

PATENT SPECIFICATION

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(54) INTERLOCKING

(71) We, THE MEAD CORPORATION, a corporation organised under the laws of the State of Ohio, United States of America, of Mead World Headquarters, Courthouse Plaza Northeast, Dayton, Ohio 45463, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to interlocking of panels and is more particularly, though not exclusively, concerned with the interlocking of panels of a wrap-around carton to form a composite wall (usually the bottom wall) thereof in the packaging of groups of articles aligned in one or more rows. The articles will usually consist of a plurality of primary containers such as bottles or cans.

In addition to the present specification, reference should also be made to United States Patent 2786572 and to British Patent Specification 790815, which describe arrangements interlocking pairs of panels in overlapping face contacting relation by driving locking tabs struck from one panel through corresponding locking apertures defined by retaining tabs struck from the other panel. We have employing interlocking means of this general type for many years and we have found that such interlocking means may provide a secure and reliable lock for use for example in article carriers of the wrap-around carton type in which the wrapper blank is secured about a group of articles by operating against the tension of the blank so as to maintain package security. However, the interlocking means of the aforesaid U.S. and British Patent Specifications is not especially adapted for use with large primary containers such as are currently popular. In certain instances, large primary packages may be returned to the packager in view of the current emphasis on

environmental considerations and for other reasons. Interlocking means for use in conjunction with wrap-around cartons and especially those for large bottles or cans must be secure even though tension of the wrapper blank may be substantial and even though the carrier locking arrangements may be weakened by substantial levels of humidity.

Our efforts have been directed to improving the interlocking arrangements in the aforesaid British and U.S. Patents and the present invention has arisen out of this work.

In addition to the present specification reference should also be made to the specification of our copending British Patent Application No. 1517/78 (Serial No. 1558306) filed the same day as this present application and which *inter alia* describes and claims mechanisms which may be adapted for use with carton blanks provided with interlocking arrangements in accordance with the present invention. The specification of the aforesaid co-pending application is to be regarded as being incorporated herein by reference.

In accordance with a first aspect of the present invention, we provide a pair of panels provided with an arrangement for interlocking the panels in overlapping relation; said arrangement comprising a locking tab struck from one of said panels and joined thereto at its base, a retaining tab struck from the other of said panels and joined thereto at its base and defining a locking aperture in said other panel for receiving said locking tab, and auxiliary means formed in said locking tab for receiving the free end of the retaining tab or means defined thereby when said locking tab is forced through said locking aperture and into angular mutually braced relation with the retaining tab, the auxiliary means acting to aid in maintaining such relation.

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The auxiliary means may comprise holding means provided upon or in one face of the locking tab (such as a depressed area formed therein or a transverse groove formed thereacross) for receiving the free end of the retaining tab when the locking tab and retaining tab are in angular mutually braced relation.

In addition, or in the alternative, the auxiliary means may comprise a securing aperture formed in the locking tab (for example by the locking tab being connected to its respective panel along an interrupted fold line, the securing aperture being disposed at an interrupted portion of such fold line) and arranged, when the locking tab is forced through the locking aperture and into angular mutually braced relation with the retaining tab, to receive a securing tab forming a projection of the said one panel along the transverse edge of the locking aperture from which the free end of the retaining tab is struck (i.e. being 'defined by' the free end of the retaining tab).

In a first alternative aspect of the present invention, we provide a pair of panels provided with an arrangement for interlocking the panels in overlapping relation; said arrangement comprising a locking tab struck from one of said panels and foldably joined thereto along an interrupted fold line, a retaining tab struck from the other of said panels and foldably joined thereto along a fold line and defining a locking aperture in said other panel, a securing tab forming a projection of said other panel along a transverse edge of said locking aperture, and a securing aperture formed in said locking tab for receiving said securing tab when said locking tab is driven through said locking aperture.

