A bag includes a rigid base. The bag includes a first rigid collapsible wall in pivotal relationship with the base. The bag includes a second rigid collapsible wall in pivotal relationship with the base and in spaced relation with and opposing the first rigid wall. The bag includes a skin disposed about the first wall and the second wall and connected to the base. The base, skin, first wall and second wall forming a storage space when they are in an expanded state where the first and second walls are maintained in a flat planar orientation essentially perpendicular with the base, and the storage space is essentially eliminated when they are in a compressed state where the first wall and the second wall are each folded up onto and essentially in parallel with the base. A method for using a bag.
latch keeps the bag closed
BAG AND METHOD OF USE

FIELD OF THE INVENTION

[0001] The present invention relates to improvements to the field of collapsing containers, containing one or more flat sides, such examples may include, but are not limited to, luggage, tool boxes, storage crates or other five or six sided containers.

BACKGROUND OF THE INVENTION

[0002] A number of such collapsing containers exist. The preferred embodiment uses two fundamental 1st principles,

[0003] triangulated folded geometry of two or more of the five or six sided containers to effect a collapse of the container,

[0004] in combination with

[0005] a cammed or over centering mechanism that snaps the container either open or closed without the use of tools, screws, locks or other mechanisms that require manipulation.

SUMMARY OF THE INVENTION

[0006] The present invention pertains to a bag. The bag comprises a rigid base. The bag comprises a first rigid collapsible wall in pivotal relationship with the base. The bag comprises a second rigid collapsible wall in pivotal relationship with the base and in spaced relation with and opposing the first rigid wall. The bag comprises a skin disposed about the first wall and the second wall and connected to the base. The base, skin, first wall and second wall forming a storage space when they are in an expanded state where the first and second walls are maintained in a flat planer orientation essentially perpendicular with the base, and the storage space is essentially eliminated when they are in a compressed state where the first wall and the second wall are each folded up onto and essentially in parallel with the base.

[0007] The present invention pertains to a method for using a bag. The method comprises the steps of forming a storage space with a base, a first rigid collapsible wall in pivotal relationship with the base, a second rigid collapsible wall in pivotal relationship with the base and in spaced relation with and opposing the first rigid wall, and a skin disposed about the first wall and the second wall and connected to the base where the first and second walls are maintained in a flat planer orientation essentially perpendicular with the base. There is the step of folding the first wall and the second wall onto and essentially in parallel with the base and essentially eliminating the storage space.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] In the accompanying drawings, the preferred embodiment of the invention and preferred methods of practicing the invention are illustrated in which:

[0009] FIGS. 1a-1f show a bag of the present invention in different stages of compression or expansion.

[0010] FIGS. 2a-2f show a bag of the present invention having a first side and a second side having different angular relationships.

[0011] FIGS. 3a and 3b show a first side and a length that is flat or that is bent, respectively.

[0012] FIG. 4 shows the bag in an exploded state.

[0013] FIG. 5 is a perspective view of the bag as panels are inserted into the skin.

[0014] FIG. 6 is a perspective view of the bag with the panels inserted into the skin and the skin is closed.

[0015] FIG. 7 is a perspective view of the bag in a collapsed state and kept closed by a latch.

[0016] FIG. 8 is a perspective view of the bag in the expanded state.

[0017] FIG. 9 is a perspective rear view of the bag with the skin not shown.

[0018] FIG. 10 is a perspective front view of the bag with the skin not shown.

[0019] FIG. 11 is a perspective top view of a first wall.

[0020] FIG. 12 is a perspective rear view of the first wall.

[0021] FIG. 13 is a perspective view of a panel with elastic bands.

[0022] FIG. 14 is a perspective view of a panel with springs.

DETAILED DESCRIPTION

[0023] Referring now to the drawings wherein like reference numerals refer to similar or identical parts throughout the several views, and more specifically to FIGS. 1a-1f thereof, there is shown a bag 10. The bag 10 comprises a rigid base 12. The bag 10 comprises a first rigid collapsible wall 14 in pivotal relationship with the base 12. The bag 10 comprises a second rigid collapsible wall 16 in pivotal relationship with the base 12 and in spaced relation with and opposing the first rigid wall. The bag 10 comprises a skin 18 disposed about the first wall 14 and the second wall 16 and connected to the base 12, as shown in FIGS. 5 and 6. The base 12, skin 18, first wall 14 and second wall 16 forming a storage space 20 when they are in an expanded state where the first and second walls 14, 16 are maintained in a flat planer orientation essentially perpendicular with the base 12, and the storage space 20 is essentially eliminated when they are in a compressed state where the first wall 14 and the second wall 16 are each folded up onto and essentially in parallel with the base 12.

