(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 447 124 A2**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **91301899.0**

(51) Int. Cl.[5]: **B65D 5/42**

(22) Date of filing: **07.03.91**

(30) Priority: **13.03.90 GB 9005611**

(43) Date of publication of application:
**18.09.91 Bulletin 91/38**

(84) Designated Contracting States:
**AT BE DE DK ES FR GB GR IT NL SE**

(71) Applicant: **THE MEAD CORPORATION**
**2000 Courthouse Plaza NE**
**Dayton Ohio 45463 (US)**

(72) Inventor: **Marie, Philippe**
**13 Rue de la Bievre**
**F-36000 Chateauroux (FR)**

(74) Representative: **Hepworth, John Malcolm**
**Hepworth Lawrence Bryer & Bizley, 36 Regent Place**
**Rugby Warwickshire CV21 2PN (GB)**

# (54) Two position punch lock for cartons.

(57) 1. A two position punch lock for cartons for securing together a pair of panels of the carton in overlapping relationship comprises a locking tab (30) struck from one of the panels and a locking aperture (42) provided in the other of the panels and arranged to receive and retain the locking tab. The locking tab has opposed lateral shoulders (32, 34) between a base and a nose of the tab and the width across said locking tab at its shoulders is broader than the greatest width of the locking aperture and the width of the extremity of the nose is narrower than the least width of said locking aperture. Each shoulder is formed with a deformable marginal portion formed by a cut extending inwardly from the edge of the shoulder. This marginal portion is deformed by engagement with the adjacent lateral edge of the locking aperture to lock the locking tab in the locking aperture.

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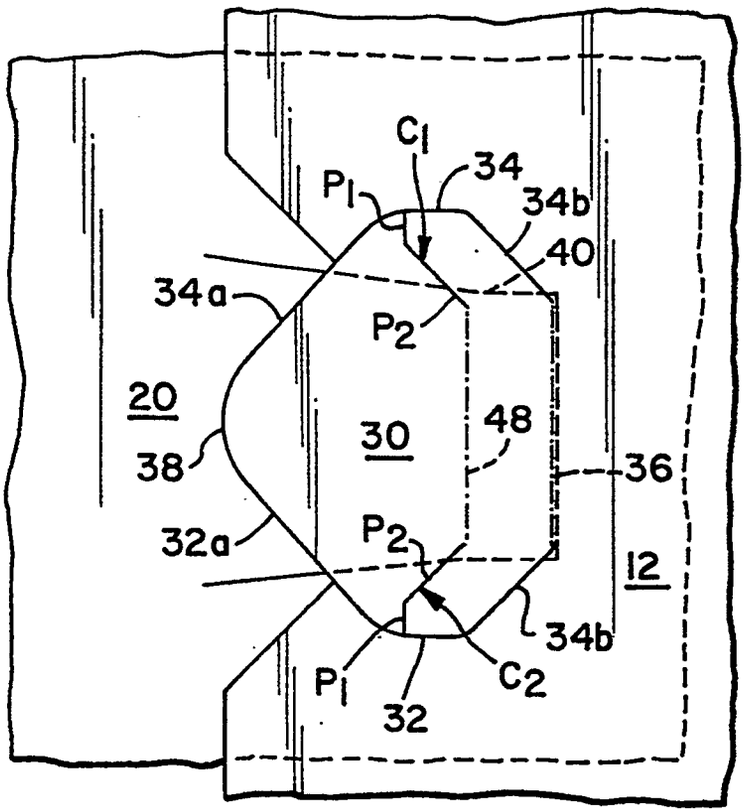
Fig. 2.



# TWO POSITION PUNCH LOCK FOR CARTONS

This invention relates to a panel interlocking arrangement comprising a two position punch lock for cartons and to cartons, particularly foldable wrappers, having such interlocking means. Known wrappers often comprise a paperboard blank which has a top wall panel, two side wall panels and two base panels hinged together by means of fold lines. One of the base panels has locking tabs which can be folded up from that base panel for engagement in associated locking apertures in the other base panel, the locking tabs then being supported in position by retaining tabs which are folded up from the edges of the locking apertures.

