Title: TAMPER EVIDENT CONTAINER

Abstract: A container (1) having a base (5) and a cover (20). The base (5) has an opening adapted to be closed by the cover (20). The cover (20) and the base (5) have an interengaging device adapted to couple the base (5) and the cover (20). At least one of the cover (20) and the base (5) has a handle that is accessed by destroying a frangible connection (42). The handle and the frangible connection (42) can be formed in the cover (20). The handle and the frangible connection (42) can be disposed above a pocket (16) or recess in the base (5). The disrupted frangible connection (42) provides evidence of tampering.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
"Tamper Evident Container"

The present invention relates to a tamper evident container particularly suitable for foodstuffs.

Conventionally, there are many different types of containers used in the food industry for storing, transporting and showing foodstuffs on the shelves in shops and markets. One problem prevalent in supermarkets is that customers will occasionally attempt to obtain access to the contents of food containers in order to taste the foods. This is clearly undesirable since this action could cause contamination of the foodstuffs and furthermore, other customers do not wish to buy the affected products, and tamper-evident containers have been devised to address this problem.

US Patent Nos. 5145088 and 5507406 disclose known solutions, but it has been found that these and other conventional tamper evident containers have various drawbacks in terms of cost and manufacture,
and also that significant proportions of important parts of the container and/or cover are destroyed when the cover is opened for the first time.

In accordance with the present invention there is provided a container having a base and a cover, the base having an opening adapted to be closed by the cover, the cover and base having an interengaging device adapted to couple the two together, wherein at least one of the cover and the base has a handle that is accessed by destroying a frangible connection.

Typically the handle is disposed at the edge of the cover, and the frangible connection typically borders at least a portion of the handle. The handle and frangible connection are typically formed in the cover, and in the closed container the handle and frangible connection are typically disposed above a pocket or recess in the base, into which a portion of the cover can be pushed to destroy the frangible connection.

At least a portion of the frangible connection is typically annular, and in preferred embodiments the frangible connection is semi-circular. The two ends of the frangible seam typically do not meet, and so a hinge is created at the non-frangible part. In some examples the semi-circular frangible seam opens to create a D-shaped flap that is hinged about its straight side, which is still connected to the cover after the frangible seam has been broken. The tab
can then pivot around the hinge, and move into the
pocket on the base to allow access to the handle.

It will be appreciated that other shapes of
frangible seam can be used, and that the invention
is not limited to D-shapes.

Typically the interengaging device comprises a rim
on one of the cover and the base, and an undercut on
the other. Typically the undercut is provided on
the base and the rim is provided on the cover.
Typically the handle is disposed on the rim.

In other embodiments, the interengaging device can
comprise a channel and a ridge.

Typically the interengaging device requires some
distortion of the components before they will
connect together, and in preferred embodiments, the
cover is slightly oversized with respect to the
opening on the base.

Kiss-cut seams are useful for the frangible
connection.

At least a portion of the container in the region of
the interengaging device can be provided with a
reinforced area. The reinforced area can be shaped
to impart greater strength to the region and can be
created by providing an uneven or stepped profile.
The stepped profile can be formed from parallel
channels thereby creating ribs therebetween. Two
perpendicular sets of channels can be provided to create a hatched pattern.

The reinforced area may be located in a region near the pocket or recess in the base. The reinforced area should be dimensioned to provide a finger grip for a user, allowing the user a purchase on the base while the handle is pulled to detach at least part of the base and cover. Preferably at least one set of the channels or ribs extend substantially perpendicular from a side wall of the base.

Preferably the interengaging side walls are set at different angles to one another, thereby increasing the deformation of the lid and base necessary for engagement of the two, which increases the rigidity of the container and the security of the seal. Typically the walls can diverge by 5°-15°. In preferred embodiments the cover side wall deviates by 10° from the vertical and the side wall of the base deviates by 15°, giving a difference of 5°.

Preferably, the cover and base are formed from resilient material, such as plastic.