[0024] Preferably, the bag 10 includes a third wall 22 and a fourth wall 24 opposing the third wall 22, and a top opposing the base 12. The third and fourth walls 22, 24 and the top forming a box with the third and second walls 14, 16 and the base 12 when they are in the expanded state, and folding together onto and within the perimeter of the base 12 when they are in the compressed date. The third wall 22 and the fourth wall 24 preferably having a restraining mechanism 26 to hold the first, second, third and fourth walls 22, 24, and the top onto the base 12 in the collapsed state, as shown in FIGS. 7 and 8.

[0025] Preferably, the first and second walls 14, 16 each comprise a first element 54, a center element 48, a first hinge 58 connecting the first element 54 and the center element 48, a second element 56, and a second hinge 60 connecting the
center element 48 and the second element 56, as shown in FIG. 11. The first element 54 and the second element 56 each preferably have a first recess 56a and a second recess 36b, respectively, and a length 30 that is disposed in each recess, the length 30 being bendable but when the length 30 is flat the length 30 is rigid. Preferably, the first recess 36a and the second recess 36b extend between the first element 54 and the center element 48, and the second element 56 and the center element 48, respectively, and intersect the first and second hinges 58, 60, respectively. The first and the second hinges 58, 60 each preferably have posts 38 which allow the first and the second hinges 58, 60 to only fold in one direction.

[0026] The present invention pertains to a method for using a bag 10. The method comprises the steps of forming a storage space 20 with a base 12, a first rigid collapsible wall 14 in pivotal relationship with the base 12, a second rigid collapsible wall 16 in pivotal relationship with the base 12 and in spaced relation with and opposing the first rigid wall, and a skin 18 disposed about the first wall 14 and the second wall 16 and connected to the base 12 where the first and second walls 14, 16 are maintained in a flat planar orientation essentially perpendicular with the base 12. There is the step of folding the first wall 14 and the second wall 16 onto and essentially in parallel with the base 12 and essentially eliminating the storage space 20.

[0027] Preferably, the forming step includes the step of forming a box about the storage space 20 with a third wall 22 and a fourth wall 24 opposing the third wall 22, a top opposing the base 12, and the first and second walls 14, 16 and the base 12, and wherein the folding step includes the step of folding together the first, second, third and fourth walls 14, 16, 22, 24 and the top onto the base 12 with a restraining mechanism 26 in a collapsed state. Preferably, the folding step includes the steps of folding the first wall 14 onto itself as it is folded onto the base 12, and folding the second wall 16 onto itself as it is folded onto the base 12.

[0028] In the preferred embodiment, the collapsed container may collapse down to 92% of its erected volume, and remain in a collapsed position with out the aid of latches or locks, merely pulling on the open container allows the container to snap open and remain in an open stable rigid state without the use of latches or locks.

[0029] FIGS. 1a-1f show a schematic in its purest form of the basic collapsing geometry.

[0030] The container may remain in an open state or optionally have some method of closure, including but not limited to the option shown, a bi-fold door or a fabric cover 18 with a zipper 28. The zipper 28 may take any direction or form. The cover 18 may be additionally complicated with decorative or functional improvements including designs and pockets 42.

[0031] The container may be solid panel 32, perforated panel 32, wire covered in fabric, panels covered in fabric or any combination thereof. The container may be outfitted with components for additional functionality such as wheels 52, handles 50, etc., as shown in FIGS. 8 and 9.

[0032] The triangulated panels 32 typically two or more per container have two creased minor panels 32 lesser than, equal to or greater than 45 degrees, as shown in FIGS. 2a-2f. Creating a container with an angle of less than 45 degrees, for example, allows it to nest.

[0033] The preferred mechanism to allow semi automatic erection of the container is via a tempered curved steel length 30, similar to those typically found in steel retracting rulers, set approximately at 45 degrees to each crease in each panel 32, as shown in FIGS. 3a and 3b. Although a similar result may be obtained from other similar flexing members springs, sprung steel plastic carbon, elastic or other material, as shown in FIGS. 13 and 14. The curved tempered steel hold several advantages due to its mechanical properties.