According to a second alternative aspect of this invention, there is provided a pair of panels provided with an arrangement for interlocking the panels in overlapping relation; said arrangement comprising a locking tab struck from one of said panels and joined thereto at its base, a retaining tab struck from the other of said panels and joined thereto at its base and defining a locking aperture in said other panel for receiving said locking tab oriented so that the base of said retaining tab is remote from the base of said locking tab, and holding means formed in said locking tab for receiving the free end of said retaining tab when said locking tab is driven through said locking aperture whereby said locking and retaining tabs are maintained in angular mutually braced relation to each other.

The invention is hereinafter more particularly described by way of example only with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of an

erected carton formed from a first embodiment of carton blank comprising a pair of panels in accordance with the present invention;

Figure 2 is an enlarged perspective fragmentary view of the carton of Figure 1 showing one locking tab and its associated retaining tab;

Figure 3 is a perspective view of a pair of panels in accordance with this invention about to be interlocked;

Figure 4 is a view generally similar to Figure 3 but shows the same two panels in the interlocked condition;

Figure 5 is a fragmentary cross-sectional view taken along the line designated 5-5 in Figure 2;

Figure 6 is a plan view of a blank from which the carton of Figure 1 may be formed; and

Figures 7 to 12 are views generally similar to Figures 1 to 6 respectively, but for a second embodiment of carton blank employing a modified interlocking arrangement, Figure 8 being a view as seen from the opposite direction to the corresponding Figure 2.

In the embodiment of Figures 1 to 6, the numeral 1 generally designates a main central panel in which a pair of finger gripping apertures 2 and 3 are formed. As explained panel 1 normally constitutes the top panel of a carrier although in Figures 1, 3 and 4 the carton is shown in upside down position.

Side walls 4 and 5 are foldably joined to main panel 1 along interrupted fold lines 6 and 7 respectively and article receiving apertures 8, 9, 10 and 11 are formed along fold line 6 while similar apertures 12, 13, 14 and 15 are formed along fold line 7. The apertures 8-15 receive end portions of the packaged articles such as cans C in a manner well known in the art.

Lap panels 16 and 17 are foldably joined to the edges 18 and 19 of panels 4 and 5 respectively and article receiving apertures 20-23 are formed along fold line 18 while similar apertures 24-27 are formed along fold line 19 and are well known in the art.

For the purpose of separating the articles such as C1 in one row of articles from the articles such as C2 in the other row of articles, a medial keel panel 28 is foldably joined to lap panel 17 along fold line 29 and keel slits 30, 31 and 32 are formed along fold line 29 so as effectively to increase the width of lap panel 17 thereby to enhance locking security in a manner well known in the art.

In order to provide for tightening the blank about a group of articles prior to interlocking the panels 16 and 17, a plurality of tightening apertures 33-36 are formed in the lap panel 16 and similar tightening apertures 37-40 are formed in lap panel 17. As is well known, machine elements enter

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tightening apertures 33-36 and move inwardly in opposition to the movement of corresponding machine elements which enter tightening apertures 37-40 and function in known manner to tighten the wrapper about the articles C. As is well known, cutaway areas 41-44 are formed along an edge of panel 16 so as to avoid interference with the machine tightening elements which enter tightening apertures 37-40 and similar cutaway areas 45-48 are formed in an edge of medial keel panel 28 so as to avoid interference with the machine elements which enter tightening apertures 33-36.

For the purpose of securing lap panels 16 and 17 together in overlapping face contacting relation, a plurality of locking tabs 49-53 are struck from lap panel 16 and are foldably joined thereto along transverse fold lines 54-58 located at the base of the locking tabs 49-53 respectively. As shown in Figure 6, these transverse fold lines are of an interrupted construction as indicated for example at 55a and 55b.

The locking tabs 49-53 cooperate with the locking apertures defined by retaining tabs 59-63 respectively which are struck from lap panel 17 and foldably joined thereto along end edge fold lines 64-68 respectively.

