United States Patent [19]

Farnsworth

[11] **3,729,111**

[45] **Apr. 24, 1973**

[54] **COLLAPSIBLE CONTAINERS INCLUDING SWIVEL HINGE CORNER ASSEMBLY AND ACCESS DOOR ASSEMBLY**

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[22] Filed: **Feb. 16, 1907**

[21] Appl. No.: **115,302**

[52] **U.S. Cl.** .....**217/16,** 16/128, 16/135, 16/168, 16/171, 217/43 R, 217/48

[51] **Int. Cl.** **B65d 9/14**

[58] **Field of Search**.....217/16, 48, 14, 46, 217/43 A, 43 R; 16/135, 128, 168, 171

[56] **References Cited**

UNITED STATES PATENTS

3,085,706	4/1963	Rawle	217/48
3,506,326	4/1970	Tantillo	16/135 X

FOREIGN PATENTS OR APPLICATIONS

443,143	1/1968	Switzerland	217/16
20,683	0/1911	Great Britain	217/16
252,801	3/1967	Austria	217/43 A

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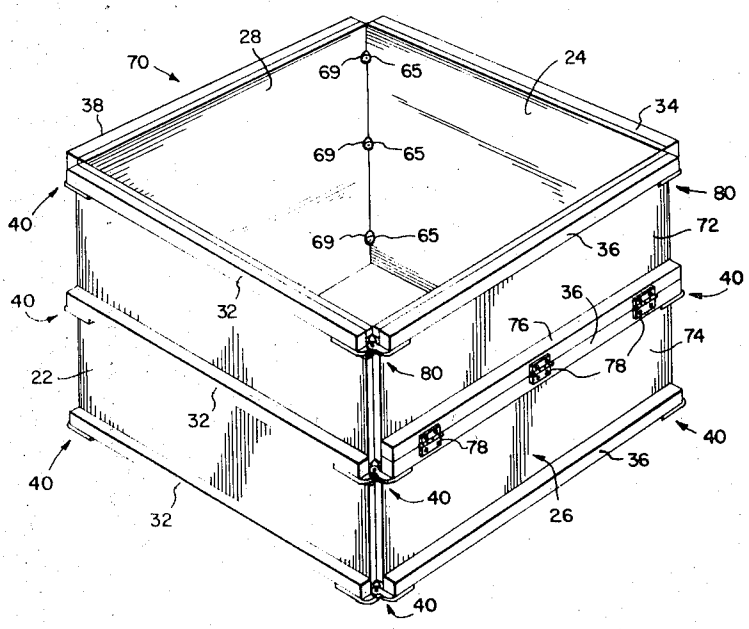
[57] **ABSTRACT**

A collapsible container is provided comprising a pair of rectangular side panels and a pair of rectangular end panels with horizontal cleats mounted on the exterior surfaces of the panels and a plurality of swivel hinge corner assemblies located at the corners of the collapsible container and secured to the cleats for pivotally connecting adjacent side panels and end panels to permit the container to collapse. Each corner assembly includes a pair of corner plates, each plate having a flat body to be secured to one of the cleats and a prong projecting laterally from one edge of the flat body to overlap the prong projecting from the other plate. The prongs of the corner plates are pivotally connected at a point spaced laterally from the edges of the flat bodies of the corner plates to permit adjacent sides at opposite corners of the container to be folded either inwardly or outwardly to collapse the container. In addition, an access door assembly is provided for pivotally connecting a door to adjacent sides of a collapsible container and permitting the door to be unlatched from the adjacent sides. The access door assembly includes a pair of corner plates that are identical to the corner plates of the swivel hinge corner assembly and a spring catch for releasably engaging openings formed in the prongs of the corner plates to pivotally connect the prongs to permit the sides of the container to collapse and the corner plates to be unlatched.

15 Claims, 10 Drawing Figures



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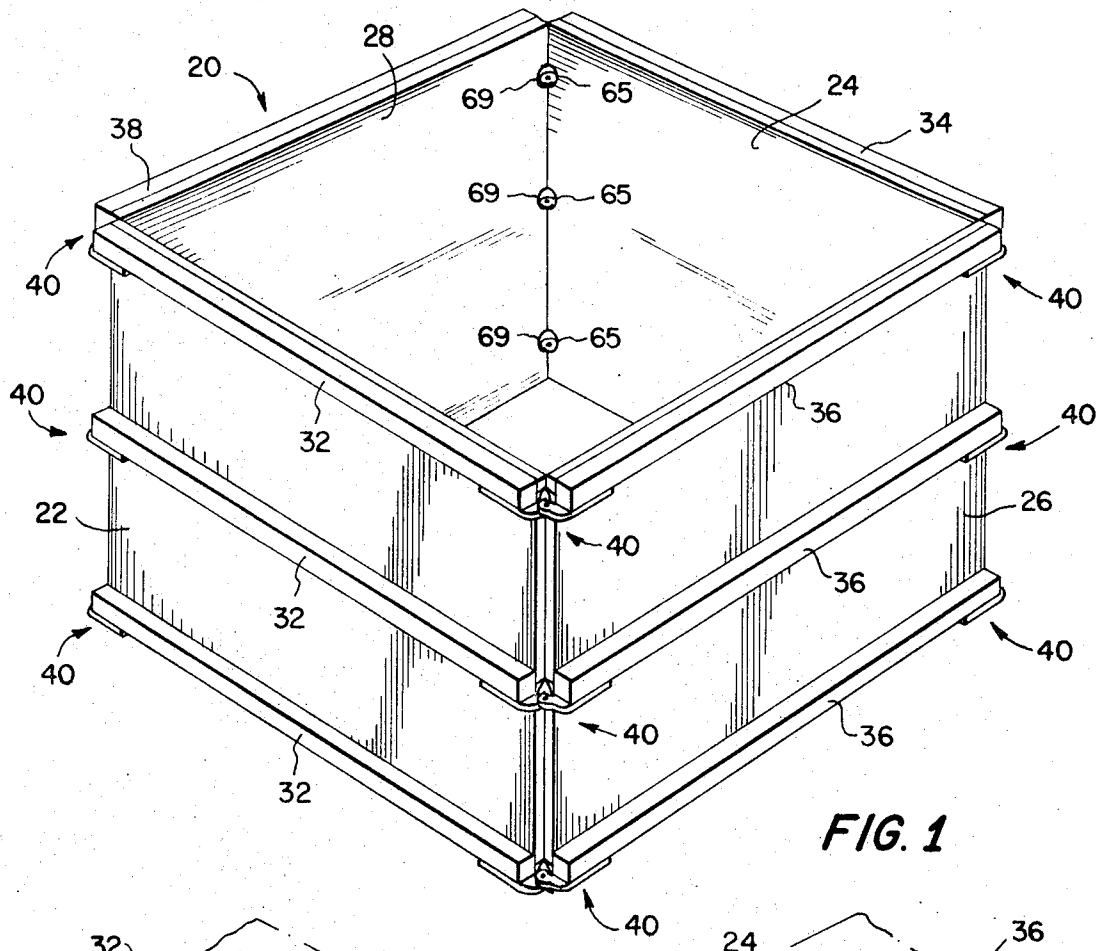