EP-A-0 275 200 discloses a panel interlocking means for securing together a pair of panels in overlapping relationship which includes a locking tab struck from one of the panels arranged to be driven through a locking aperture struck from the other panel.

Each lateral edge of the locking tab is formed with a plurality of deformable marginal portions provided by a series of cuts. The marginal portions are selectively deformable by engagement with the opposed lateral edges of the locking aperture dependent upon the extent to which the locking tab is driven into the locking aperture. Thus, the locking tab may be locked in the locking aperture in a plurality of selected positions.

In small cartons and/or where the available space between adjacent packaged articles is limited, the above known locking arrangement has been found difficult to incorporate. The present invention however does offer a panel interlocking means for application where space is at a premium, i.e. in situations where the area of paperboard available to place panel locking means is limited.

One aspect of the present invention provides panel interlocking means for securing together a pair of panels in overlapping relationship comprising a locking tab struck from one of the panels and a locking aperture provided in the other of said panels and arranged to receive and retain said locking tab, said locking tab being hinged to said one panel at a base and having a nose remote from the base, said locking aperture comprising spaced lateral edges, characterized in that said locking tab has opposed lateral edges one of which edges comprises a shoulder portion disposed between said base and said nose, the width across said locking tab at each shoulder being broader than the greatest width of said locking aperture and the width at the extremity of said nose being narrower than the least width of said locking aperture, each lateral edge being formed with a deformable marginal portion formed by a cut extending inwardly from said lateral edge said marginal portion being deformed by engagement with the adjacent lateral edge of the locking aperture to lock the locking tab in the locking aperture.

According to a feature of this aspect of the invention one lateral edge of the locking tab may be defined by a straight and uninterrupted cut which is generally aligned with the co-operating edge of said locking aperture when the locking tab is positioned for locking in said locking aperture.

According to another feature of this aspect of the invention, both lateral edges of the locking tab may comprise a shoulder portion, both said shoulder portions extending beyond the respective co-operating edges of said locking aperture when the locking tab is positioned for locking in said locking aperture.

In some preferred constructions said cut may be formed in each shoulder portion and extends inwardly from the lateral edge of said shoulder portion.

In other preferred constructions said cut may be formed intermediate each shoulder portion and said nose.

According to yet another feature of this aspect of the invention, said nose may be exposed at a lateral edge of said one panel.

In constructions where both lateral edges of the locking tab comprise shoulder portions, the cut lines in the respective shoulder portions may be generally aligned with one another. Preferably, the cut lines are convergent in a direction towards the base of said locking tab.

According to a still further feature of this aspect of the invention the locking aperture may be defined by a retaining tab arranged to support the tab in a locked position within the locking aperture, said retaining tab being hinged to said other panel at a base which is spaced from the base of the locking tab when said locking tab is positioned for locking by means of each shoulder cut in the locking aperture.

Another aspect of the invention provides a blank for forming a carton including a pair of panels which are secured in overlapping relationship when the carton is assembled, said pair of panels having panel interlocking means according to any of the preceding claims.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

FIGURE 1 is a schematic perspective view of a wrapper blank formed into a tubular configuration with its base panels overlapped and shown with one of its locking tabs engaged in a co-operating locking aperture;

FIGURE 2 is a fragmentary plan view of the overlapped base panels showing a single locking tab in a position to be driven through a locking aper-

ture;

FIGURE 3 is a perspective fragmentary view in part cross-section showing a single locking tab interlocked intermediate its nose and its base within a locking aperture; and

FIGURE 4 is a perspective fragmentary view similar to Figure 3 but showing a single locking tab interlocked adjacent its base within a locking aperture.

