ABSTRACT OF THE DISCLOSURE

A six-sided box construction wherein a six-sided body portion and an end closure are fabricated from a flat blank, and wherein the end closure is an assembly of mutually supporting fingers and stub flaps. Fingers are provided with interengaging lock tabs, and are also coupled to the stub flaps by locks when the blank is in its box-forming position so that inward or outward collapse of the end closure is prevented. The fingers are also provided with interchangeable camming surfaces to guide the lock tabs to a locking position as the blank is manipulated to its box-forming position.

This application is a continuation-in-part of application Ser. No. 723,709, filed Apr. 24, 1968, now abandoned. This invention relates to a six-sided box construction, and more particularly, to a six-sided box construction comprising a tubular body portion and a collapse-resistant end closure.

Many-sided boxes are frequently used in packaging large, bulky objects, such as hats. The cross-sectional shape of such boxes more closely approaches the shape of the contents than does the square or rectangular cross section characteristic of conventional four-sided boxes. Previously proposed constructions for boxes having more than four sides have frequently required the fabrication of several pieces to provide the necessary body portion and end closures, with attendant high cost. On the other hand, when attempts have been made to fabricate such boxes from single-piece blanks, the result has frequently been a frail, easily collapsed product, or a box which is uneconomical due to difficulty of assembly.

One six-sided box construction previously proposed is that shown in U.S. Pat. 3,174,675, issued Mar. 23, 1965. In such construction, an element bridging opposite sides of the body portion serves to support inwardly directed flaps, thereby resisting forces tending to burst the end closure outwardly of the box. No provision is therein made, however, for the prevention of inward collapsing of the end closure. When the end closure in question constitutes the bottom of the box, inward collapse of the end closure is a real danger. When the box is supported by a force applied to a central portion of its bottom, for example, when the box is balanced in one hand, collapse is exceedingly likely.

The present box construction avoids inward collapse of the end closure by a novel arrangement whereby the separate parts of the end closure form a mutually supporting interlocking assembly. Such assembly is resistant to both inward and outward collapse. Moreover, the present box construction provides for virtually automatic interlocking of the parts as a partly assembled blank is expanded to its assembled condition.

Accordingly, it is an object of this invention to provide a six-sided box construction having a strong end closure member, resistant to inward and outward collapse.
3,525,466

28. The tab 34 provides a means whereby distal ends of the panels 26 and 28 may be joined. Moreover, the fold or score line 36 facilitates folding of the body portion 14, as will be explained later.

The distal end of the panel 26 is provided with beveled edge portions 38 and 40, the purpose of which will be explained later.

Referring again to FIG. 2, a finger element 42 extends inwardly from a panel 18 adjacent to the panel 18 to which the above-described panel 28 is coupled. The finger element 42 is separated from such panel 18 by a fold or score line 44. Coupled to the finger element 42, but separated therefrom by a fold or score line 46 is a stub member 48. The distal end 50 of the finger element 42 includes a locking tab 52, located on an edge of the finger element 42 adjacent the fold or score line 46. Also on the edge of the finger element 42, immediately adjacent the locking tab 52, is a cam-forming edge portion 54.

A flap 56 is secured to a panel of the body portion 14 adjacent the panel 18 to which the finger element 42 is secured. The flap 56, when the box is assembled, overlies a portion of the stub member 48. The flap 56 may be secured to the stub member 48 by glue, staples, or other convenient and well-known means. In the illustrated embodiment, the flap 56 is associated with the panel 18", and separated therefrom by a fold or score line 58.

A stub member 60 is secured, by a fold or score line 62, to the panel of the body portion 14 adjacent to the panel 18 to which bridge panel 24 is secured. In plan view, stub member 60 is an irregular four-sided polygon. A slit providing a lock 64 is disposed along the edge of the stub member 60 remote from the fold or score line 62. Secured to the stub member 60, and separated therefrom by a fold or score line 66, is a finger element 68. A fold or score line 66 defines a lateral edge of the finger element 68. A distal end 70 of the finger element 68 includes a locking tab 72, the purpose of which will be explained later. A cam-forming edge portion 74 is provided on the edge of the distal portion 70, adjacent the locking tab 72. A panel 18 adjacent to the panel 18 to which the stub member 60 is secured bears a flap 76, separated from such panel 18 by a fold or score line 78. The flap 76 is adapted to overlie the finger element 68, with an edge 80 thereof adjacent to the fold score line 66. Glue, staples, or other means may be used to join the flap 76 and finger element 68. The finger element 42, stub member 48 and flap 56, taken together, may be referred to for convenience as a filler panel. Thus, these three members serve to fill in the gaps between the bridge panel 24 and the panels 18, 18" to which the finger element 42 and flap 56 are secured. Similarly, the flap 76, finger element 68 and stub member 60 constitute a filler panel, filling the gap between the bridge panel 24 and the respective panels 18 from which the finger element 68 and flap 76 project. Referring to FIGS. 3 to 6, the respective filler panels are designated generally by the reference numerals 82 and 84.

