

PANEL INTERLOCKING MEANS FOR CARTONS

This invention relates to panel interlocking means for cartons for securing together a pair of panels, for example, adjacent overlapping panels of a paperboard carton. In some situations, these panels are provided by the opposite ends of a wrapper blank which are brought together in overlapping relationship and interlocked.

Locking tabs which are struck from one end of the carton wrapper and which are arranged to be forced through corresponding apertures defined by retaining tabs, struck from an opposite end of a wrapper are well known. An example of such a lock is shown in Figure 1 and corresponds substantially to GB 1 598 367. A problem associated with locking tabs of this type is that when they are forced through the aperture, the shoulder portion 1, illustrated in Figure 1, is forcibly folded out of alignment with the remainder of the tab in order to pass through the aperture. This is undesirable as it weakens the locking tab. Further, if the machinery that punches the locking tab through the aperture fails to do so correctly or completely, the integrity of the tab is compromised resulting in a carton which can no longer be used or is unreliable in use. Moreover such incomplected locks can be difficult to detect prior to use.

A further example is illustrated in GB 2 156 785 and owned by the applicant of this invention. This document illustrates a wraparound carton with panel interlocking means comprising a locking tab which is required to be driven through an aperture. It is apparent from the drawings that the outer portions of the tab are forcibly folded out of alignment with the remainder of the tab during the locking procedure. The locking tab is propped up by a retaining tab and the base portion of the locking tab is disposed in second engagement with the locking edge of a locking aperture.

By contrast, the present invention seeks to provide a panel interlocking means which does not result in the locking tab being deformed during locking and which

allows incompleting locking i.e. insufficient engagement between locking tab and retaining tab to be readily detected prior to use. Further, because the retaining tab is broader than known similar locks, there is an improved cooperation between a locking finger to engage the lock by increasing the dwell time of the finger in the height and flow direction which makes mechanical adjustment easier and assists in avoiding incomplete engagement between the locking and retaining tabs.

According to one aspect of the present invention, there is provided panel interlocking means for securing together a first and a second panel in overlapping relationship, said first panel comprising a locking tab struck from said first panel, the locking tab having a neck portion hinged at a base thereof to said first panel and a shoulder portion contiguous therewith, said second panel including a retaining tab extending into a locking aperture struck from said second panel and wherein the retaining tab is displaced out of the plane of said second panel to receive said locking tab through the locking aperture and abuts a portion of said locking tab projecting beyond said shoulder portion characterised in that the locking aperture is sized and/or shaped to enable the locking tab to move unimpeded through the locking aperture and in that a locking edge of the locking tab is provided at the shoulder portion to interengage with at least one panel portion of said second panel located adjacent said locking aperture to maintain together with said retaining tab, said first panel and said second panel in a locked overlapped relationship.

According to a second aspect of the invention, there comprises a carton blank of the wraparound type incorporating panel interlocking means having a first panel and a second panel, said first panel comprising a locking tab struck from said first panel, the locking tab having a neck portion hinged at a base thereof to said first panel and a shoulder portion contiguous therewith, said second panel including a retaining tab defining a locking aperture struck from said second panel and wherein the retaining tab can be displaced out of the plane of said second panel to receive said locking tab through the locking aperture being sized and/or shaped to enable the locking tab to move unimpeded through the locking aperture and to abut a portion of said locking tab

projecting beyond said shoulder portion and wherein a locking edge of the locking tab is provided at the shoulder portion thereby to interengage with at least one panel portion of said second panel located adjacent said locking aperture to maintain together with said retaining tab said first panel and said second panel in a locked overlapped relationship.

According to an optional feature of either aspect of the invention the retaining tab is struck from the second panel to define the locking aperture.

According to another optional feature, the locking tab comprises a second locking edge adapted to interengage a second panel portion being spaced and opposed the first panel portion about the locking aperture.

According to yet another optional feature each panel portion is located adjacent one corner of the distal end of the locking aperture.

Preferably, the edge of the corner is curved.

According to a further optional feature of either aspect of the invention, the cut line defining the locking aperture is shaped to provide a recess extending along part of a side edge of the locking aperture, which recess is adapted to receive the shoulder portion of said locking tab. Preferably, the retaining tab comprises a protruding portion along its side edge.

Embodiments of the invention will now be described, by way of example only, in which:

FIGURE 1 shows a locking means substantially corresponding to patent number GB 1 598 368;

FIGURE 2 shows a pair of panels which are opposite ends of a wraparound carton blank, in close proximity, one of which includes a locking tab and the other of which includes a retaining tab and locking apertures;

FIGURE 3 is a perspective view of part of the panels illustrated in Figure 2
5 which are interlocked;

FIGURE 4 shows a second embodiment of the invention and, in particular, pair of panels which are opposite ends of a wraparound carton blank in close proximity, one of which includes a locking tab and the other of which includes a retaining tab and locking aperture.