Referring to the drawings, the wrapper 10 is formed from a blank of paperboard or similar foldable sheet material and comprises, in series, a first base panel 12, a first side wall panel 14, a top wall panel 16, a second side wall panel 18 and a second base panel 20 hinged one to the next along fold lines 22-28. In practice, upper and lower portions of the side wall panels are formed with openings for receiving portions of articles e.g. neck and heel portions of bottles to be packaged. The base panels include triangular handling openings "A" used to draw the two base panels towards one another into overlapping relationship prior to locking.

A series of locking tabs 30 is struck from the base panel 12 at its free edge and, referring now more particularly to Figure 2, each locking tab includes opposed parallel lateral edge parts 32, 34, respectively, which comprise straight and uninterrupted cut lines; a base part 36 by which the tab is hinged to the base panel 12 and an opposed leading nose portion 38. A series of retaining tabs 40 is struck from the other base panel 20 adjacent its free edge and each retaining tab defines a locking aperture 42 at locations arranged so as to correspond with the locking tabs 30 when the wrapper is formed. Each locking aperture 42 has opposed lateral edges 44, 46, respectively.

Figure 1 shows that when the wrapper is formed and the base panels 12, 20 interlocked, the locking tabs 30 are driven into the locking apertures 40 where they are supported in this position by the retaining tabs. The particular form of the locking tabs can be seen in Figures 2, 3 and 4.

Referring now to Figure 2 the lateral edges 32, 34 of each locking tab form shoulder portions of the tab and constitute the broadest part of the tab disposed intermediate its base 36 and its nose 38. The forward lateral edges 32a, 34a, respectively, of the tab converge towards the rounded nose 38 which is narrower than the broadest part of the locking aperture. The rearward lateral edges 32b, 34b, respectively, of the tab converge towards the base 36 which comprises a fold line or, at least a notional foldable stip between the extremities of the rearward lateral edges about which the locking tab is foldable relative to base panel 12.

Each of the shoulder portions of the locking tab is formed with a single cut line C1 and C2 respectively. Each cut line has a first portion P1 which meets the associated lateral edge of the tab at an angle of 90 degrees and a second contiguous portion P2 which is directed towards the hinged base 36 of the tab at an angle which is greater than 90 degrees with respect to the first portion.

In the arrangement shown, the angle subtended between the first and second portions of each cut line is substantially 135 degrees. Thus, the first portions are parallel to the hinged base whereas the second portions are convergent towards the base of the tab.

The ends of the cut lines remote from the shoulder portions of the tabs are connected by a fold line 48 or at least a strip of the tab which is readily foldable.

Thus, the shoulder portions of the tab can be deformed in that the forward lateral edges and the nose of the tab can be displaced together relative to the rearward lateral edges and the base to engage the tab in a locking aperture.

The lateral edges 44, 46 of each locking aperture 42 diverge towards the base of the associated retaining tab 40. These edges may be parallel at their ends remote from the base of each retaining tab as can be seen by the broken lines in Figure 2. The breadth (as measured between the opposed lateral edges) of each locking aperture is selected so that it is approximately in alignment with the "roots" of the cuts in the deformable shoulder portions of a locking tab i.e. the distance of fold line 48 across the ends of opposed cut lines is approximately equal to the breadth of the locking aperture at the location at which locking is to take place.

Referring to Figure 3, when locking of the base panels is effected, each locking tab 30 is caused to penetrate into a corresponding locking aperture nose first and thereby displace the retaining tab. Since the breadth of the locking tab is greater than that of its locking aperture as measured across the opposed shoulder portions forward lateral edges of the locking tab are displaced by abutment against the lateral edges of the locking aperture until the nose, the forward lateral edges and forward parts of the shoulder portions of the locking tab are engaged between the locking edges of the locking aperture adjacent one (the inner) face of base panel 20 whereas the remaining part of that locking tab is disposed adjacent the opposite (outermost) face of base panel 20 so that the lateral edges of the locking aperture are received in the shoulder cuts of the locking tab.

