screw 170 may be passed through the portion of the enlarged slots 164 and 166 which are in registration with one another. In this embodiment the enlarged slots 164 and 166 are of such a width that they will accommodate arcuate movement without the necessity of providing vertical slots in the outer end subpanel 156 and inner end subpanel 158. In the embodiments depicted particularly in FIGS. 1 through 8, the slots are approximately the same width as the fasteners so that the arcuate movement of the flap subpanels 66, 74, 82, and 90 must be accommo-

dated by slots 126 and 128 which permit the respective fasteners to move up and down as the arcuate movement of the slots dictates. The screws 168 and 170 are provided at their heads with outer washer 172 and inner washer 174, respectively. These washers together with the natural resiliency of the preferred corrugated board material provide necessary frictional resistance to undesired pivotal movement of sides 152 and 154. The washers 172 and 174 are large enough to provide a substantial bearing area on the corrugated carboard material. Folding of the various subpanels along the desired flexible hinge lines is provided by creasing the corrugated board at the desired fold location. Such creases are indicated, for example, at 176, 177, 179. A handhold is cut into outer end subpanel 156. This is designed to register with one of the handholds 138 or 134 in box top 130. The handhold 178 does not extend through inner end subpanel 158. Thus, the interior of the structure 146 remains as sealed as possible from dirt, dust, and debris.

A stiffener 180 is provided on the upper unsupported longitudinal edges of the sides 152 and 154. The stiffener is formed by folding over the edge of the side and gluing it down to the surface of the side.

The structure is proportioned, as illustrated particularly in FIG. 11, so as to provide a structure which can be sealed as tight as possible in a box configuration, while at the same time being collapsible into a compact packaged configuration for transportation and storage. The inside width 182 of box top 130 is wider than the bottom outside width 188 of bottom panel 155. The inside depth 184 of box top 130 is slightly greater than the extended height 185 (FIG. 13) of outer end subpanel 156. This permits the free edges of box top 130 to extend down slightly over the free edges of sides 152 and 154. The outside height of sides 152 and 154 is less than inside width 182. The proportioning of the box-tub structure 146 for purposes of being collapsed into a compact package configuration will be illustrated by reference to FIG. 7. It is understood that alternative folding procedures may be utilized for collapsing the structure to a compact package configuration. One suitable procedure for each of the embodiments specifically illustrated in the drawings commences with panel 10 in the flat configuration illustrated in FIG. 7. Each of the flap subpanels 66 and 74 is folded upwardly out of the plane of FIG. 7 along the respective flexible hinges 38 and 42 through an arc of approximately 180° so that the surfaces of the flap subpanels 66 and 74 rest on the surface of first side subpanel 30. Third and fourth flap subpanels 82 and 90, respectively, are folded downwardly out of the plane of the FIG. 7 drawing, along flexible hinges 52 and 56 through an arc of approximately 180 degrees until the surfaces of the third and fourth flap subpanels rest against the surface of second side subpanel 44. Side subpanel 30 is folded along flexible hinge 16 downwardly out of the plane of the drawing of FIG. 7 through an arc of approximately 180° until the surface of first side subpanel 30 is resting upon the surface of rectangular base subpanel 12. Second side subpanel 44 is folded upwardly out of the plane of the drawing of FIG. 7 along flexible hinge 20 through an arc of approximately 180° until the surface of second side subpanel 44 rests on the surface of rectangular base subpanel 12. First and second end subpanels 58 and 62, respectively, are then folded upwardly out of the plane of the drawing of FIG. 7 through an arc

of approximately 180° around flexible hinges 24 and 28, respectively, until the surfaces of the respective end subpanels are in contact with the surfaces of third and fourth flap subpanels 82 and 90, respectively. The flexible hinges 28 and 24 are preferably elongated somewhat to accommodate the folding of the end subpanels over two thicknesses of sheet material. In the corrugated board configuration this is accommodated by providing an extra crease in the outer end subpanel 156. Where a more rigid material is utilized, it is necessary to elongate the flexible hinge portion of the sheet. If desired, the folding of the end subpanels in the package configuration may be omitted. The resultant package is lengthened by the length of the end subpanels, but structural problems with the folding are avoided. When the structure is completely folded into its package configuration with the end subpanels folded over through an arc of 180°, the entire package may be inserted into box top 130, thus providing a very compact, convenient, and attractive package.