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

Figs 1, and 2 show plan and side views of a container;

Fig 3 shows a side view of a cover;
Fig 4 shows a side view of a base;
Figs 5 and 6 show perspective views of a container being opened;
Figs 7 and 8 are side views showing the configuration of the side walls of the cover (Fig 7) and the base (Fig 8); and
Figs 9 and 10 are plan views of containers having reinforced areas.

Figs 1 and 2 show a first embodiment of a clear (see through) container 1 in accordance with the invention. The container is made of plastics material having slight resilience and is particularly useful for holding foodstuffs such as fruit, vegetables and prepared foods such as salads etc.

The container comprises a base 5 and a cover 20. The base 5 is generally bowl-shaped with a flat bottom. The bowl is stepped to form a ledge 6 extending radially outward from the bowl in a horizontal plane, and a side wall 7 extends upward and radially inward at an angle of 15° (with respect to the vertical) from the outermost edge of the ledge 6. The side wall 7 continues inward and upward to apex 7a, where it then extends radially outward and upward to form a funnel 8 before reaching an outer ledge 9, which extends radially outward in the horizontal plane. A ridge 10 in the shape of an inverted U extends upward from the outer ledge 9.
The outer ledge 9 surrounds the base 5, and expands radially outwards into a tab 15 located at one position on the periphery of the base 5. The ridge 10 extends around a large portion of the base, apart from a region at the back of the container 1 where a hinge 3 connects the base 5 and the cover 20. In the region of the hinge the outer ledge 9 is unbroken by the ridge 10. In non-hinged embodiments where the cover and the base are separate items the ridge could extend all the way around the base.

The ridge retains its inverted U shape at the tab 15, but as the ledge expands radially outward from the base 5, its horizontal surface dips to form a pocket 16. The pocket 16 is generally D-shaped with the annular surface of the D situated radially outward of the base. The pocket 16 is shallow at its radially innermost part, and deepens as it extends radially outward, so that the side profile of the pocket is generally wedge-shaped.

The cover 20 has a generally flat central plate 25. The cover 20 dips downward (when considering the closed container) and radially outward from the central plate 25 to form an annular ridge 26 surrounding the plate 25. The ridge 26 has a radially inner wall formed by the gradually dipping surface of the cover 20, which extends radially outwards to meet a horizontal wall 27. Horizontal wall 27 meets a radially outer wall 28 at the apex 26a of the ridge 26. The outer wall 28 extends upward and radially inward at an angle of 10° (with
respect to vertical) toward the central plate 25, before meeting a generally horizontal annular rim 35.

The annular rim 35 surrounds the ridge 26. The hinge 3 connects the rim 29 of the cover 20 and the outer ledge 9 of the base 5.

The cover 20 has a tab 40 formed as a radial extension of the annular rim 35 at a region of the periphery of the cover 20 that coincides with the tab 10, on the base 5. The tab 40 is generally flat with a semi-circular groove 41 disposed radially outward from a kiss-cut semi-circular perforation 42. The perforation 42 defines a flap F in the rim 35 that is attached to the rim by a hinge portion 43 located radially inward from the perforation 42.

Figs 9 and 10 show alternative configurations of the base. Parts which are the same as those previously described for figs 1 to 8 are shown in figs 9 and 10 indicated by reference numerals adding 100 and 200 respectively to the like parts.

Fig 9 shows a container 101 having a base 105 and a cover 120. An outer ledge 109 surrounds the base 105 and a tab 115 is located on the periphery of the base 105 in the same manner as described for the previous embodiment. A ridge 110 extends upwardly from the outer ledge 109. The ridge 110 has a wider portion 110w in the region of the tab 115. Part of the wider portion 110w is provided with a ribbed
profile to create a reinforced area 132. The reinforced area 132 is formed from a series of channels 136 extending downwardly from the ridge 110. Formation of the channels 136 creates parallel ribs 134 therebetween. The channels 136 and ribs 134 are formed substantially perpendicular to the outer ledge 109.