FIG. 1

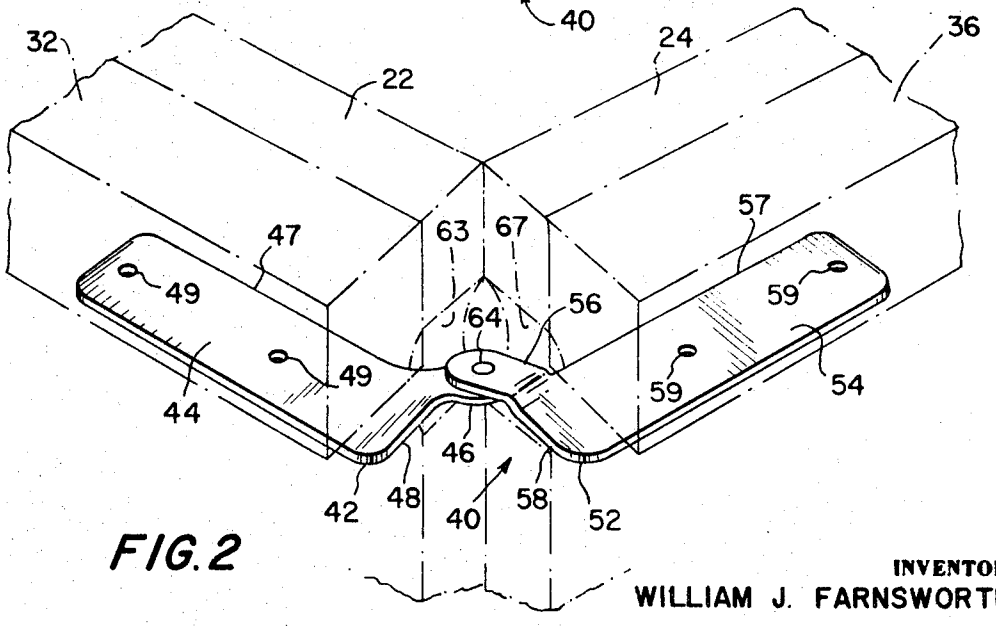

FIG. 2

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FIG. 3

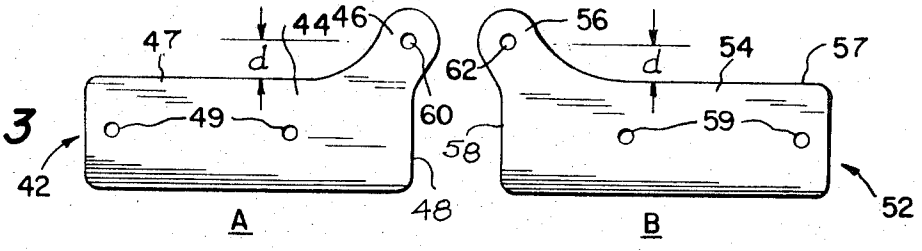
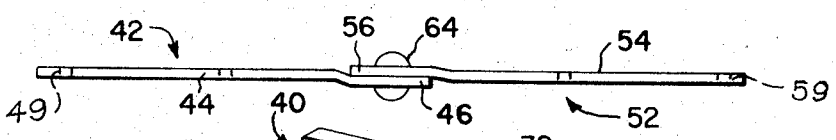