In the specific embodiment illustrated in FIGS. 1 through 8, the limits of the arcuate excursion of the side subpanels as they pivot about their respective longitudinal edges are defined by the length of the expansion slots. The ends of the expansion slots together with the fasteners define the limits of the arcuate excursion of the side subpanels in either the box or tub configurations. In the specific embodiment illustrated in FIGS. 9 through 13, the ends of the enlarged slots define the limit of the arcuate excursions of the sides 152 and 154 in the tub configuration. In the box configuration the lower edges of the movable subpanels 160 and 162 come to rest upon the upper surface of bottom panel 155, which serves to limit the arcuate excursion of the sides 152 and 154 in the box configuration.

In the embodiment specifically illustrated in FIG. 14, end subpanel 190 is operably associated with first flap subpanel 192 and second flap subpanel 194. These first and second flap subpanels do not overlap one another. First fastener 196 extends through end subpanel 190 and first expansion slot 200 in first flap subpanel 192. Second fastener 198 extends through end subpanel 190 and second expansion slot 202 in second flap subpanel 194. Expansion slots 200 and 202 are generally rectangular in shape and sufficiently larger than fasteners 196 and 198 so that the necessary space for the arcuate movement required during the conversion between the tub and box configurations is provided.

I claim;

1. A structure comprising:

a generally flat, single unitary shaped panel having a plurality of subpanels defined therein, said subpanels including a generally rectangular base subpanel having two side edges and two end edges, a first side subpanel flexibly attached to one of said side edges, a second side subpanel flexibly attached to the second of said side edges, a first end subpanel flexibly attached to one of said end edges by a first flexible hinge, a second end subpanel flexibly attached to the

second of said end edges by a second flexible hinge, each of said first and second side subpanels being generally rectangular and having two longitudinal edges and two transverse edges, four flap subpanels, each of said flap subpanels being flexibly attached to a said transverse edge, said transverse edges being generally colinear with said end edges, said subpanels being adapted to be folded together into a compact packaged configuration and assembled into a convertible box-tub configuration, said first and second flexible hinges being elongated to accommodate the folding of said first and second end subpanels over the combined thickness of one of said flap subpanels and one of said side subpanels, fastening means for holding said subpanels together in said convertible box-tub configuration, said fastening means permitting at least one of said side subpanels to move pivotally about the said side edge to which it is flexibly attached between a box configuration and a tub configuration.

2. A structure of claim 1 wherein the generally flat, shaped panel is a single unitary sheet of corrugated board, the subpanels being defined by crease lines in said single unitary sheet.

3. A structure of claim 1 wherein the generally flat, shaped panel is a single unitary sheet of synthetic plastic, the subpanels being defined by thin sections of said single unitary sheet, said thin sections forming the flexible attachments between said subpanels.

4. A structure of claim 1 including a generally rectangular box top adapted to close a generally rectangular open top side defined by said structure in the box configuration and to completely contain said structure when said structure is in the compact packaged configuration.

5. A structure of claim 1 wherein the first side subpanel and the second side subpanel have about the same width, and the first end subpanel and the second end subpanel have about the same width, the width of said first and second side subpanels being less than the width of said first and second end subpanels.

6. A structure of claim 1 wherein the width of the first and second side subpanels is less than the width of the generally rectangular base subpanel.

7. A structure of claim 1 including a pin element located in each of the first and second end subpanels, each of the four flap subpanels having a slot defined therein, a first said pin element being located in said first end subpanel and passing through both the slot defined in a first of said flap subpanels and the slot defined in a second of said flap subpanels, a second said pin element being located in said second end subpanel and passing through both the slot defined in a third of said flap subpanels and the slot defined in a fourth of said flap subpanels.

8. A convertible box-tub structure of claim 1 wherein the fastening means includes means for locking said structure in the box configuration.

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