Similarly the container 201 of figure 10 has a reinforced area 233. Two sets of parallel channels 237 are arranged substantially perpendicular to one another and approximately 45° to the outer part of ridge 210, thereby forming a reinforced area 233 with a hatched pattern.

The reinforced areas 132, 233 typically stiffen the corresponding portion of the container 101, 201 and resist deformation of the container 101, 201 in the region of the tab 115, 215.

When the container 1 is filled and is to be closed, the cover 20 is pivoted about the hinge 3 relative to the base 5, until the ridge 26 on the cover approaches the funnel 8 on the base 5. The cover 20 is pushed down until the apex 26a of the ridge 26 moves past the apex 7a of the side wall 7. The angle between the side wall 7 and the ledge 6 forms an undercut, which secures the cover 20 in place. The cover 20 is over-sized with respect to the base 5, such that the base 5 will stretch somewhat when the cover 20 is closed in order for the base 5 to accommodate the cover 20. The deformation is
typically maintained while the cover 20 is in place on the base 1. This makes the seal between the cover 20 and the undercut more secure and less prone to leaks, and makes it less likely that the cover 20 will accidentally become detached from the base 5. Also, the resultant forces of tension created in the base and compression exerted on the cover increase the rigidity of the container when it is closed.

The wall 28 of the ridge 26 and the side wall 7 of the base 5 are typically set at different angles. For example, the angles between the side wall 7 of the base 5 is usually more acute than the angle between the wall 28 of the ridge 26 and the vertical. The mismatch of the angles between the walls means that each has to deform to snap together. This mismatch between the angles increases the deformation of the cover 20 and the base 5, and stretches out the walls of the base 5 when the cover 20 is in place as the two wall portions 7 and 28 seek to lie flat against one another in the closed container. This in turn increases the rigidity of the container and the security of the seal.

As the cover 20 is closed and the ridge 26 enters the undercut, the annular rim 35 lies flat on top of the outer ledge 9. The edge of the rim 35 cannot be accessed because of the ridge 10 that surrounds the ledge 9 and (in the closed container) the rim 35.
In the closed container 1, the tab 40 overlies the tab 15, and the flap F is positioned directly above the pocket 16 in the tab 15. When the container 1 is to be opened, the flap F is pressed down as shown in Fig 5, until the perforation 42 breaks and the flap F can move around the hinge 43 into the pocket 16, leaving an annular handle 45 radially outward from the groove 41. The handle 45 cannot be accessed without destroying the perforation 42.

In certain embodiments the flap F can be entirely surrounded by the perforation 42, so that it detaches completely from the cover 20.

The separation of the flap F from the rim 35 allows the user to insert a finger into the pocket and to grip the annular handle 45 to pull the cover 20 away from the base 5. The groove 41 strengthens the handle 45 to increase the purchase that can be exerted upon it, and also makes it easier for the user to grip the handle.

In the embodiments shown in figs 9 and 10, pulling the cover 120, 220 away from the base 105, 205 is facilitated by the reinforced areas 132, 233. The reinforced areas 132, 233 act as a finger grip allowing a user a purchase as the handle 145, 245 is used to pull the cover 120, 220 away from the base 105, 205.

The reinforced areas 132, 233 perform the dual function of imparting strength to the region
surrounding the tab 115, 215. Typically the
material from which the container 101, 201 is
produced is deformable. This has potentially
adverse consequences for larger containers since the
flexibility could allow partial separation of base
105, 205 and cover 120, 220 without disrupting the
frangible seam. Clearly this is undesirable since
in order to provide evidence of tampering, the
frangible seam should be disrupted before accessing
the container. Therefore the reinforced areas 132,
233 are provided to increase the rigidity of the
containers to restrict deformation, which would
allow separation of the base 105, 205 and the cover
120, 220. Reinforced areas can be located in any
region of the container which requires
strengthening.

Naturally the shape of the flap F and the handle 45
can be selected by changing the shape of the
perforation, and the invention is not limited to D-
shaped flaps.

