United States Patent

Lock

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[54] **PANEL INTERLOCKING MEANS AND METHOD**

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[73] Assignee: **The Mead Corporation**

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[51] **Int. Cl.**.....**A44b 17/00**, A44b 19/00, B65d 5/10

[58] **Field of Search**.....24/204, 17; 229/39–39 B

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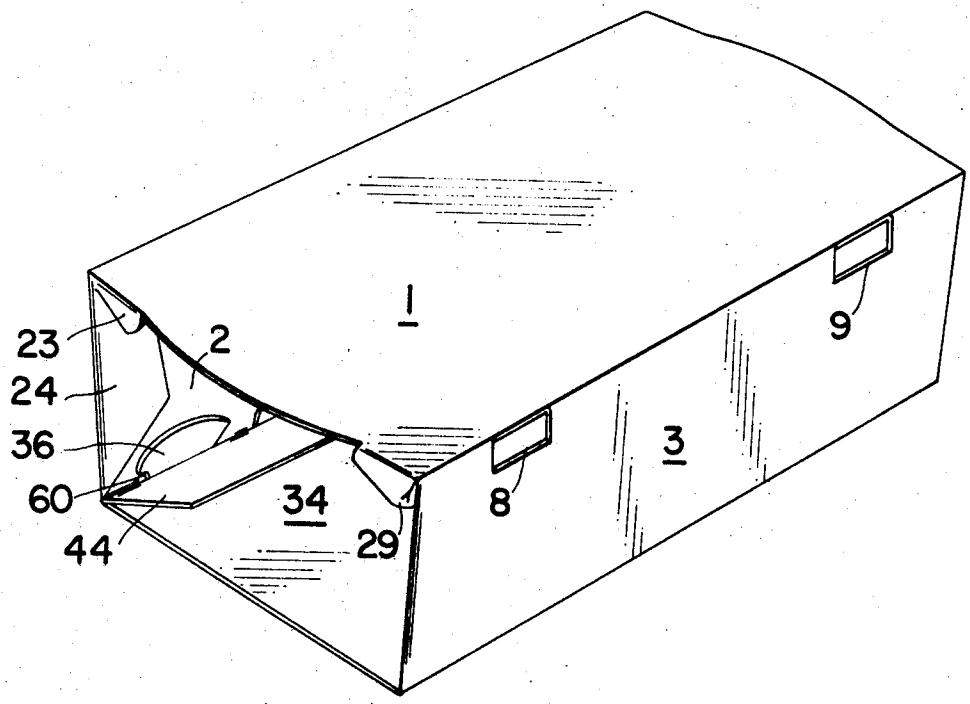
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[57] **ABSTRACT**

A pair of angularly related panels are interlocked by providing a plurality of locking slots formed along a fold line adjoining one edge of one of the panels and an associated guide panel together with a plurality of locking tabs foldably joined to an edge of the other panel. The slots are configured to extend into the guide panel and define entry tabs integral with the associated panel and the slots are arranged to extend into that panel along an angular fold line. When inserting the locking tabs into the associated locking slots the guide panel is first moved into normal relationship with respect to its associated panel and the other panel is bowed in such a way as to impart bodily rotation in sequence to the locking tabs whereby the dimension of the locking tab in the general direction of the locking slot is reduced following bowing to facilitate entry of the lock and the panel is restored to a planar condition upon completion of a locking operation so as to rotate the locking tabs sequentially to cause a larger dimension of the tab to become aligned with the general direction of the slot.