FIG. 4



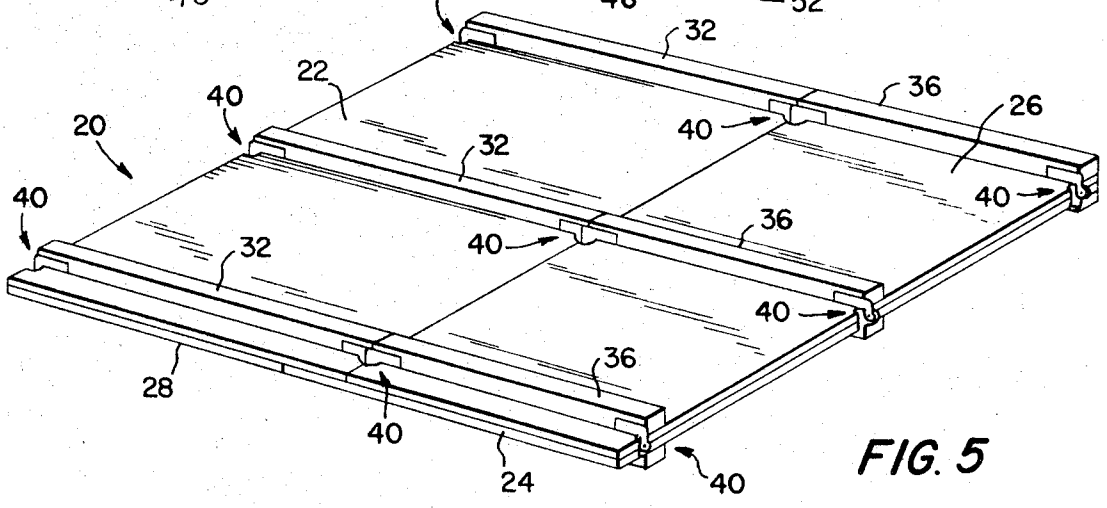


FIG. 5

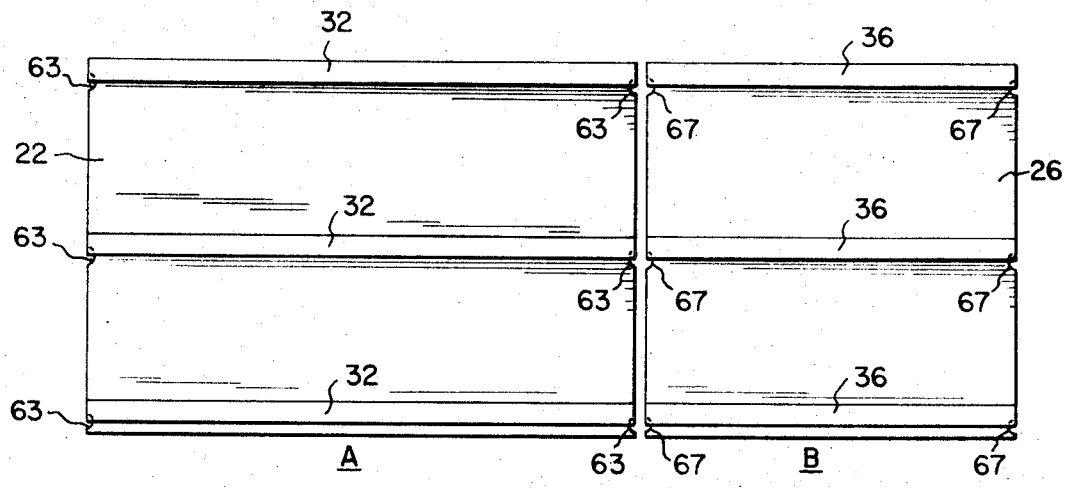


FIG. 6

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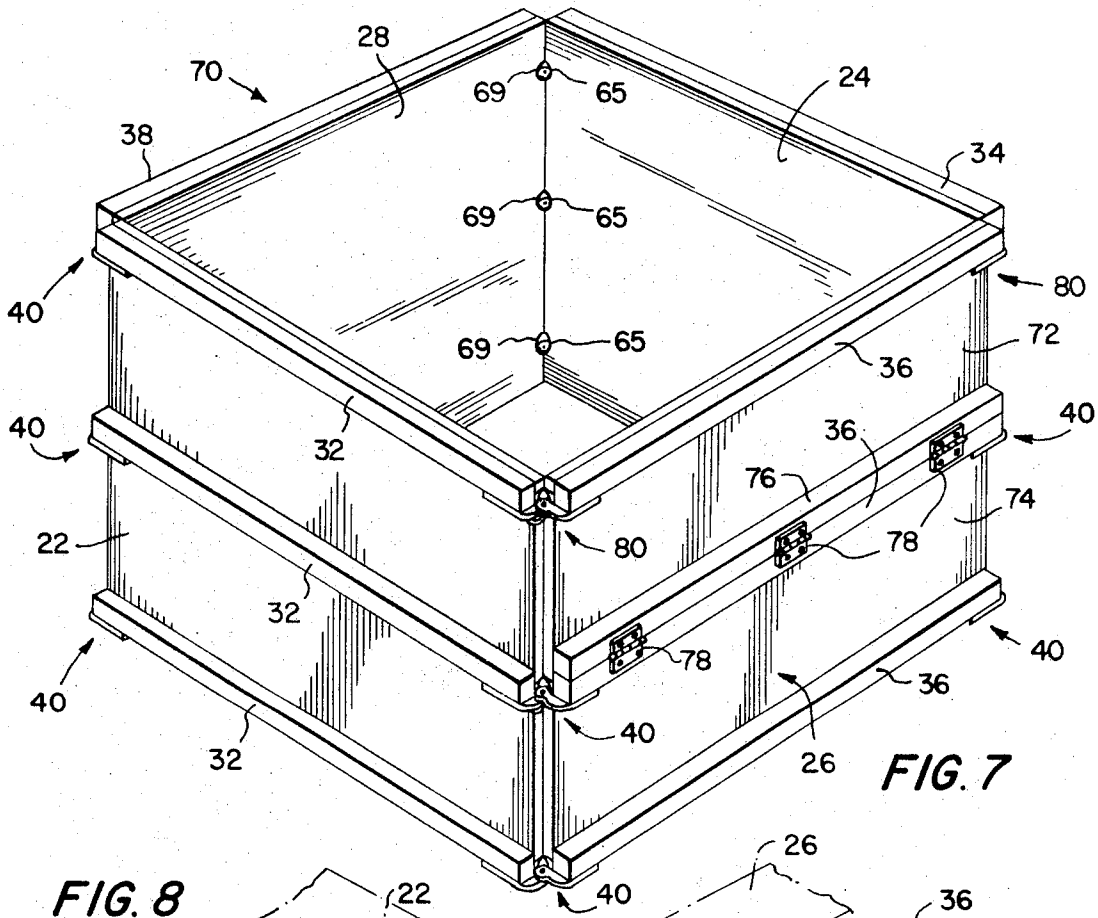
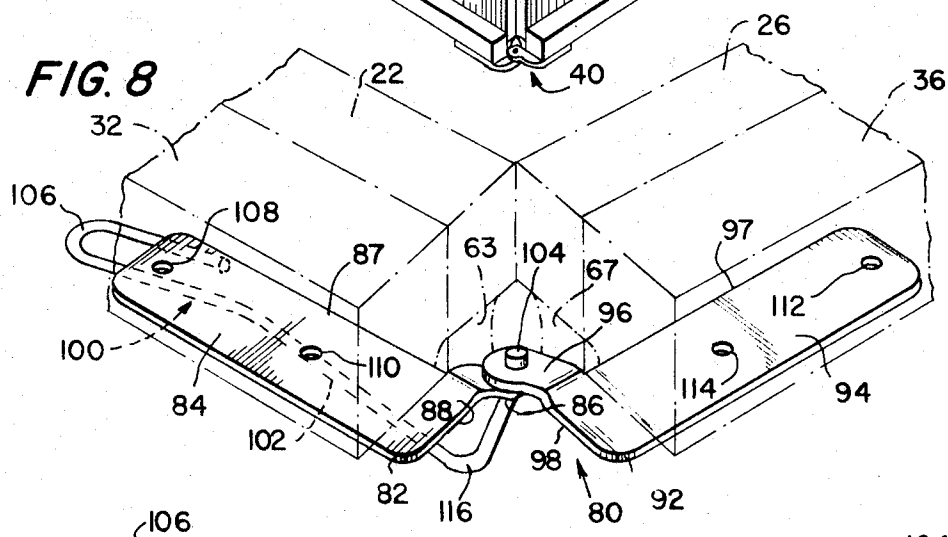


FIG. 7

FIG. 8



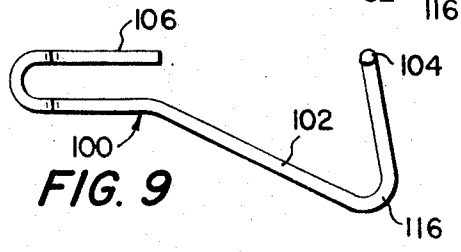


FIG. 9

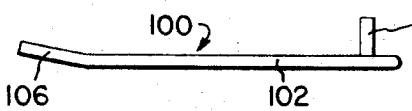


FIG. 10

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COLLAPSIBLE CONTAINERS INCLUDING SWIVEL HINGE CORNER ASSEMBLY AND ACCESS DOOR ASSEMBLY

The present invention relates to collapsible containers and, more particularly, a collapsible container including a plurality of swivel hinge corner assemblies for connecting adjacent sides of the collapsible container to permit the sides of the container to collapse into a flat configuration. This invention also relates to an access door assembly for pivotally connecting a door to adjacent sides of a collapsible container and permitting the door to be unlatched from the adjacent sides.

In the field of collapsible containers, it is necessary to provide a collapsible container that is very sturdy when set up and is also easily collapsed into a flat configuration for storage. In addition, it is preferred that the container be designed to collapse by folding adjacent sides at opposite corners of the container either inwardly or outwardly. Thus, it is desirable to provide a collapsible container including a plurality of swivel hinge corner assemblies for connecting adjacent sides of the collapsible container to provide a strong corner connection when the container is set up and to permit the sides of the container to collapse by folding the corners of the container in either direction.