Figure 3 shows the locking tab less than fully inserted into the locking aperture to an intermediate locked position whereby the wrapper girth will have a dimension somewhere between its maximum and minimum girth dimension. In practice, the relative position of the base panels which dictates the extent to which the locking tabs are engaged is set by the articles to be packaged.

Figure 4 shows the locking tab fully inserted into the retaining tab in which case the rearward lateral edges 32b, 34b are engaged with the lateral (locking)

edges of the locking aperture whereby the whole of the locking tab is disposed adjacent that face of base panel 20 which is remote from the face overlapped with base panel 12.

The divergent portion of the retaining tab provides a broader initial entry portion in the locking aperture for the locking tab which also facilitates insertion of the locking tab, particularly because the nose and forward lateral edges of the locking tab are of lesser breadth than that of the divergent portion of the retaining tab.

In some arrangements such as the embodiment illustrated, the nose and forward lateral edges of the locking tab are exposed at the free edge of base panel 12.

In some arrangements where space is limited "half" locks may be provided, that is where the locking tab includes a cut at the shoulder portion formed along only one of its lateral edges, the opposite lateral edge being provided by a straight cut line from nose to base of the tab which is parallel to a co-operating edge of the associated locking aperture.

## Claims

1. Panel interlocking means for securing together a pair of panels in overlapping relationship comprising a locking tab struck from one of the panels and a locking aperture provided in the other of said panels and arranged to receive and retain said locking tab, said locking tab being hinged to said one panel at a base and having a nose remote from the base, said locking aperture comprising spaced lateral edges, characterized in that said locking tab has opposed lateral edges at least one of which edges comprises a shoulder portion disposed between said base and said nose, the width across said locking tab at each shoulder being broader than the greatest width of said locking apertures and the width at the extremity of said nose being narrower than the least width of said locking aperture, each lateral edge being formed with a deformable marginal portion formed by a cut extending inwardly from said lateral edge said marginal portion being deformed by engagement with the adjacent lateral edge of the locking aperture to lock the locking tab in the locking aperture.

2. Panel interlocking means according to claim 1, wherein one lateral edge of the locking tab is defined by a straight and uninterrupted cut which is generally aligned with the co-operating edge of said locking aperture when the locking tab is positioned for locking in said locking aperture.

3. Panel interlocking means according to claim 1, wherein both lateral edges of the locking tab comprise a shoulder portion, both said opposed shoulder portions extending beyond the respective co-operating edges of said locking aperture when the locking tab is positioned for locking in said locking aperture.

4. Panel interlocking means according to any of the preceding claims wherein said cut is formed in each shoulder portion and extends inwardly from the lateral edge of said shoulder portion.

5. Panel interlocking means according to any of the claims 1 to 3 wherein said cut is formed intermediate each shoulder portion and said nose.

6. Panel interlocking means according to any of the preceding claims wherein said nose is exposed at a lateral edge of said one panel.

7. Panel interlocking means according to claim 3 wherein the cut lines in the respective shoulder portions are generally aligned with one another.

8. Panel interlocking means according to claim 3 wherein the cut lines are convergent in a direction towards the base of said locking tab.

9. Panel interlocking means according to any of the preceding claims wherein the locking aperture is defined by a retaining tab arranged to support the tab in a locked position within the locking aperture, said retaining tab being hinged to said other panel at a base which is spaced from the base of the locking tab when said locking tab is positioned for locking by means of each shoulder cut in the locking aperture.

10. A blank for forming a carton including a pair of panels which are secured in overlapping relationship when the carton is assembled, said pair of panels having panel interlocking means according to any of the preceding claims.

Fig.1.