10 Referring to the drawings, and in particular Figures 2 and 3, a pair of panels 10, 12 respectively are adapted to be interlocked and are formed from paperboard or similar foldable sheet material. The panels 10, 12 may, for example, be disposed at the opposite ends of one and the same wraparound carton blank which is to be formed into a carton sleeve in which panels 10, 12 then provide bottom panels of the carton.
15 The carton is used for packaging a plurality of articles, for example, cans.

Locking tab 14 is struck from first panel 10 and is hingeably connected thereto by fold line 16. The fold line 16 is substantially parallel to and spaced from the end edge 18 of panel 10. The locking tab 14 comprises a neck portion 20 and a main portion 21 including a shoulder portion 22. The neck portion 20 is hingeably
20 connected to main panel 10 along fold line 16. Optionally, fold line 16 is positioned in a central part of neck portion 20. A pair of oppositely disposed cut lines 24, 26 define the side edges of the neck portion 20 and preferably, extend beyond fold line 16. Optionally, fold line 16 is separated by a cut line to make folding the locking tab 14 easier.

25 Main portion 21 extends beyond neck portion 20 towards free edge 18 and is separated from first panel 10 by a cut line 28 which connects cut lines 24 and 26 and

to define the shape of the main portion which is preferably an "arrow head" shape. Neck portion 20 should be narrower in width than the adjacent part of shoulder portion 22 to define at least one locking edge 25 formed along the lower part of the shoulder portion.

5 As shown in Figure 2, a retention tab 30 is struck from second panel 12 and is hingeably connected thereto by fold line 32. Fold line 32 is substantially parallel to and spaced from end edge 34 of panel 12. Optionally, fold line 32 is separated by a cut line to make folding the retention tab easier. Retention tab 30 comprises a
10 elongate portion 36 and separated from panel 12 by a pair of oppositely disposed cut lines 38, 40 which define side edges of the elongate portion 36 and are increasingly spaced apart towards the end edge 34. A cut line 42 defines a distal edge 37 of elongate portion 36 which in this embodiment is substantially parallel to fold line 32. In this embodiment, cut lines 38 and 42 are interconnected by a curved cut line 44 to define a panel portion 43 adjacent the locking aperture. Likewise, cut lines 40 and 42
15 are interconnected by a curved cut line 46 to define a second panel portion 45 adjacent the locking structure.

 In the embodiment illustrated in Figure 3, the widest part of the shoulder portion 22 corresponds to the distance between cut lines 38 and 40 at the point of maximum spacing B thereby enabling the locking tab 14 to pass through the aperture
20 without being impeded or forcibly folded out of alignment. Preferably, the radius of curvature C for cut lines 44 and 46 is greater than or equal to the radius of curvature at the base of the shoulder portion 22 of locking tab 14 to assist the locking tab 14 to pass through the aperture 48 formed by the retention tab 30 (see below).

 It will be appreciated by those skilled in the art that a carton may be provided
25 with a number of locking tabs and retention tabs which are substantially identical to locking tab 14 and retention tab 30 in order to lock together two panels and are not therefore described in any greater detail. Further, it is envisaged that the panel interlocking means can comprise a "half lock": the locking tab, retaining tab and

locking aperture being formed to one side of a notional centre line D only, shown in Figure 1. The general principle of applying an invention of panel interlocking means to a half lock is well known in the art. Thus it will be apparent to a person skilled in the art that the present invention includes half locks incorporating those relevant features of the present invention.

In order to lock together first and second panels 10 and 12, they are brought into an overlapping relationship with each other, and locking tab 14 is folded out of alignment with panel 10. Retention tab 30 is folded out of alignment with panel 12 and locking tab 14 is punched through the aperture 48 defined by the retention tab 30. Beneficially, the base of shoulder portion 22 does not need to be deformed to pass through aperture 48. One advantage of the present invention is that the locking process does not require an interference type fit thereby reducing the requirement of the shoulders of a locking tab to meet any strength requirements during the punching motion.

As locking tab 14 passes through the aperture 48, it continues to be folded about fold line 16 and into a substantially perpendicular relationship with panels 10, 12 such that locking tab 14 is pushed beyond the end edge 42 of retention tab 30. Thus, locking tab 14 is held in position because retention tab 30 abuts one side of shoulder portion 22 to prevent it from springing back to its original position and the corresponding edge of aperture 48 abuts neck portion 20 thereby retaining locking tab 14 in a substantially perpendicular relationship.

As illustrated in Figure 3, the base of shoulder portion 22 is held in place by abutment with panel portions of the second panel, which in this embodiment are defined by the radius of curvature of cut lines 44 and 46, as the shoulder portions are broader than the locking aperture in a vertical or oblique positions. If the locking tab 14 fails to be interengaged, it can be easily detected after the locking process has taken place and can be rectified because integrity of the shoulder portion has not been tampered with. It will also be appreciated by those skilled in the art that as the

retention tab 30 is broader than known locking means, the amplitude of the locking finger motion is improved in terms of its height and flow direction within the pack which makes the locking process easier to adjust.