In a collapsible container, it is advantageous to provide a door which can be pivoted outward from the container to permit easy access to the interior of the container. A collapsible container in which the door consists of an upper section of one side of the container connected by hinges to a lower section of that side is preferred. Thus, it is desirable to provide an access door assembly for pivotally connecting the door to adjacent sides of the collapsible container and permitting the door to be unlatched from the adjacent sides.

In accordance with the present invention, a collapsible container includes a pair of rectangular side panels and a pair of rectangular end panels in which each side panel and end panel has planar exterior and interior surfaces with the edges of the side panels being located adjacent to the edges of said end panels to provide the corners of the collapsible container, a plurality of horizontal side panel cleats mounted on the exterior surface of each side panel, extending toward the edges of each side panel, a plurality of horizontal end panel cleats mounted on the exterior surface of each end panel, extending toward the edges of each end panel and being aligned with the side panel cleats, and a plurality of swivel hinge corner assemblies for connecting adjacent side panels and end panels, each corner assembly comprising a first corner plate having a flat body secured to a side panel cleat and a prong projecting laterally from one edge of the flat body toward the adjacent end panel, a second corner plate having a flat body to be secured to an end panel cleat and a prong projecting laterally from one edge of the flat body toward the adjacent side panel and overlapping the prong of the first corner plate, and pivot means spaced laterally from the edges of the flat bodies for pivotally connecting the prongs of the corner plates to permit the side panels and end panels of the container to collapse. Each of the side panels has its edges cutaway at positions adjacent to the side panel cleats for receiving the prongs projecting from the first corner plates

mounted on the side panel cleats. In addition, each of the end panels has its edges cutaway at positions adjacent to the end panel cleats for receiving the prongs projecting from the second corner plates mounted on the end panel cleats.

In a preferred embodiment of the collapsible container, the swivel hinge corner assembly includes openings formed in the prongs of the first and second corner plates and spaced laterally from the edges of the flat bodies of the corner plates, and the pivot means comprises a hinge pin inserted in the openings to pivotally connect the first and second corner plates to permit the corner plates to pivot about the hinge pin to collapse the side panels and end panels of the container. Further, in the preferred embodiment, the prongs of the first and second corner plates are substantially planar and aligned parallel to the flat bodies of the corner plates and offset by one-half of the thickness of the corner plates to permit the flat bodies of the corner plates to be co-planar.

In accordance with a preferred embodiment, the rectangular side panels and end panels of the collapsible container are arranged to position each vertical edge of the interior surface of the side panels abutting a vertical edge of the interior surface of one of the end panels to provide the corners of the collapsible container. The first and second corner plates of each swivel hinge corner assembly are secured to horizontal surfaces of the side panel cleats and end panel cleats, respectively, with the edges of the first and second corner plates in abutting relation to the exterior surfaces of the side panels and end panels, respectively. In addition, the pivot means of each swivel hinge corner is located at the vertex defined by the intersection of the planes of the interior surfaces of the adjacent side panel and end panel to permit the panels to collapse inwardly or outwardly.

The collapsible container of this invention can be collapsed into a flat configuration by applying external pressures to the side panels and end panels of the container. A rectangular top panel and a rectangular bottom panel can be provided to form a closed container and to hold the side panels and end panels in a rectangular relationship when the container is set up. In addition, material held in the container will exert internal pressure on the side panels and end panels to maintain the container in its set-up condition.

An access door assembly constructed in accordance with the principles of the present invention for pivotally connecting a door to adjacent sides of a collapsible container and permitting the door to be unlatched from the adjacent sides comprises a first corner plate having a flat body to be secured to one side of the collapsible container and a prong projecting laterally from one edge of the flat body, a second corner plate having a flat body to be secured to the door of the collapsible container and a prong projecting laterally from one edge of the flat body and overlapping the prong of the first corner plate, and spring-biased pivot means spaced laterally from the edges of the flat bodies of the first and second corner plates for releasably engaging the prongs of the corner plates to pivotally connect the prongs to permit the sides of the container to collapse and the corner plates to be unlatched.

In a preferred embodiment of the access door assembly, openings are formed in the prongs of the first and second corner plates and spaced laterally from the edges of the flat bodies of the corner plates, and the spring-biased pivot means comprises a spring catch mounted adjacent to one of the corner plates and including a cantilevered spring arm extending toward the prongs of the corner plates and a finger projecting from the cantilevered spring arm for normally engaging the openings formed in the prongs of the corner plates.

The cantilevered spring arm of the preferred embodiment includes a bend extending away from the prongs of the corner plates to permit the finger to be disengaged from the openings in the corner plates by pressing on the bend. Further, the prongs of the first and second corner plates of the preferred embodiment are substantially planar and aligned parallel to the flat bodies of the corner plates and offset by one-half of the thickness of the corner plates to permit the flat bodies of the corner plates to be co-planar.

The access door assembly of this invention is particularly useful in a collapsible container in which the sides of the container are rectangular panels having cleats in the form of horizontal strips mounted on the exterior surfaces of the panels and in which one rectangular panel consists of upper and lower rectangular sections with the upper section providing a door for the container. In this type of container, the first corner plate of the access door assembly can be secured to a cleat mounted on an adjacent side of the container and the second corner plate can be secured to a cleat mounted on the door to pivotally connect the side of the container to the door and to permit the sides of the container to be collapsed by folding opposite corners of the container inwardly or outwardly. In addition, the first and second corner plates of the access door assembly can be unlatched to permit the door to be pivoted outward relative to the interior of the container.

The accompanying drawings illustrate presently preferred embodiments of the invention and, together with the description, serve to explain the principles of the invention.

Of the drawings:

FIG. 1 is a perspective view of the sides of a collapsible container including a plurality of swivel hinge corner assemblies constructed in accordance with the principles of this invention;

FIG. 2 is an enlarged perspective view of one corner of the collapsible container of FIG. 1, illustrating a swivel hinge corner assembly in detail;

FIGS. 3A and 3B illustrate first and second corner plates, respectively, of the swivel hinge corner assembly having prongs projecting laterally from the corner plates;

FIG. 4 is a side elevation view of the swivel hinge corner assembly illustrating the offset of the prongs of the corner plates;

FIG. 5 is a perspective view of the sides of the container of FIG. 1 in a collapsed configuration;

FIGS. 6A and 6B are plan views of a side panel and an end panel, respectively, of the collapsible container of FIG. 1;

FIG. 7 is a perspective view of the sides of a collapsible container provided with an access door on one side of the container and incorporating a pair of access door assemblies constructed in accordance with the principles of this invention;

FIG. 8 is an enlarged perspective view of one corner of the collapsible container of FIG. 7, illustrating an access door assembly comprising a pair of corner plates and a spring catch;

FIG. 9 is a plan view of the spring catch of the access door assembly; and

FIG. 10 is a side view of the spring catch of the access door assembly.