The structure as described above except for the interrupted fold lines such as 55a and 55b, is substantially in accordance with the prior art such as is represented by the aforementioned patent 2,786,572.

In the present arrangement, securing apertures such as are designated by the numerals 69-73 are formed in the locking tabs 49-53 respectively.

Formed in lap panel 17 are securing tabs 74-78 and form extensions of lap panel 17 which project from the transverse end edges of the locking apertures defined by retaining tabs 59-63 respectively. Thus, it will be seen, the securing tabs are 'defined by' the free ends of the retaining tabs.

With the wrapper blank properly tightening about the group of articles C, the locking tabs 50-53 are engaged by locking plungers such as that schematically represented in Figures 1 and 4 at P and are driven through the locking apertures defined by retaining tabs 59-63 respectively. This action swings the retaining tabs 59-63 about their end edge fold lines 64-68 respectively and causes the free ends of the retaining tabs to engage the respective locking tabs to hold these tabs in angularly disposed braced relationship as is shown in Figures 2, 4 and 5.

Simultaneously with the performance of the locking operation by driving the locking tabs through the locking apertures, the securing tabs such as are designated by the numerals 74-78 inclusive are inserted into the securing apertures 69-73 respectively and serve to maintain the wrapper in locked

condition. The securing tabs and their associated securing apertures serve to maintain lock security even though the fold lines such as 54-58 at the base of the locking tabs 49-53 respectively tend to "roll" or to shift position along their associated locking tabs. The tendency of the locking tab fold lines 54-58 to "roll" or to shift position from the base of the locking tab to a position somewhat removed from the base or from the normal disposition of the fold line sometimes is due to high humidity conditions which tend to weaken or to soften the material from which the wrapper is made such as paperboard.

While the securing apertures 69-73 preferably are disposed approximately midway between the ends of the interrupted fold lines 54-58, these apertures could be located at some other position along these fold lines and, if desired, more than one securing aperture such as 69-73 could be employed. Of course corresponding securing tabs such as 74-78 inclusive would be utilized so as to match the disposition of the apertures 69-73 respectively both as to position and number.

From the description above it is apparent that the securing tabs such as 74-78 or their equivalent in association with the securing apertures 69-73 or their equivalents may serve to ensure lock security even though ambient conditions are characterized by a high degree of humidity or in the event some other condition may occur which tends to shift the position of the fold lines such as 54-58 inclusive. In addition the securing tabs and apertures tends to enhance the bracing action of the retaining tabs by limiting relative movement between panels such as 16 and 17 and generally contribute to positive lock security.

The second embodiment illustrated in and described with reference to Figures 7 to 12 of the accompanying drawings shows substantial similarity with the embodiment of Figures 1 to 6 and parts which are the same or substantially the same as for the corresponding parts in the first embodiment are so indicated by having a reference numeral which is the same as the reference numeral for the corresponding part in Figures 1 to 6 except that it is increased by 100. We shall accordingly restrict our description of the second embodiment in detail to those features by which it differs from the first embodiment.

As will be clear from the drawings illustrating the second embodiment, in addition to securing apertures such as are designated by numerals 169 to 173 formed in the locking tabs 149 to 153 respectively, and securing tabs 174 to 178 which form extensions of lap panel 117 projecting from the transverse end edges of the locking apertures defined by retaining tabs 159 to 163 respectively, holding means in the form of

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grooves 79 to 83 are formed in locking tabs 149 to 153 respectively.

5 With the wrapper blank properly tightened about the group of articles C, the locking tabs 150-153 are engaged by locking plungers such as that schematically represented in Figures 7 and 10 at P and are driven through the locking apertures defined by retaining tabs 159-163 respectively.
10 This action swings the retaining tabs 159-163 about their end edge fold lines 164-168 respectively and causes the free ends of the retaining tabs to engage the respective locking tabs to hold these tabs in angularly disposed braced relationship as is shown in Figures 8, 10 and 11. Engagement of the free ends of the retaining tabs 159-163 in the grooves 79-83 respectively aids in holding the locking and retaining tabs in angular mutually braced relation to each other.
15 Instead of the grooves such as 179-183, suitable apertures could be provided or embossed or upraised ridges could be employed all within the meaning of the term "holding means".