[0034] In its straight state (FIG. 3a), the steel has a certain amount of beam strength and remains entirely rigid and true, this is useful to achieve and crispness and rigidity to the container, of significant additional benefit it that there is no manual lock or intervention on behalf of the user to achieve this condition, it is automatic an additional advantage of the steels ‘automatic’ nature is that it can be hidden inside a container. Additionally, when the steel is folded, as shown in FIG. 3b, although it retains some tension, it is relatively easy to keep in any convenient position. Lastly, due to it being sprung steel it is in theory eternal and will never fatigue or soften ensuring good quality and product life.

[0035] Although the aforementioned panel 32 assembly can be made from sprung steel, and assembled panels 32 of a suitable rigid material, plastic, wood, laminate, etc. with conventional hinged hinges and rivets, modern manufacturing materials and processes allow for the consolidation of three panels 32, two hinges, assorted rivets and a minimum of two locating anchors and accordant ties down to one simple strong component, whose additional features are identified below.

[0036] In the preferred embodiment, the panel 32 is manufactured in one piece with a suitable thermoplastic material including but not limited to polypropylene, copolymer or homopolymer or polyethylene. An example of the panel 32 is shown in FIGS. 11 and 12.

[0037] The rectangular panel 32 essentially flat on one side (see FIG. 12) with the exception of raised rivet bosses and required holes for molding, has on its other side a series of raised ribs 34 constructed in accordance with sound engineering principles to best strengthen the part for the loads it will see and also provide a recess within which the sprung steel length 30 can operate and deflect. Additionally, there are raised ribs 34 near the perimeter of the part and stepped inboard of the part. This is in order that the panel 32 can sit within a stitched fabric pocket 42. A stitched fabric pocket 42 typically has excess material inside and stepping the perimeter wall in allows a recess within which the excess material can sit. The raised ribs 34 provide a protective tack within which the steel can sit.

[0038] The single panel 32 is able to hinge along a predetermined axis via the thinning of the material in a particular direction. Additionally, to prevent the panel 32 from hinging in the opposite direction which would be undesirable, ‘T’ shaped posts 38 extrude up from the underside on either side of the hinge and butt against it preventing hinging in the opposite direction.

[0039] The steel length 30 is inserted from one open end of the panel 32 and is captured via ‘pass thru 40’ details that
are made in the same piece as the main panel 32 and capture the steel. The receiving end of the first pass thru 40 has a flexing member on its end that depresses to allow the steel to enter, once the steel is fully inserted the flexing member returns to its origin and prevents the steel from coming out.

[0040] The pass thru 40 at each end are identified due to their curved inner surfaces, that conform to the steel, effectively centering the steel in the track of the panel 32. It is notable that the center pass thru 40 (bridging the live hinge) is of a different profile to the end pass thru 40.

[0041] The center pass thru 40 inner profile is straight deviating from the curvature of the steel which it bridges, this is because as the steel bends the profile of the steel transforms from curved to bent in the bent area. This also makes the steel wider. The straight pass thru 40 accommodates this variance. The track the steel sits in is also wide enough to accommodate the steel when the center is bent, i.e. it is flat and therefore wider.

[0042] When the steel is bent in half, it bends along 'point break' lines. These are the visible edges of the underside of the center pass thru 40. Tuning the location of these edges effects performance. Specifically, the closer the edges are to each other the easier it is for the steel to deform and bend in half, conversely the further they are from each other, the more resistant the steel is to bending. The aforementioned is important, for example, a preferred embodiment of three different sizes of luggage, the smaller sizes have less leverage in their panels 32 to bend the steel (presuming the steel is of the same exact dimension and specification in each size of case). Therefore, by tuning the point break opening to different dimension specific to each container, a uniformity of force required to deploy or fold down all the bags 10 can be achieved because the bend of the steel does not precisely follow the bending profile of the panels 32. It effectively shortens as it bends in relation to the panel 32, therefore the steel cannot be affixed to the panel 32 but must ‘float’ in order to allow the panel 32 to bend.