5 Claims, 4 Drawing Figures



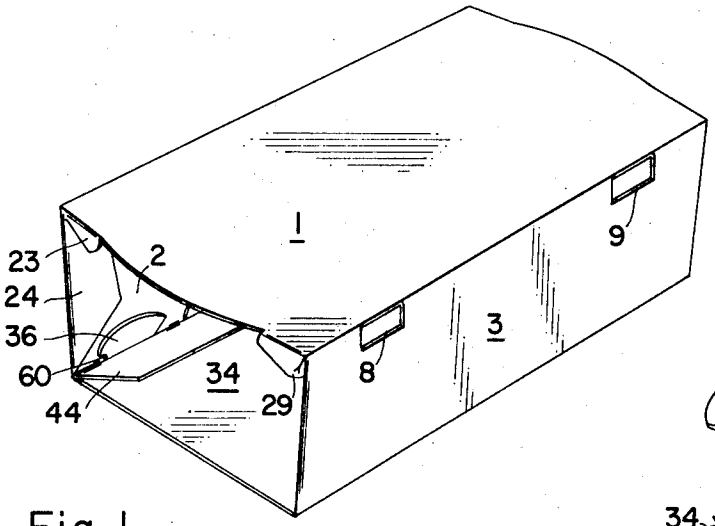


Fig. 1

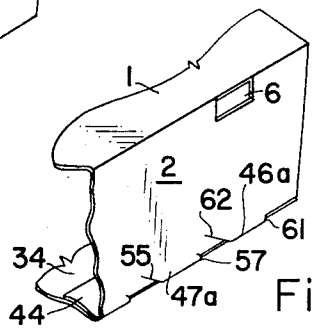


Fig. 3

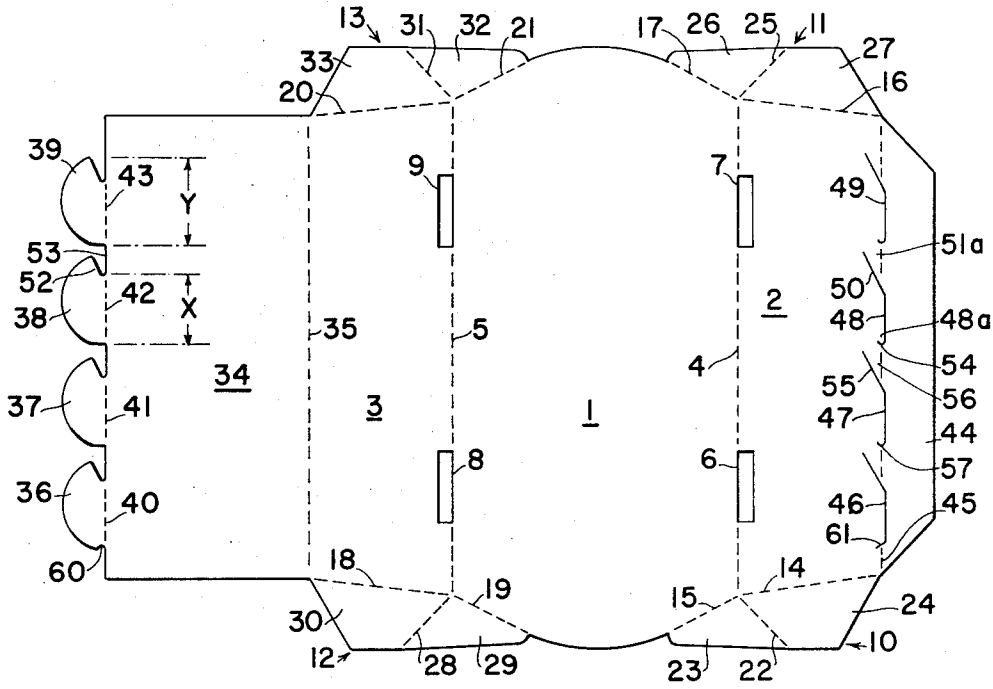


Fig. 2

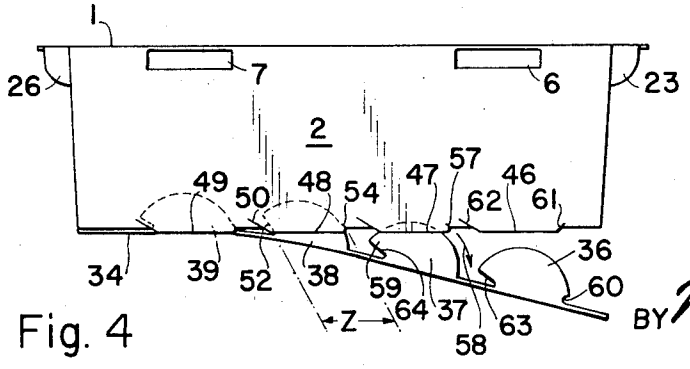


Fig. 4

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PANEL INTERLOCKING MEANS AND METHOD

U.S. application Ser. No. 672,100 filed Oct. 2, 1967 now U.S. Pat. No. 3,497,924 and assigned to the assignee of this invention discloses and claims a diagonal type locking structure having locking tabs and associated slots. In this arrangement the panels to be adjoined are interrelated in such manner that a locking edge of each locking tab is disposed in parallel abutting relationship to a part of its associated locking slot.