25 Simultaneously with the performance of the locking operation by driving the locking tabs through the locking apertures, securing tabs such as are designated by the numerals 174-178 inclusive and which are substantially identical to tabs 74-78 of the first embodiment are inserted into securing apertures 169-173 respectively and serve to maintain the wrapper in locked condition as in the previous embodiment.

35 The holding means 79-83 serve to maintain the locks in locked condition particularly when wrapper tension is reduced, as by removing one or more articles therefrom, due to engagement of the free ends of the retaining tabs in the grooves 79-83 which action tends to prevent sliding of the retaining tabs along the locking tabs when wrapper tension is relaxed.

45 It will readily be appreciated that holding means, such as that shown at 79-83, may be employed in panel interlocking arrangements of the kind shown in the aforesaid U.S. and British Patents; that is, without the additional lock security provided by the securing tabs and apertures.

50 It will further be appreciated that the panel interlocking arrangement herein described is not restricted in utility to wrap-around cartons for packaging a plurality of cans in aligned parallel rows as in the two illustrated embodiments. Interlocking arrangements in accordance with this invention may be embodied in bottle carriers, as shown for example in our aforesaid copending application, or in cartons of various configurations for packaging one or more articles.

WHAT WE CLAIM IS:-

65 1. A pair of panels provided with an

arrangement for interlocking the panels in over-lapping relation; said arrangement comprising a locking tab struck from one of said panels and joined thereto at its base, a retaining tab struck from the other of said panels and joined thereto at its base and defining a locking aperture in said other panel for receiving said locking tab, and auxiliary means formed in said locking tab for receiving the free end of the retaining tab or means defined thereby when said locking tab is forced through said locking aperture and into angular mutually braced relation with the retaining tab, the auxiliary means acting to aid in maintaining such relation.

2. A pair of panels according to Claim 1, wherein the auxiliary means comprises holding means provided upon or in one face of the locking tab for receiving the free end of the retaining tab when the locking tab and retaining tab are in angular mutually braced relation.

3. A pair of panels according to Claim 1 or Claim 2, wherein the auxiliary means comprises a securing aperture formed in said locking tab and arranged, when the locking tab is forced through said locking aperture and into angular mutually braced relation with the retaining tab, to receive a securing tab forming a projection of said one panel along the transverse edge of the locking aperture from which the free end of the retaining tab is struck.

4. A pair of panels provided with an arrangement for interlocking the panels in overlapping relation; said arrangement comprising a locking tab struck from one of said panels and foldably joined thereto along an interrupted fold line, a retaining tab struck from the other of said panels and foldably joined thereto along a fold line and defining a locking aperture in said other panel, a securing tab forming a projection of said other panel along a transverse edge of said locking aperture, and a securing aperture formed in said locking tab for receiving said securing tab when said locking tab is driven through said locking aperture.

5. A pair of panels according to Claim 3 or Claim 4, wherein said securing tab is disposed approximately midway between the ends of said transverse edge of said locking aperture.

6. A pair of panels according to Claim 4, wherein said securing aperture is disposed approximately midway between the ends of said interrupted fold line.

7. A pair of panels according to any of Claims 3 to 6, wherein said retaining tab is struck from said other panel in a manner to define said securing tab along the edge of the resultant aperture.

8. A pair of panels according to Claims 4 or 6, wherein said securing aperture is

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grooves 79 to 83 are formed in locking tabs 149 to 153 respectively.