A collapsible container constructed according to the principles of the present invention includes a pair of rectangular side panels and a pair of rectangular end panels in which each side panel and end panel has planar exterior and interior surfaces and the edges of the side panels are located adjacent to the edges of the end panels to provide the corners of the collapsible container. FIG. 1 illustrates the sides of a collapsible container **20** including a pair of rectangular side panels **22** and **24** and a pair of rectangular end panels **26** and **28**. The vertical edges of side panels **22** and **24** are located adjacent to the vertical edges of end panels **26** and **28** to provide the corners of collapsible container **20**. The interior surfaces of side panels **22** and **24** and end panels **26** and **28** define the interior of container **20**.

In a preferred embodiment, as shown in FIG. 1, the vertical edges of the interior surfaces of side panels **22** and **24** are in abutting relation to the vertical edges of the interior surfaces of end panels **26** and **28** at the corners of container **20**. A top panel and bottom panel (not shown) rectangular in shape can be provided to form a closed container.

In the collapsible container of this invention, a plurality of horizontal side panel cleats is mounted on the exterior surface of each side panel, extending toward the edges of each side panel. Referring to FIG. 1, a plurality of horizontal side panel cleats **32** is mounted on the exterior surface of side panel **22**. Similarly, a plurality of horizontal side panel cleats **34** (only one shown) is mounted on the exterior surface of side panel **24**. In a preferred embodiment of the container, cleats **32** and **34** comprise a plurality of horizontal strips of rectangular cross section extending completely across the side panels.

The collapsible container of this invention also includes a plurality of horizontal end panel cleats mounted on the exterior surface of each end panel, extending toward the edges of each end panel and being aligned with the side panel cleats. Referring to FIG. 1, a plurality of horizontal cleats **36** is mounted on the exterior surface of end panel **26**. Similarly, a plurality of horizontal end panel cleats **38** (only one shown) is mounted on the exterior surface of end panel **28**. In the preferred embodiment of the container, horizontal cleats **36** and **38** comprise a plurality of horizontal strips of rectangular cross section extending completely across the end panels in vertical alignment with the horizontal strips on the side panels.

In addition, the collapsible container includes a plurality of swivel hinge corner assemblies located at each corner of the collapsible container for connecting adjacent side panels and end panels. As shown in FIG. 1, collapsible container **20** includes a plurality of swivel hinge corner assemblies **40** located at the corners of the

collapsible container. The corner assemblies are secured to horizontal surfaces on the side panel and end panel cleats and, in the preferred embodiment, are secure to lower horizontal surfaces of cleats **32**, **34**, **36**, and **38**. FIGS. **2**, **3**, and **4** illustrate one swivel hinge corner assembly **40** in detail.

In accordance with the invention, the swivel hinge corner assembly for connecting adjacent side panels and end panels of a collapsible container to permit the sides of the container to collapse includes a first corner plate having a flat body to be secured to a side panel cleat and a prong projecting laterally from one edge of the flat body toward the adjacent end panel. The swivel hinge corner assembly also includes a second corner plate having a flat body to be secured to an end panel cleat and a prong projecting laterally from one edge of the flat body toward the adjacent side panel and overlapping the prong of the first corner plate.

As embodied and shown in FIGS. **2** and **3**, swivel hinge corner assembly **40** includes a first corner plate **42** having a generally rectangular, flat body **44** and a prong **46** projecting laterally from a longitudinal edge **47** of the flat body. A lateral edge **48** of flat body **44** is located adjacent to prong **46**.

The first corner plate includes a pair of holes **49** formed in flat body **44** for receiving fasteners, such as a pair of screws (not shown) having enlarged screw heads, to secure the flat body to the lower horizontal surface of a side panel cleat, e.g., cleat **32**. Since the screws are inserted into the side panel cleat in a vertical direction, the holding power of the screws is at an angle of 90° to the internal pressure exerted on the interior surface of side panel **22** by material held in the container.

Similarly, the swivel hinge corner assembly includes a second corner plate **52** (FIGS. **2** and **3**) having a generally rectangular, flat body **54** and a prong **56** projecting laterally from a longitudinal edge **57** of the flat body. A lateral edge **58** of flat body **54** is located adjacent to prong **56**. As shown in FIG. **2**, prong **56** of the second corner plate overlaps prong **46** of the first corner plate.

The second corner plate includes a pair of holes **59** formed in flat body **54** for receiving fasteners, such as a pair of screws (not shown) having enlarged screw heads, to secure the flat body to the lower horizontal surface of an end panel cleat, e.g., cleat **36**. Since the screws are inserted into the end panel cleat in a vertical direction, the holding power of the screws is at an angle of 90° to the internal pressure exerted on the interior surface of end panel **26** by material held in the container.

In the preferred embodiment, as shown in FIG. **2**, flat body **44** of first corner plate **42** is secured to the side panel cleat with longitudinal edge **47** of the flat body is abutting relation with the side panel. Similarly, flat body **54** of second corner plate **52** is secured to the end panel cleat with longitudinal edge **57** of the flat body in abutting relation with the end panel.

Referring to FIG. **4**, prong **46** of first corner plate **42** is substantially planar and aligned in a plane parallel to flat body **44** of the first corner plate. This prong is offset by one-half of the thickness of the corner plate from flat body **44**. Similarly, prong **56** of second corner plate **52** is substantially planar and aligned in a plane parallel to flat body **54** of the second corner plate. This prong is offset by one-half of the thickness of the corner plate from flat body **54**. The prongs are offset to permit flat bodies **44** and **54** of the corner plates to be co-planar when the flat bodies are secured to side panel and end panel cleats mounted on adjacent sides of the collapsible container.

In the collapsible container of this invention, the swivel hinge corner assembly also includes pivot means spaced laterally from the edges of the flat bodies of the first and second corner plates for pivotally connecting the prongs of the corner plates to permit the sides of the container to collapse. In the preferred embodiment, the pivot means is located at the intersection of the planes of the interior surfaces of the adjacent side panel and end panel.

Referring to FIG. **3**, an opening **60** is formed in prong **46** of the first corner plate and is spaced laterally from longitudinal edge **48** of flat body **44** of the first corner plate by a distance *d*. Opening **60** is also located in alignment with lateral edge **48** of the flat body. Similarly, an opening **62** is formed in prong **56** of the second corner plate and spaced laterally from longitudinal edge **57** of flat body **54** by a distance *d*. Opening **62** is also located in alignment with lateral edge **58** of the flat body. As embodied and shown in FIG. **2**, the pivot means comprises a hinge pin or rivet **64** inserted into openings **60** and **62** formed in prongs **46** and **56** to pivotally connect the first and second corner plates to permit the corner plates to pivot about the hinge pin to collapse the side panels and end panels of the container.