In contrast to the aforementioned patent application, this invention utilizes generally similar structure which is well adapted for adjoining a pair of angularly related panels and which contemplates insertion of a locking tab having a locking shoulder into a locking slot following exposure of the locking slot by folding a guide panel adjacent thereto out of the plane of its associated panel and the accompanying bowing of the panel to which the locking tab is foldably adjoined. The bowing of the panel associated with the locking tab causes bodily rotation of the locking tab and thus facilitates entry of the locking tab into the locking slot. When the bowed panel is restored to planar condition the locking tab is rotated in a reverse direction so as to secure the locking edge portion thereof into overlapping relationship with respect to a locking segment defined in the slotted panel. By this means an easily formed but securely fastened interrelationship between a pair of panels is provided. For a better understanding of the invention reference may be had to the following detailed description taken in conjunction with the accompanying drawings in which

FIG. 1 is a perspective view of a wrapper type carton having a bottom panel and a side wall panel adjoined according to this invention;

FIG. 2 is a plan view of the single unitary blank utilized in the formation of the carton depicted in FIG. 1;

FIG. 3 is a fragmentary side view of the side wall of the carton which is adjoined to the bottom panel; and in which

FIG. 4 is a side view similar to FIG. 3 and which depicts the bowing procedure whereby the bottom panel is bowed to rotate the locking tabs according to this invention.

In the drawings the numeral 1 designates the top wall of the carton to which side wall panels 2 and 3 are foldably joined along fold lines 4 and 5 respectively. Article holding slots 6, 7, 8 and 9 are formed in the upper portions of side walls 2 and 3 and receive outwardly protruding flange portions of articles such as cans or other similar articles packaged within the container.

For the purpose of aiding in holding the packaged articles within the wrapper, web structure is provided at each upper end corner of the carton and is designated generally in the drawings by the numerals 10, 11, 12 and 13. Web structure 10 is foldably joined to an end edge of side wall panel 2 along fold line 14 and to an arcuate end portion of top wall 1 along fold line 15. Similarly web structure 11 is foldably joined to an end edge of side wall 2 along fold line 16 and to the top wall 1 along arcuate fold line 17. Fold lines 18 and 19 adjoin web structure 12 to side wall 3 and top wall 1 while fold lines 20 and 21 adjoin web structure 13 to side wall 3 and top wall 1.

As is apparent in the drawings, web structure 10 is formed in two parts which are separated by a fold line

22. Fold line 22 divides the web structure 10 into a holding strap 23 and an anchoring flap 24. In similar fashion fold line 25 divides web structure 11 into a holding strap 26 and an anchoring flap 27. Web structure 12 incorporates a fold line 28 which divides the web structure into a holding strap 29 and an anchoring flap 30 while fold line 31 divides web structure 13 into holding strap 32 and anchoring flap 33.

The bottom wall of the carton comprises a panel 34 which is foldably joined along the bottom edge of side wall 3 along fold line 35.

According to this invention, side wall panel 2 is interlocked with bottom wall 34 by means of a plurality of locking tabs 36—39 which are foldably joined to panel 34 along fold lines 40—43 respectively when guide panel 44 which is folded along a fold line generally designated as 45 out of the plane of side wall 2 to expose a plurality of locking slots 46—49 into which locking tabs 36—39 are inserted.

In forming the lock between side wall panel 2 and bottom wall panel 34, the carton blank is disposed about its contents and bottom panel 34 is disposed underneath the articles therein. Locking tabs 36—39 are folded into substantially normal relationship with respect to bottom wall panel 34 while guide panel 44 is folded into substantially normal relationship with respect to side wall panel 3. The locking tabs 36—39 are then inserted in sequence into their associated locking slots 46—49 while a progressive bowing action is imparted to bottom wall 34 as best shown in FIG. 4.

Each locking tab 36—39 is provided with a base portion such as is indicated at X in connection with locking tab 38 and a shoulder portion such as is indicated at Y in connection with tab 39. Furthermore, each of the locking slots 46—49 is disposed astride the fold line 45 between guide panel 44 and side wall 2. Each of the locking slots extends somewhat into the guide panel 44 to define an entry tab which is integral with side wall 2. For example, slot 48 defines an entry tab 48*a* which is integral with side wall 2 so that when guide panel 44 is folded into normal relationship with respect to side wall 2 as best shown in FIG. 1, a wide entry aperture is provided for receiving the locking tab such as 38. Furthermore, an end portion 50 of locking slot 48 extends well into side wall 2. This portion of the slot identified by the numeral 50 is disposed in an angular relationship to fold line 45 to define therebetween a locking segment designated by the numeral 51*a*. The locking edge 52 of locking tab 38 is disposed at an acute angle to the edge 53 of panel 34 which corresponds approximately to the angle between end 50 of slot 48 and fold line 45. The opposite end portion 54 of slot 48 is generally parallel to end 50 thereof.