5 Tension is applied to the first and second panels 10, 12 in opposition to the locking direction; i.e. in a direction tending to move the panels apart. Thus, the butt engagement between the locking tab and retention tab 30 maintain the locking tab 14 in its locked condition. First and second panels 10, 12 remain interlocked because the front edge of aperture 50 is in butt engagement with fold line 16 of panel 10 and, as explained above, the locking edges of locking tab are supported by the panel portion
10 of second panel 12.

 Figure 4 illustrates a second embodiment wherein a locking tab 110 and a retention tab 112 are struck from a pair of panels 114, 116 respectively. It will be appreciated that the construction and form of the locking tab 110 and retention tab 112 is substantially identical to the locking arrangement of the first embodiment, and
15 therefore only the differences are described in any greater detail. In this embodiment, a pair of oppositely disposed cut lines 118, 120 define the side edges of retention tab 112 such that they are substantially parallel and spaced. The panels are interlocked according to the method described above.

 The present invention and its preferred embodiments relates to a means of
20 locking two adjacent panels in a wraparound carton and is shaped to provide satisfactory strength in a locked position but with a degree of flexibility so that the load transferred to the panels is absorbed by the carrier. The shape of the blank minimises the amount of paperboard required. The carrier can be formed by hand or machinery. It is anticipated that the invention can be applied to a variety of carriers
25 not limited to those of the wraparound type.

CLAIMS

1. Panel interlocking means for securing together a first and a second panel in overlapping relationship, said first panel comprising a locking tab struck from said first panel, the locking tab having a neck portion hinged at a base thereof to said first panel and a shoulder portion contiguous therewith, said second panel including a retaining tab extending into a locking aperture struck from said second panel and wherein the retaining tab is displaced out of the plane of said second panel to receive said locking tab through the locking aperture and abuts a portion of said locking tab projecting beyond said shoulder portion characterised in that the locking aperture is sized and/or shaped to enable the locking tab to move unimpeded through the locking aperture and in that a locking edge of the locking tab is provided at the shoulder portion to interengage with at least one panel portion of said second panel located adjacent said locking aperture to maintain together with said retaining tab, said first panel and said second panel in a locked overlapped relationship.
2. Panel interlocking means as claimed in claim 1, wherein the retaining tab is struck from the second panel to define the locking structure.
3. Panel interlocking means as claimed in claim 1 wherein the locking tab comprises a second locking edge adapted to interengage a second panel portion being spaced from and opposed to the first panel portion about the locking aperture.
4. Panel interlocking means as claimed in any of claims 1 to 3 wherein the or each panel portion is located adjacent a corner of the distal end of the locking aperture.
5. Panel interlocking means as claimed in claim 4 wherein the edge of the corner is curved.



6. Panel interlocking means as claimed in claims 1, 2, 3 or 5 wherein a cut line defining the locking aperture is shaped to provide a recess in the plane of said second panel extending along part of a side edge of the locking aperture, which recess is adapted to receive the shoulder portion of said locking tab.

5 7. Panel interlocking means as claimed in claims 1, 2, 3 or 5 wherein the retaining tab comprises a protruding portion along its side edge to strengthen the retaining tab.

10 8. A carton blank of the wraparound type incorporating panel interlocking means having a first panel and a second panel, said first panel comprising a locking tab struck from said first panel, the locking tab having a neck portion hinged at a base thereof to said first panel and a shoulder portion contiguous therewith, said second panel including a retaining tab defining a locking aperture struck from said second panel and wherein the retaining tab can be displaced out of the plane of said second panel to receive said locking tab through the locking aperture being sized and/or
15 shaped to enable the locking tab to move unimpeded through the locking aperture and to abut a portion of said locking tab projecting beyond said shoulder portion and wherein a locking edge of the locking tab is provided at the shoulder portion thereby to interengage with at least one panel portion of said second panel located adjacent said locking aperture to maintain together with said retaining tab said first panel and
20 said second panel in a locked overlapped relationship.

9. A carton blank means as claimed in claim 8, wherein the retaining tab is struck from the second panel to define the locking structure.

25 10. A carton blank as claimed in claim 8 wherein the locking tab comprises a second locking edge adapted to interengage a second panel portion being spaced and opposed the first panel portion about the locking aperture.



11. A carton blank as claimed in any of claims 8 to 10 wherein each panel portion is located adjacent one corner of the distal end of the locking aperture.
12. A carton blank as claimed in claim 11 wherein the edge of the corner is curved.
- 5 13. A carton blank as claimed in any of claims 8, 9 10 or 12 wherein the cut line defining the locking aperture is shaped to provide a recess extending along part of a side edge of the locking aperture, which recess is adapted to receive the shoulder portion of said locking tab.
- 10 14. A carton blank as claimed in any of claims 8, 9, 10 or 12 wherein the retaining tab comprises a protruding portion along its side edge.
15. A carton of the wraparound type incorporating panel interlocking means as defined in any of claims 1 to 7.
16. The use of panel interlocking means of any of claims 1 to 7 to interlock a first and second panel in overlapping relationship.