With the wrapper blank properly tightened about the group of articles C, the locking tabs 150-153 are engaged by locking plungers such as that schematically represented in Figures 7 and 10 at P and are driven through the locking apertures defined by retaining tabs 159-163 respectively. This action swings the retaining tabs 159-163 about their end edge fold lines 164-168 respectively and causes the free ends of the retaining tabs to engage the respective locking tabs to hold these tabs in angularly disposed braced relationship as is shown in Figures 8, 10 and 11. Engagement of the free ends of the retaining tabs 159-163 in the grooves 79-83 respectively aids in holding the locking and retaining tabs in angular mutually braced relation to each other. Instead of the grooves such as 179-183, suitable apertures could be provided or embossed or upraised ridges could be employed all within the meaning of the term "holding means".

Simultaneously with the performance of the locking operation by driving the locking tabs through the locking apertures, securing tabs such as are designated by the numerals 174-178 inclusive and which are substantially identical to tabs 74-78 of the first embodiment are inserted into securing apertures 169-173 respectively and serve to maintain the wrapper in locked condition as in the previous embodiment.

The holding means 79-83 serve to maintain the locks in locked condition particularly when wrapper tension is reduced, as by removing one or more articles therefrom, due to engagement of the free ends of the retaining tabs in the grooves 79-83 which action tends to prevent sliding of the retaining tabs along the locking tabs when wrapper tension is relaxed.

It will readily be appreciated that holding means, such as that shown at 79-83, may be employed in panel interlocking arrangements of the kind shown in the aforesaid U.S. and British Patents; that is, without the additional lock security provided by the securing tabs and apertures.

It will further be appreciated that the panel interlocking arrangement herein described is not restricted in utility to wrap-around cartons for packaging a plurality of cans in aligned parallel rows as in the two illustrated embodiments. Interlocking arrangements in accordance with this invention may be embodied in bottle carriers, as shown for example in our aforesaid copending application, or in cartons of various configurations for packaging one or more articles.

WHAT WE CLAIM IS:-

1. A pair of panels provided with an

arrangement for interlocking the panels in over-lapping relation; said arrangement comprising a locking tab struck from one of said panels and joined thereto at its base, a retaining tab struck from the other of said panels and joined thereto at its base and defining a locking aperture in said other panel for receiving said locking tab, and auxiliary means formed in said locking tab for receiving the free end of the retaining tab or means defined thereby when said locking tab is forced through said locking aperture and into angular mutually braced relation with the retaining tab, the auxiliary means acting to aid in maintaining such relation.

2. A pair of panels according to Claim 1, wherein the auxiliary means comprises holding means provided upon or in one face of the locking tab for receiving the free end of the retaining tab when the locking tab and retaining tab are in angular mutually braced relation.

3. A pair of panels according to Claim 1 or Claim 2, wherein the auxiliary means comprises a securing aperture formed in said locking tab and arranged, when the locking tab is forced through said locking aperture and into angular mutually braced relation with the retaining tab, to receive a securing tab forming a projection of said one panel along the transverse edge of the locking aperture from which the free end of the retaining tab is struck.

4. A pair of panels provided with an arrangement for interlocking the panels in overlapping relation; said arrangement comprising a locking tab struck from one of said panels and foldably joined thereto along an interrupted fold line, a retaining tab struck from the other of said panels and foldably joined thereto along a fold line and defining a locking aperture in said other panel, a securing tab forming a projection of said other panel along a transverse edge of said locking aperture, and a securing aperture formed in said locking tab for receiving said securing tab when said locking tab is driven through said locking aperture.

5. A pair of panels according to Claim 3 or Claim 4, wherein said securing tab is disposed approximately midway between the ends of said transverse edge of said locking aperture.

6. A pair of panels according to Claim 4, wherein said securing aperture is disposed approximately midway between the ends of said interrupted fold line.

7. A pair of panels according to any of Claims 3 to 6, wherein said retaining tab is struck from said other panel in a manner to define said securing tab along the edge of the resultant aperture.