Locking slot 47 is provided with an end portion 55 which defines a locking segment 56 together with a parallel end portion 57 which is substantially parallel with end portion 55.

As is apparent from FIG. 4, the downward bowing of bottom wall panel 34 imparts bodily rotation to locking tabs such as 36 and 37 and the other tabs in a generally clockwise direction as indicated by the arrow 58. Thus because of the downward bowing and the accompanying rotation of each individual locking tab accompanied by the sequential insertion of each locking tab into its associated locking slot, the transverse dimen-

sion of the locking tab such as **37** as represented for example in somewhat exaggerated form by the letter Z is significantly less than the dimension designated by the letter Y in FIG. **2**. Thus hang-ups of extremities of the locking tab are avoided and easy insertion of each tab is assured according to a feature of the invention.

When a lock is completely formed, the shoulder portion such as is indicated by the numeral **59** in FIG. **4** is inserted behind the locking segment **56** in a slightly overlapping relationship therewith. Thus the lock is secure though easy to insert.

In order to insure that the easy insertion feature of the lock does not result in a reverse operation and a consequent inadvertent unlocking of the carton, a securing notch such as is designated by the numeral **60** is provided in connection with one of the end locking tabs such as **36** and cooperates with the end portion **61** of the locking slot **46** so as to form a secure and inviolate locked condition of the panels **2** and **34**. End portion **61** is disposed a substantial angle to the other end **55** of the associated slot **46**. Of course if the end lock is secure, the remaining locks cannot be rotated and unlocked.

From the above description it is apparent that while this lock is not limited for use in conjunction with a pair of angularly related panels it is well adapted for use in conjunction with such panels and that it not only facilitates the initial formation of the lock but, according to the invention, security of the lock is significantly improved and the resulting security of a package utilizing the lock is substantially enhanced.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An arrangement for interlocking a pair of angularly related panels, said arrangement comprising a guide panel foldably joined along one edge thereof to one edge of one of said panels along a fold line, a locking tab foldably joined to an edge of the other of said panels, said locking tab having a base portion and a generally transverse shoulder portion defining a locking edge angularly disposed with respect to the plane of said other panel and to the general disposition of said edge of said other panel, an irregular slot disposed astride the fold line adjoining said guide panel and said one panel and formed in said guide panel and in said one panel with both of its end portions formed in and extending into said one panel a substantial distance to define an entry tab struck from said guide panel and constituting an integral projection of said one panel, one end of said slot extending into said one panel at an angle corresponding generally to the angle by which said locking edge of said locking tab is disposed relative to the plane of said other panel to define a locking segment formed in said one panel between said slot and said fold line, and the overall length of said slot in a direction parallel to said fold line being generally equivalent to the dimension of the shoulder portion of said locking tab in the same direction, the locking edge of said locking tab and the adjacent part of said shoulder portion being disposed in slightly overlapping relation with said locking segment and said locking tab being disposed in flat face contacting relation with said one panel and at an angle to said other panel corresponding to the angular relation between said panels, and means for positively maintaining the carton in locked condition.

2. An arrangement according to claim **1** wherein the end portion of said slot which is remote from the end which extends into said one panel is substantially parallel therewith.

3. An arrangement according to claim **1** wherein a plurality of locking tabs and their associated locking slots are provided and wherein the base portion of an end one of said locking tabs on the side remote from said locking edge is cutaway to define a securing notch and wherein the associated end of said slot is disposed at a substantial angle to the other end portion thereof.

4. A method of interlocking a pair of panels one of which is foldably joined to a guide panel along one edge thereof and is provided with a locking slot disposed astride said one edge and configured to define an entry tab struck from said guide panel and having one end extending into said one panel at an angle to said one edge thereof and the other panel being foldably joined along one edge thereof to a locking tab having a shoulder portion defining a locking edge which is disposed at an acute angle to said one edge of said other panel, the method comprising folding said guide panel into a position of substantially normal relation to said one panel, folding said locking tab into a position of substantially normal relation to said other panel, bowing said other panel so as to impart bodily rotation to said locking tab in one direction, the effective overall dimension of said locking tab in the direction of said fold following bowing of said one panel and bodily rotation of said locking tab in said one direction being significantly less than the corresponding dimension thereof when said one panel is in a planar flat condition, inserting said locking tab into said locking slot, and finally restoring said one panel to a planar condition thereby rotating said locking tab in the opposite direction.

5. A method according to claim **4** wherein a plurality of locking tabs and associated slots are provided and wherein the bowing of said one panel is progressive in the direction of said fold line so as to impart sequential insertion of said locking tabs into their associated locking slots.

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