The plurality of swivel hinge corner assemblies **40** permits collapsible containers **20** to be collapsed by folding the adjacent sides at opposite corners of the container inwardly or outwardly. As shown in FIG. **5**, side panel **22** can be folded inwardly toward end panel **28**, and side panel **24** can be folded inwardly toward end panel **26** to move the sides of the container to the collapsed configuration. Alternatively, side panel **22** can be folded inwardly toward end panel **26**, and side panel **24** can be folded inwardly toward end panel **28** to achieve the collapsed configuration. Thus, the swivel hinge corner assembly of the present invention permits the sides of the container to be collapsed in either direction.

The advantage of having openings **60** and **62** spaced laterally from edges **47** and **57** of the first and second corner plates by distance *d* (FIG. **3**) is clearly understood by considering container **20** in its collapsed configuration. As shown in FIG. **5**, each swivel hinge corner assembly connecting side panel **24** to end panel **26** must accommodate the thickness of two panels between the longitudinal edges of its corner plates when the container is collapsed by folding side panel **24** toward end panel **26**. Thus, it is preferred that the distance *d* be equal to the thickness of the side panels and end panels of the container.

Further, each swivel hinge corner assembly connecting end panel **26** to side panel **22** must permit the panels to be folded outwardly to a position where the panels are 180° apart. The location of openings **60** and **62** formed in the prongs of the first and second corner plates in alignment with lateral edges **47** and **57**, respectively, of the flat bodies of the corner plates and

the offset of the prongs by one-half of the thickness of the corner plates permit each swivel hinge corner assembly to open to an angle of 180° to collapse the container.

In the preferred embodiment of the container, with distance *d* equal to the thickness of the side panels and end panels, hinge pin or rivet **64** is located at the vertex defined by the intersection of the planes of the interior surfaces of the adjacent side panel and end panel connected by swivel hinge corner assembly **40**.

In the collapsible container of the present invention, each of the side panels has its edges cutaway at positions adjacent to the side panel cleats for receiving the prongs projecting from the first corner plates mounted on the side panel cleats, and each of the end panels has its edges cutaway at positions adjacent to the end panel cleats for receiving the prongs projecting from the second corner plates mounted on the end panel cleats. The preferred embodiment of the collapsible container includes a plurality of notches formed at opposite edges of each side panel and located adjacent to the side panel cleats for receiving the prongs projecting from the first corner plates mounted on the cleats. In addition, the preferred embodiment also includes a plurality of notches formed at opposite edges of each end panel and located adjacent to the end panel cleats for receiving the prongs projecting from the second corner plates mounted on the cleats.

As embodied and shown in FIG. 6A, side panel **22** includes a plurality of semi-circular notches **63** located at the opposite edges of the side panel in alignment with the lower surfaces of side panel cleats **32**. Similarly, side panel **24** includes a plurality of semi-circular notches **65** (FIG. 1) formed at opposite edges of the side panel and located in alignment with the lower surfaces of side panel cleats **34**. Referring to FIG. 6B, end panel **26** includes a plurality of notches **67** formed at opposite edges of the end panel and located in alignment with the lower surfaces of end panel cleats **36**. Similarly, end panel **28** includes a plurality of semi-circular notches **69** (FIG. 1) formed at opposite edges of the end panel and located in alignment with the lower surfaces of end panel cleats **38**. Notches **63**, **65**, **67**, and **69** are provided to receive prongs **46** and **56** of the corner plates of the swivel hinge corner assemblies both when container **20** is set up (FIG. 1) and when the container is collapsed (FIG. 5).

FIG. 7 illustrates the sides of a collapsible container **70** constructed according to the principles of this invention which includes an access door located on one side of the container. The construction of collapsible container **70** is similar to the construction of collapsible container **20** (FIG. 1) and, accordingly, the structural elements of container **70** which are identical to the elements of container **20** are identified by the same reference numerals used in FIG. 1. Thus, collapsible container **70** includes rectangular side panels **22** and **24** having side panel cleats **32** and **34**, respectively, mounted on the exterior surfaces of the side panels. In addition, the collapsible container includes rectangular end panels **26** and **28** having end panel cleats **36** and **38**, respectively, mounted on the exterior surfaces of the end panels. Side panels **22** and **24** and end panels **26** and **28** are pivotally connected at the edges of the panels by a plurality of swivel hinge corner assemblies **40** to permit the container to be collapsed.

The side and end panels of container **70** also include a plurality of notches formed at the edges of each panel in alignment with the cleats mounted on the panels. FIG. 7 illustrates semi-circular notches **65** and **69** in side panel **24** and end panel **28**, respectively.

As shown in FIG. 7, end panel **26** of collapsible container **70** consists of an upper rectangular section **72** and a lower rectangular section **74**. The lower rectangular section includes a pair of end panel cleats **36** mounted on its exterior surface. Lower rectangular section **74** is pivotally connected to side panels **22** and **24** of the container by swivel hinge corner assemblies **40** secured at opposite ends of the pair of end panel cleats **36** and to corresponding side panel cleats **32** and **34** on the side panels.

In collapsible container **70**, upper rectangular section **72** of side panel **26** provides a door for the collapsible container. As shown in FIG. 7, a lower edge of the door extends horizontally across lower section **74** of the side panel. A horizontal cleat **76** is mounted on the exterior surface of the door at its lower edge, and one end panel cleat **36** is mounted at the upper edge of the door in alignment with side panel cleats **32** and **34** on the side panels.

The collapsible container includes hinge means for connecting the lower edge of the door to the side panel to permit the door to be pivoted outward to an open position relative to the container. In collapsible container **70** (FIG. 7), the hinge means comprise a plurality of hinges **78** secured to cleat **76** and end panel cleat **36** at the upper edge of lower rectangular section **74** to pivotally connect the door to the lower rectangular section.

The collapsible container also includes a pair of access door assemblies constructed according to the principles of the present invention which are located at the corners of the container adjacent to the upper edge of the door for pivotally connecting the door to adjacent sides of the container and permitting the door to be unlatched from the adjacent sides. As embodied and shown in FIG. 7, collapsible container **70** includes a pair of access door assemblies **80** located at opposite ends of end panel cleat **36** mounted on the upper edge of the door. FIG. 8 illustrates one access door assembly **80** in detail.

In accordance with the invention, the access door assembly includes a first corner plate having a flat body to be secured to one side of the collapsible container and a prong projecting outwardly from one edge of the flat body. In addition, the access door assembly includes a second corner plate having a flat body to be secured to the door of the collapsible container and a prong projecting laterally from one edge of the flat body and over-lapping the prong of the first corner plate.

As embodied and shown in FIG. 8, access door assembly **80** includes a first corner plate **82** which is identical to corner plate **42** of swivel hinge corner assembly **40** (FIGS. 2, 3, and 4). Referring to FIG. 8, corner plate **82** includes a generally rectangular, flat body **84** and a prong **86** projecting laterally from a longitudinal edge **87** of the flat body. A lateral edge **88** of flat body **84** is located adjacent to prong **86**.