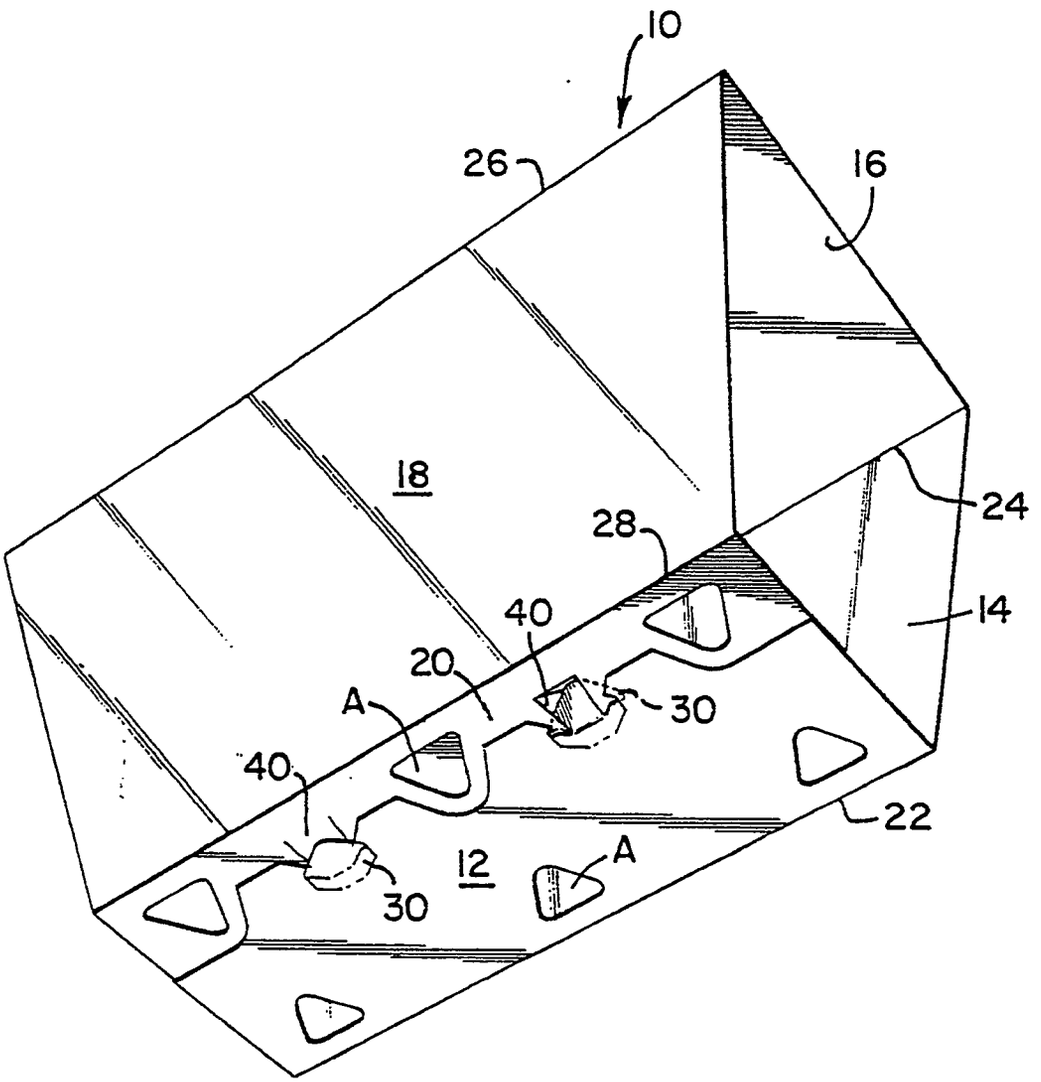


Fig. 2.