Referring now to FIGS. 5 and 6, with the body portion 14 assembled, the fold or score line 46 bisects the dihedral angle defined by panels 18" and adjacent panel 18. Similarly, the fold or score line 66 bisects the dihedral angle between the respective panels 18 to which the flap 76 and stub member 60 are secured. Thus, upon collapsing of the body portion 14, the respective score lines 46, 66 nest within the score lines separating the panels of the body portion 14. The filler panels 82 and 84 are configured to permit folding of the body portion 14 to a flat condition. The fold or score line 36 of the bridge panel 24 permits upward folding of that panel when the body portion 14 is in a flattened condition.

One aspect of the present invention is the manner in which the locking tabs 52 and 72 and lock 64 cooperate to prevent collapsing of the end closure 16 inwardly or outwardly with respect to the body portion 14. Referring again to FIGS. 5 and 6, and also to FIG. 7, it will be seen that the bridge panel 24 serves as a support for the distal ends 50, 70 of the finger elements 42 and 68, and also for portions of stub members 48 and 60, to prevent collapse of the end closure 16 outwardly with respect to the plane defining an end of the body portion 14. Locking tabs 52 and 72 on the respective finger elements 42 and 68 are hooked together, and when thus interengaged, resist folding of the filler panels 82 and 84 to positions within the body portion 14. Also, the lock 64 on the filler panel 84 engages an edge of the finger element 42. Thus, the filler panels 82 and 84 are securely maintained in a generally coplanar relation, wherein inward as well as outward collapse is effectively precluded.

Referring to FIGS. 3 and 4, the cooperative relationship between the filler panels 82 and 84 and the bridge panel 24 during final assembly of the body portion 14 is shown.

As indicated previously, following securing of the tab 34 to the panel 26, and the flaps 56 and 76 to stub member 48 and finger element 68, respectively, the body portion 14 may be folded to a flat configuration wherein score lines 46 and 66 nest within respective score lines 20. In such configuration, the bridge panel 24 folds at score lines 38, 32 and 36, to assume a position within the body portion 14, in juxtaposition with panels 18 and 18".

Application of force as indicated by the arrows "F" in FIG. 4 causes spreading apart of the panels 18 and 18". Simultaneously, the filler panels 82 and 84 unfold inwardly and downwardly from their nested positions. Also, the bridge panel 24 unfolds, and begins to approach its operative position.

Referring to FIG. 3, the tab 34 on panel 28 is secured to panel 26 at a distal portion thereof. Thus, the distal end of the panel 26, which includes the beveled edge portions 38 and 40 defines a continuation or extension of the panel 26 beyond the score line 36.

As the bridge panel 24 and filler panels 82 and 84 unfold as described above, the beveled edge 40 slidably contacts the underside of stub member 60, thereby controlling unfolding of the filler panel 84. Also, the beveled edge portion 38 contacts the underside of finger element 42, thereby controlling unfolding of the filler panel 82. For clarity in FIG. 3, the finger element 42 is shown in a raised position, slightly out of contact with the beveled edge portion 38. In actual unfolding of the preferred embodiment, the finger element 42 is in contact with the edge portion 38, as indicated by the arrow A. As unfolding progresses, the above-described cam-forming edge portion 54 and 74 on the finger elements 42 and 68 come into sliding interengagement, as is best seen in FIG. 9. Sliding interengagement of the edge portions 54 and 74 guides the respective locking tabs 52 and 72 into mated engagement. Locking interengagement of the locking tabs 52 and 72 is thus achieved automatically as unfolding is completed. The locking tabs 52 and 72 are seen in locking interengagement in FIGS. 5 and 6.

After interengagement of the locking tabs 52 and 72, the lock 64 may be manually placed in the position seen in FIGS. 5 and 6, wherein it overlies an edge of the finger element 42.