In the preferred embodiment, an opening (identical to opening **50** formed in prong **46** of corner plate **42** shown in FIG. 3) is formed in prong **86** of corner plate

82 and is spaced laterally from longitudinal edge 87 of flat body 94 of the corner plate. This opening is also located in alignment with lateral edge 88 of flat body 84.

Similarly, access door assembly 80 (FIG. 8) includes a second corner plate 92 which is identical to corner plate 52 of swivel hinge corner assembly 40 (FIGS. 2, 3, and 4). Referring to FIG. 8, second corner plate 92 includes a generally rectangular, flat body 94 and a prong 96 projecting laterally from a longitudinal edge 97 of flat body. Prong 96 of the second corner plate overlaps prong 86 of the first corner plate.

In the preferred embodiment, an opening (identical to opening 60 formed in prong 56 of corner plate 52 shown in FIG. 3) is formed in prong 96 of corner plate 92 and is spaced laterally from longitudinal edge 97 of flat body 94 of the corner plate. This opening is also located in alignment with lateral edge 98 of flat body 94.

Referring to FIG. 8, prongs 86 and 96 of the first and second corner plates of access door assembly 80 are substantially planar and aligned parallel to flat bodies 84 and 94, respectively, of the corner plates. The prongs are offset by one-half of the thickness of the corner plates to permit the flat bodies of the corner plates to be co-planar when the access door assembly is mounted on the collapsible container.

The access door assembly of this invention includes spring-biased pivot means spaced laterally from the edges of the flat bodies of the first and second corner plates for releasably engaging the prongs of the corner plates to pivotally connect the prongs to permit the sides of the container to collapse and the corner plates to be unlatched. In a preferred embodiment, the spring-biased pivot means comprises a spring catch mounted adjacent to one of the corner plates including a cantilevered spring arm extending toward the prongs of the corner plates and a finger projecting from the cantilevered spring arm for normally engaging openings formed in the prongs of the corner plates.

As embodied and shown in FIG. 8, access door assembly 80 includes a spring catch 100 comprising a spring arm 102 extending toward prongs 86 and 96 of the corner plates. Spring arm 102 is provided with a finger 104 projecting upward from one end of the spring arm for normally engaging the openings formed in prongs 86 and 96. The opposite end of spring arm 102 includes a U-shaped section 106 to enable the spring arm to be mounted adjacent to corner plate 84 of the access door assembly, as explained below.

Corner plates 82 and 92 can be secured to cleats of the collapsible container by conventional fasteners, such as screws or bolts. As shown in FIG. 8, a pair of holes 108 and 110 are formed in flat body 84 of first corner plate 82, and a pair of holes 112 and 114 are formed in flat body 94 of second corner plate 92. The corner plates can be secured to cleats 32 and 36 by inserting a plurality of screws (not shown) having enlarged screw heads into the cleats through openings 108, 110, 112, and 114 in the flat bodies.

Spring arm 102 can be mounted adjacent to first corner plate 82 by placing U-shaped section 106 of the spring arm around opening 108 and then inserting one of the screws into cleat 32 through the opening. The enlarged head of the screw will clamp the U-shaped section of spring arm 102 against flat body 84 of the corner plate. In addition, another screw can be driven into cleat 32 at a position inside U-shaped section 106 adjacent to the curved portion of the U-shaped section to clamp this curved portion against the cleat.

As shown in FIG. 10, the curved portion of U-shaped section 106 of spring arm 102 is bent slightly upward from the spring arm. When U-shaped section 106 is clamped against cleat 32 and flat body 84 of corner plate 82, the curved portion of the U-shaped section is flattened out to produce a spring tension in spring arm 102 to urge finger 104 upward so that it normally engages the openings formed in prongs 86 and 96 to pivotally connect corner plates 82 and 92. In addition, spring arm 102 is formed with a bend 116 (FIGS. 8 and 9) extending away from prongs 86 and 96 of the corner plates to permit finger 104 to be disengaged from the openings formed in the prongs by pressing downward on bend 116.

Referring to FIG. 7, each access door assembly 80 serves the same function as swivel hinge corner assemblies 40 when the spring catch of the access door assembly engages the openings formed in the prongs of the corner plates. Thus, collapsible container 70 can be fully collapsed by folding the sides at opposite corners of the container inwardly or outwardly. When container 70 is set up, however, access door assemblies 80 permit the door of the container to be unlatched and pivoted outward relative to the interior of the container. The door can be unlatched by pressing downward on the bends formed in the spring arms of the access door assemblies to unlatch the corner plates secured to horizontal cleat 36 of the upper edge of the door from the corner plates secured to cleats 32 and 34 on the adjacent sides of the container.

The invention in its broader aspects is not limited to the specific details shown and described, and modifications may be made in the details of the swivel hinge corner assembly and access door assembly without departing from the principles of the present invention.

What is claimed is:

1. A collapsible container comprising:

a pair of rectangular side panels and a pair of rectangular end panels each side panel and end panel having planar exterior and interior surfaces with the edges of said side panels being located adjacent to the edges of said end panels to provide the corners of the collapsible container;

a plurality of horizontal side panel cleats mounted on the exterior surface of each side panel, extending toward the edges of each side panel;

a plurality of horizontal end panel cleats mounted on the exterior surface of each end panel, extending toward the edges of each end panel, said end panel cleats being aligned with said side panel cleats; and

a plurality of swivel hinge corner assemblies located at each corner of the collapsible container for connecting adjacent side panels and end panels, each corner assembly comprising

a first corner plate having a flat body secured to a side panel cleat and a prong projecting laterally from one edge of said flat body toward the adjacent end panel,

a second corner plate having a flat body secured to an end panel cleat and a prong projecting laterally

from one edge of said flat body toward the adjacent side panel and overlapping the prong of said first corner plate, and

pivot means spaced laterally from the edges of said flat bodies for pivotally connecting said prongs of said corner plates to permit said side panels and end panels of the container to collapse;

each of said side panels having its edges cutaway at positions adjacent to said side panel cleats for receiving the prongs projecting from the first corner plates mounted on said side panel cleats; and

each of said end panels having its edges cutaway at positions adjacent to said end panel cleats for receiving the prongs projecting from the second corner plates mounted on said end panel cleats.

2. The collapsible container of claim 1, wherein said pivot means is located at the intersection of the planes of the interior surfaces of the adjacent side panel and end panel.

3. The collapsible container of claim 1, wherein:

said prongs of said first and second corner plates have openings formed therein and spaced laterally from the edges of said corner plates; and said pivot means comprises

a hinge pin inserted into said openings to pivotally connect said first and second corner plates to permit said corner plates to pivot about said hinge pin to collapse said side panels and end panels of the container.

4. The collapsible container of claim 1, wherein:

said prongs of said first and second corner plates are parallel to the flat bodies of said corner plates and offset by one-half of the thickness of said corner plates to permit the flat bodies of said corner plates to be co-planar.