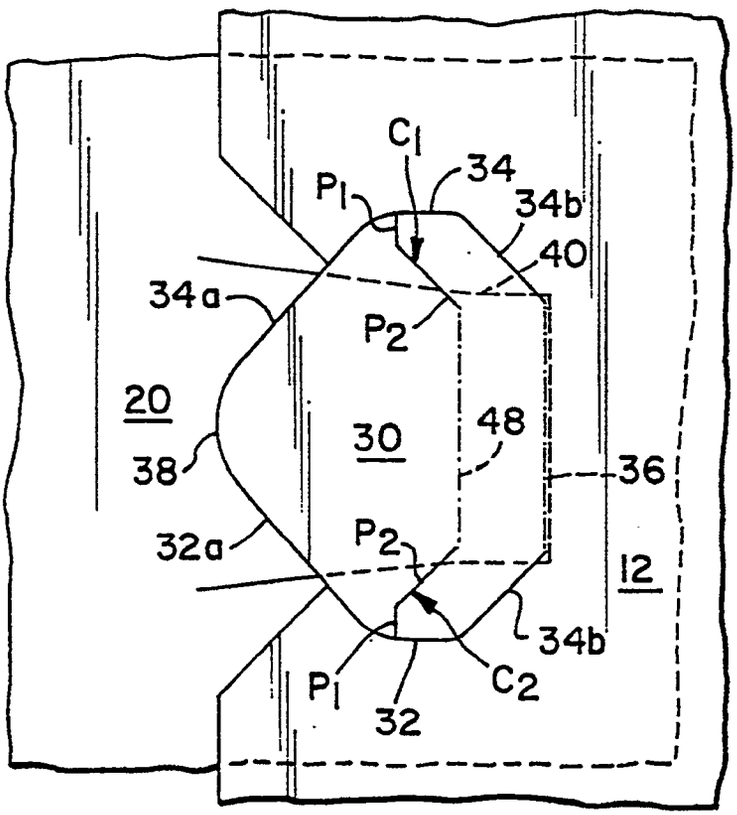

C1
34
P1
34b
40
34a
P2
20
30
48
38
36
32a
P2
12
34b
C2
P1
32

Fig. 3.

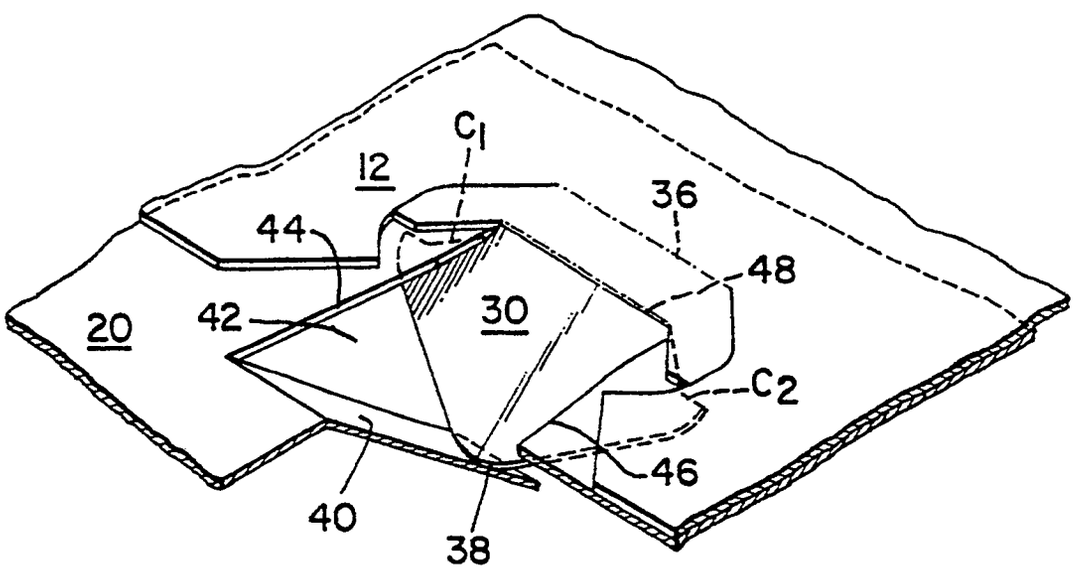

C1
12
36
44
48
20
42
30
C2
46
40
38

Fig. 4.