The cover 12 shown in assembled relation with the box 10 in FIG. 1 may be of conventional construction, or may be of the construction shown in greater detail in FIG. 8. In FIG. 8 the cover 12 is seen to comprise a cover panel 86 and lip panels 88, separated from the cover panel 86 by fold or score lines 89. Adjacent lip panels 88 are provided with interengaging hooks 92 and slit tabs 94. Score lines 96, 98 separate the hooks 92 and slit tabs 94 from the lip panels 88 with which they are associated. Engagement of the hooks 92 with the slit tabs 94 maintains the lip panels 88 in perpendicular relation to the cover panel 86, thereby providing a simple and inexpensive cover.
The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof.

1. A box construction comprising a tubular six-sided body portion having side panels disposed about a longitudinal axis thereof, and a collapsible end closure for said body portion, said end closure comprising a bridge panel extending between opposite side panels of said body portion and foldable to a position within said body portion, said end closure further comprising a pair of inwardly extending filler panels coupled to oppositely disposed pairs of adjacent side panels other than the side panels from which said bridge panel extends and foldable to positions within said body portion, said filler panels overlaying said bridge panel so that said bridge panel maintains said filler panels in generally co-planar relation and prevents folding of said bridge panel to positions outside the plane of the end of said body portion, and said filler panels including interengageable lock means to maintain said filler panels in generally co-planar relation, and prevent folding of said filler panels to positions within said body portion.

2. A box construction in accordance with claim 1 wherein said filler panels comprise elongated finger elements disposed adjacent each other when said filler panels are in generally co-planar relation, said lock means comprising interengageable locking tabs for interconnecting said finger elements, said locking tabs being disposed at edges of said finger elements juxtaposed when said filler panels are in generally co-planar relation.

3. A box construction in accordance with claim 2 wherein said finger elements include cam-forming edge portions adjacent said locking tabs for guiding said locking tabs into interengaged relation.

4. A box construction in accordance with claim 3 wherein further lock means for maintaining said filler panels in generally co-planar relation, said further lock means comprising a lock member adapted to overlie an edge of the finger elements of the other filler panel opposite the locking tab on said one finger element when said filler panels are in generally co-planar relation, said further lock means comprising a lock member on one of said filler panels adapted to overlie an edge of the finger elements of the other filler panel opposite the locking tab on said one finger element when said filler panels are in generally co-planar relation.

5. A box construction in accordance with claim 7 wherein said bridge panel comprises a pair of panels having distal end portions thereof coupled together at a fold line, one of said pair of panels being foldably coupled to one of said opposite side panels, and the other of said pair being foldably coupled to other of said opposite side panels, one of said pair of panels having an end portion thereof extending beyond said fold line, said end portion having beveled edges thereon adapted to contact said filler panels when said filler panels are in positions intermediate said positions within said body portion and their respective positions when in generally co-planar relation.

6. A box construction in accordance with claim 1 wherein said filler panels comprise elongated finger elements foldably coupled to opposite side panels of said body portion, and stub members shorter than said finger elements foldably coupled to opposite side panels of said body portion, said stub members being foldably coupled to respective finger elements, the respective finger elements being disposed adjacent to each other and overlying portions of said stub members of the other of said filler panels when said filler panels are in generally co-planar relation, said lock means comprising interengageable locking tabs for interconnecting said finger elements, said locking tabs being disposed at edges of said finger elements juxtaposed when said filler panels are in generally co-planar relation.

7. A box construction in accordance with claim 6 wherein said finger elements include cam-forming edge portions adjacent said locking tabs for guiding said locking tabs into interengaged relation.

8. A box construction in accordance with claim 7, and further lock means for maintaining said filler panels in generally co-planar relation, said further lock means comprising a lock member on one of said filler panels adapted to overlie an edge of the finger elements of the other filler panel opposite the locking tab on said one finger element when said filler panels are in generally co-planar relation.
member-forming element remote from said first bridge member-forming element, said second finger element being separated from said second stub member-forming element by a score line, a locking tab on said second finger element on an edge thereof adjacent said score line, a cunform- ing edge portion on said second finger element adjacent said locking tab on said finger element, and a second flap-forming element secured to a side panel adjacent to the side panel to which the second filler member-forming element is secured, said second flap-forming element overlying a portion of said second finger element when the blank is folded to an operative configuration.