5. A collapsible container comprising:

a pair of rectangular side panels and a pair of rectangular end panels each side panel and end panel having planar exterior and interior surfaces with the edges of said side panels being located adjacent to the edges of said end panels to provide the corners of the collapsible container;

a plurality of horizontal side panel cleats mounted on the exterior surface of each side panel, extending toward the edges of each side panel;

a plurality of horizontal end panel cleats mounted on the exterior surface of each end panel, extending toward the edges of each end panel, said end panel cleats being aligned with said side panel cleats; and

a plurality of swivel hinge corner assemblies located at each corner of the collapsible container for connecting adjacent side panels and end panels, each corner assembly comprising

a first corner plate having a flat body secured to a side panel cleat and a prong projecting laterally from one edge of said flat body toward the adjacent end panel,

a second corner plate having a flat body secured to an end panel cleat and a prong projecting laterally from one edge of said flat body toward the adjacent side panel and overlapping the prong of said first corner plate, and

pivot means spaced laterally from the edges of said flat bodies for pivotally connecting said prongs of said corner plates to permit said side panels and end panels of the container to collapse;

each side panel including a plurality of notches formed at opposite edges of said side panel and located adjacent to said side panel cleats for receiving the prongs projecting from the first corner plates mounted on said cleats; and

each end panel including a plurality of notches formed at opposite edges of said end panel and located adjacent to said end panel cleats for receiving the prongs projecting from the second corner plates mounted on said cleats.

6. The collapsible container of claim 5, wherein:

each of said side panel cleats is a horizontal strip of rectangular cross section extending completely across the side panels; and

each of said end panel cleats is a horizontal strip of rectangular cross section extending completely across the end panels.

7. The collapsible container of claim 6, wherein the flat bodies of said corner plates are secured to lower surfaces of the horizontal strips mounted on said side panels and end panels.

8. A collapsible container, comprising:

a pair of rectangular side panels and a pair of rectangular end panels, said side panels and said end panels having planar exterior surfaces and planar interior surfaces with each vertical edge of the interior surface of said side panels abutting a vertical edge of the interior surface of one of said end panels to provide the corners of the collapsible container;

a plurality of horizontal side panel cleats mounted on the exterior surface of each side panel, extending toward the edges of each side panel;

a plurality of horizontal end panel cleats mounted on the exterior surface of each end panel, extending toward the edges of each end panel, said end panel cleats being vertically aligned with said side panel cleats; and

a plurality of swivel hinge corner assemblies located at each corner of the collapsible container for connecting an adjacent side panel and end panel, each corner assembly comprising

a first corner plate having a flat body secured to a horizontal surface of a side panel cleat and a prong projecting laterally from one edge of said flat body toward the adjacent end panel, said edge of said first corner plate being in abutting relation to the side panel,

a second corner plate having a flat body secured to a horizontal surface of an end panel and a prong projecting laterally from one edge of said flat body toward the adjacent side panel and overlapping the prong of said first corner plate, said edge of said second corner plate being in abutting relation to the end panel, and

pivot means spaced laterally from the edges of said flat bodies and located at the vertex defined by the intersection of the planes of the interior surfaces of the adjacent side panel and end panel for pivotally connecting said prongs of said corner plates to permit said side panels and end panels of the container to collapse;

each side panel including a plurality of notches formed at opposite edges of said side panel and located adjacent to said side panel cleats for receiving the prongs projecting from the first corner plates mounted on said cleats; and

each end panel including a plurality of notches formed at opposite edges of said end panel and located adjacent to said end panel cleats for receiving the prongs projecting from the second corner plates mounted on said cleats.

9. The collapsible container of claim 8, wherein:

said prongs of said first and second corner plates have openings formed therein and spaced laterally from the edges of said corner plates to be located at the vertex defined by the intersection of the planes of the interior surfaces of adjacent side panels and end panels; and said pivot means comprises

a hinge pin inserted into said openings to pivotally connect said first and second corner plates to permit the corner plates to pivot about said hinge pin to collapse said side panels and end panels of the container.

10. In a collapsible container having a pair of side panels and a pair of end panels pivotally connected at the edges of the panels to permit the container to be collapsed, the combination of:

a door having an upper edge and a lower edge extending horizontally across one of said panels;

hinge means for connecting the lower edge of said door to said panel to permit said door to be pivoted outward to an open position relative to the container; and

a pair of access door assemblies located at the corners of the container adjacent to the upper edge of said door for pivotally connecting said door to adjacent sides of the container and permitting said door to be unlatched from the adjacent sides, each access door assembly comprising

a first corner plate having a flat body secured to one of the panels located adjacent to said door and a prong projecting laterally from one edge of said flat body toward the door,

a second corner plate having a flat body secured to said door and a prong projecting laterally from one edge of said flat body toward one of the adjacent panels and overlapping the prong of said first corner plate, and

spring-biased pivot means spaced laterally from the edges of the flat bodies of said first and second corner plates for releasably engaging said prongs of said corner plates to pivotally connect said prongs and permit the sides of the container to collapse.

11. The collapsible container of claim 10, wherein:

said prongs of said first and second corner plates have openings formed therein and spaced laterally from the edges of the flat bodies of said corner plates; and

said spring-biased pivot means comprising a spring catch located adjacent to one of said corner plates including a cantilevered spring arm extending toward the prongs of said corner plates and a finger projecting from said cantilevered spring arm for normally engaging said openings formed in said prongs of said corner plates.

12. The collapsible container of claim 11, wherein said cantilevered spring arm includes a bend extending away from said prongs of said corner plates to permit said finger to be disengaged from said openings by pressing on said bend.

13. The collapsible container of claim 11, wherein:

said prongs of said first and second corner plates are parallel to the flat bodies of said corner plates and offset by one-half of the thickness of said corner plates to permit the flat bodies of said corner plates to be co-planar.

14. In a collapsible container having a pair of side panels and a pair of end panels pivotally connected at the edges of the panels to permit the container to be collapsed, the combination of:

a door having an upper edge and a lower edge extending horizontally across one of said panels;

hinge means for connecting the lower edge of said door to said panel to permit said door to be pivoted outward to an open position relative to the container; and

a pair of access door assemblies located at the corners of the container adjacent to the upper edge of said door for pivotally connecting said door to adjacent sides of the container and permitting said door to be unlatched from the adjacent sides, each access door assembly comprising

a first corner plate having a flat body secured to one of the panels located adjacent to said door and a prong projecting laterally from one edge of said flat body toward the door,

a second corner plate having a flat body secured to said door and a prong projecting laterally from one edge of said flat body toward one of the adjacent panels and overlapping the prong of said first corner plate, and

releasable pivot means spaced laterally from the edges of the flat bodies of said first and second corner plates for releasably engaging said prongs of said corner plates to pivotally connect said prongs and to permit the sides of the container to collapse upon release of said pivot means.

15. The collapsible container of claim 14, wherein:

said prongs of said first and second corner plates have openings formed therein and spaced laterally from the edges of the flat bodies of said corner plates for receiving said releasable pivot means.

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