Once the perforation has been broken for the first
time the flap cannot be reattached, and this serves
as evidence of opening the container, or tampering
with it. Thus a retail outlet can tell if the
foodstuffs within the container have been accessed
before sale.

Clearly the container can be rectangular or any
other shape rather than oval. The container may be
hinged or may a have separate cover and base. The
ridge (when present) can optionally extend around
the whole of the container, or just part of it.

Modifications and improvements may be made to
embodiments of the present invention described
herein without departing from the scope of the
invention.
CLAIMS

1. A container having a base and a cover, the base having an opening adapted to be closed by the cover, the cover and the base having an interengaging device adapted to couple the two together, wherein at least one of the cover and the base has a handle that is accessed by destroying a frangible connection.

2. A container as claimed in claim 1, wherein the handle and the frangible connection are formed in the cover.

3. A container as claimed in claim 2, wherein the handle is disposed towards an edge of the cover.

4. A container as claimed in claim 3, wherein the frangible connection borders at least a portion of the handle.

5. A container as claimed in any preceding claim, wherein the container can occupy a first closed configuration in which the cover is positioned over the opening in the base.

6. A container as claimed in any claim 5, wherein in the first closed configuration, the handle and the frangible connection are disposed above a pocket or recess in the base.
7. A container as claimed in any preceding claim, wherein least a portion of the frangible connection is annular.

8. A container as claimed in claim 7, wherein the frangible connection is semi-circular.

9. A container as claimed in claim 8, wherein the semi circular frangible connection is a frangible seam having two ends between which a non-frangible hinge portion is provided.

10. A container as claimed in claim 9, wherein the container can occupy a second open configuration in which the semi-circular frangible seam is disrupted, thereby creating a D-shaped tab that is hinged about its straight side, which is connected to the cover.

11. A container as claimed in claim 10, wherein in the second open configuration, the tab is pivotable around the non-frangible hinge portion, and movable into the pocket on the base thereby allowing access to the handle.

12. A container as claimed in any preceding claim, the interengaging device comprises a rim on one of the cover and the base, and an undercut on the other.

13. A container as claimed in claim 12, wherein the undercut is provided on the base and the rim is provided on the cover.
14. A container as claimed in any of claims 12 to 13, wherein the handle is disposed on the rim.

15. A container as claimed in any preceding claim, wherein the interengaging device comprises a channel and a ridge.

16. A container as claimed in any preceding claim, wherein the interengaging device is deformable.

17. A container as claimed in any preceding claim, wherein the cover is oversized with respect to the opening on the base.

18. A container as claimed in any preceding claim, wherein the frangible connection comprises a kiss-cut seam.

19. A container as claimed in any preceding claim, wherein at least a portion of the container is provided with a reinforced area in the region of the interengaging device.

20. A container as claimed in claim 19, wherein the reinforced area is shaped to increase rigidity of the container in the region of the interengaging device.

21. A container as claimed in any of claims 19 or 20, wherein the reinforced area comprises an uneven
profile with respect to an adjacent part of the container.

22. A container as claimed in any preceding claim, wherein the container is provided with interengaging side walls set at different angles to one another.

23. A container as claimed in claim 22, wherein the interengaging side walls diverge by 5-15°.

24. A container as claimed in claim 23, wherein the cover has a side wall which deviates by 10° from the vertical and the base has a side wall which deviates by 15° from the vertical.

25. A container as claimed in any preceding claim, wherein the cover and the base are formed from resilient material.

26. A container as claimed in any preceding claim, wherein the resilient material is plastic.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D43/16 B65D43/22 B65D55/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation; to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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[X] Further documents are listed in the continuation of box C.  [X] Patent family members are listed in annex.

* A* document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"X+" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"A" document member of the same patent family

Date of the actual completion of the international search 13 May 2005

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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2, NL - 2280 HV Rijswijk, Tel. (+31-70) 340-3040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016

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