[0043] The flexing panels 32 may be joined in combination in any number of ways to assemble novel containers, for example, panels can be joined to homa frame, i.e. an extruded fluted plastic, or a cardboard box base 12, or a folded extruded pp or pp ‘corex’ base 12, or a wire base 12, or a wire base 12 covered in fabric or a vacuum formed or otherwise molded base 12 including injection molding. The materials for bases 12 can also be used as a side in any and all combinations. Furthermore, although it is desirable for the flexing panel 32 itself to have well defined hinges the panels 32 of the overall five to six sided container, may be joined by hinges, loose fabric hinges; or each panel 32 in any combination may reside inside a fabric pocket 42.

[0044] The collapsible sidewalls 46, and fixed sidewalls 46 are pivotally attached to the base 12. The base 12 is slipped into a box shaped fabric skin 18 (i.e. the bag 10). Each panel 32 of the skin 18 is doubled up in an outer skin 18 and a liner. This essentially forms pockets 42. The panels 32 simply slip into the pockets 42, therefore the panels 32 in this embodiment are joined via the pockets 42 which form fabric hinges; in a hard case they could be directly affixed to each other. The rivet holes 44 in the panels 32 are anchor points to affix load bearing items, i.e. handle 50 straps and the like.

[0045] In regard to the curved steel length 30, it is preferably spring steel, its length 30 is dictated by the panel 32 to which it is affixed, its thickness is 0.005" to 0.010", its width is 0.5" to 1".

[0046] Although the invention has been described in detail in the foregoing embodiments for the purpose of illustration, it is to be understood that such detail is solely for that purpose and that variations can be made therein by those skilled in the art without departing from the spirit and scope of the invention except as it may be described by the following claims.

What is claimed is:
1. A bag comprising:
a rigid base;
a first rigid collapsible wall in pivotable relationship with the base;
a second rigid collapsible wall in pivotable relationship with the base and in spaced relation with and opposing the first rigid wall; and
a skin disposed about the first wall and the second wall and connected to the base, the base, skin, a first wall and second wall forming a storage space when they are in an expanded state where the first and second walls are maintained in a flat planar orientation essentially perpendicular with the base, and the storage space is essentially eliminated when they are in a compressed state where the first wall and the second wall are each folded up onto and essentially in parallel with the base.
2. A bag as described in claim 1 including a third wall and a fourth wall opposing the third wall, and a top opposing the base, the third and fourth walls and the top forming a box with the first and second walls and the base when they are in the expanded state, and folding together onto and within the perimeter of the base when they are in the compressed state.
3. A bag as described in claim 2 wherein the third wall and the fourth wall have a restraining mechanism to hold the first, second, third and fourth walls, and the top onto the base in the collapsed state.
4. A bag as described in claim 3 wherein the first and second walls each comprise a first element, a center element, a first hinge connecting the first element and the center element, a second element, and a second hinge connecting the center element and the second element.
5. A bag as described in claim 4 wherein the first element and the second element each have a first recess and a second recess, respectively, and a length that is disposed in each recess, the length being bendable but when the length is flat the length is rigid.
6. A bag as described in claim 5 wherein the first recess and the second recess extend between the first element and the center element, and the second element and the center element, respectively, and intersect the first and second hinges, respectively.
7. A bag as described in claim 6 wherein the first and the second hinges each have posts which allow the first and the second hinges to only fold in one direction.
8. A method for using a bag comprising the steps of:
forming a storage space with a base, a first rigid collapsible wall in pivotable relationship with the base, a second rigid collapsible wall in pivotable relationship
with the base and in spaced relation with and opposing the first rigid wall, and a skin disposed about the first wall and the second wall and connected to the base where the first and second walls are maintained in a flat planer orientation essentially perpendicular with the base; and

folding the first wall and the second wall onto and essentially in parallel with the base and essentially eliminating the storage space.

9. A method as described in claim 8 wherein the forming step includes the step of forming a box about the storage space with a third wall and a fourth wall opposing the third wall, a top opposing the base, and the first and second walls and the base; and wherein the folding step includes the step of folding together the first, second, third and fourth walls and the top onto and within the perimeter of the base.

10. A method as described in claim 9 including the step of holding the first, second, third and fourth walls, and the top onto the base with a restraining mechanism in a collapsed state.

11. A method as described in claim 10 wherein the folding step includes the steps of folding the first wall onto itself as it is folded onto the base, and folding the second wall onto itself as it is folded onto the base.

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