8. A pair of panels according to Claims 4 or 6, wherein said securing aperture is

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disposed at an interrupted portion of said interrupted fold line.

9. A pair of panels according to Claim 4 or any claim appendent thereto, wherein said interrupted fold line is arranged to be disposed adjacent said transverse edge of said locking aperture when said panels are interlocked.

10. A pair of panels according to Claim 4 or any claim appendent thereto, wherein said transverse edge of said locking aperture from which said securing tab projects is remote from said fold line.

11. A pair of panels according to Claim 10, wherein the locking tab has transverse shoulders projecting from its side edges, and wherein the transverse edge of the locking aperture from which the securing tab projects is adjacent the free end of the retaining tab.

12. A pair of panels according to Claim 11, wherein said side edges of said locking tab are approximately parallel to each other and wherein said locking aperture is of generally rectangular configuration.

13. A pair of panels according to Claims 11 or 12, wherein said interrupted fold line is remote from said shoulders.

14. A pair of panels provided with an arrangement for interlocking the panels in overlapping relation; said arrangement comprising a locking tab struck from one of said panels and joined thereto at its base, a retaining tab struck from the other of said panels and joined thereto at its base and defining a locking aperture in said other panel for receiving said locking tab oriented so that the base of said retaining tab is remote from the base of said locking tab, and holding means formed in said locking tab for receiving the free end of said retaining tab when said locking tab is driven through said locking aperture whereby said locking and retaining tabs are maintained in angular mutually braced relation to each other.

15. A pair of panels according to Claim 2 or Claim 14, wherein said holding means comprises a depressed area formed in said locking tab.

16. A pair of panels according to Claim 2 or 14, wherein said holding means comprises a transverse groove formed in said locking tab.

17. A pair of panels according to any of Claims 2 or 14 to 16, wherein a securing tab forms a projection of an edge of said locking aperture and wherein a securing aperture is formed in said locking tab for receiving said securing tab.

18. A pair of panels according to Claim 17, wherein said securing aperture is disposed at the base of said locking tab.

19. A pair of panels according to Claim 17, wherein said locking tab is foldably

joined at its base to said one panel along an interrupted fold line and wherein said securing aperture is disposed at an interrupted part of said interrupted fold line.

20. A pair of panels according to Claims 2 or 14, wherein said locking tab is configured with generally parallel side edges from which shoulders project laterally and wherein said holding means comprises a transverse holding groove formed in said shoulders for receiving the free end of said retaining tab.

21. A pair of panels according to Claims 2, 14 to 16, or 20, wherein said retaining tab and said locking aperture are generally rectangular in configuration, said retaining tab being struck from said other panel in a manner to define a securing tab in the form of a projection of said other panel along an edge of said locking aperture remote from the base of said retaining tab, and wherein a securing aperture is formed in said locking tab for receiving said securing tab when said locking tab is driven through said locking aperture.

22. A pair of panels according to Claim 21, wherein said locking tab is joined to said one panel at its base along an interrupted fold line and wherein said securing aperture is disposed at an interrupted portion of said interrupted fold line.

23. A carton blank for packaging one or more articles and comprising a plurality of panels including a pair of panels according to any preceding claim provided with an arrangement for interlocking the panels of the said pair in overlapping relation.

24. A carton blank according Claim 23 of the wrap-around type in which said plurality of panels are separated from each other by fold lines transverse to the longitudinal direction of the blank, the said pair of panels comprising a first panel at or adjacent one longitudinal end of the blank and a second panel at or adjacent the other longitudinal end of the blank.

25. Carton blanks substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

26. A fully erected carton formed from a carton blank according to any of Claims 23 to 25.

27. A fully erected carton substantially as herein before described with reference to and as shown in Figure 1 or Figure 7 of the accompanying drawings.

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28. A package comprising one or more articles packaged within a carton according to either of Claims 26 or 27.

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