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(54) **TAMPER EVIDENT THERMOFORMED CONTAINERS**

Publication Classification

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(57) **ABSTRACT**

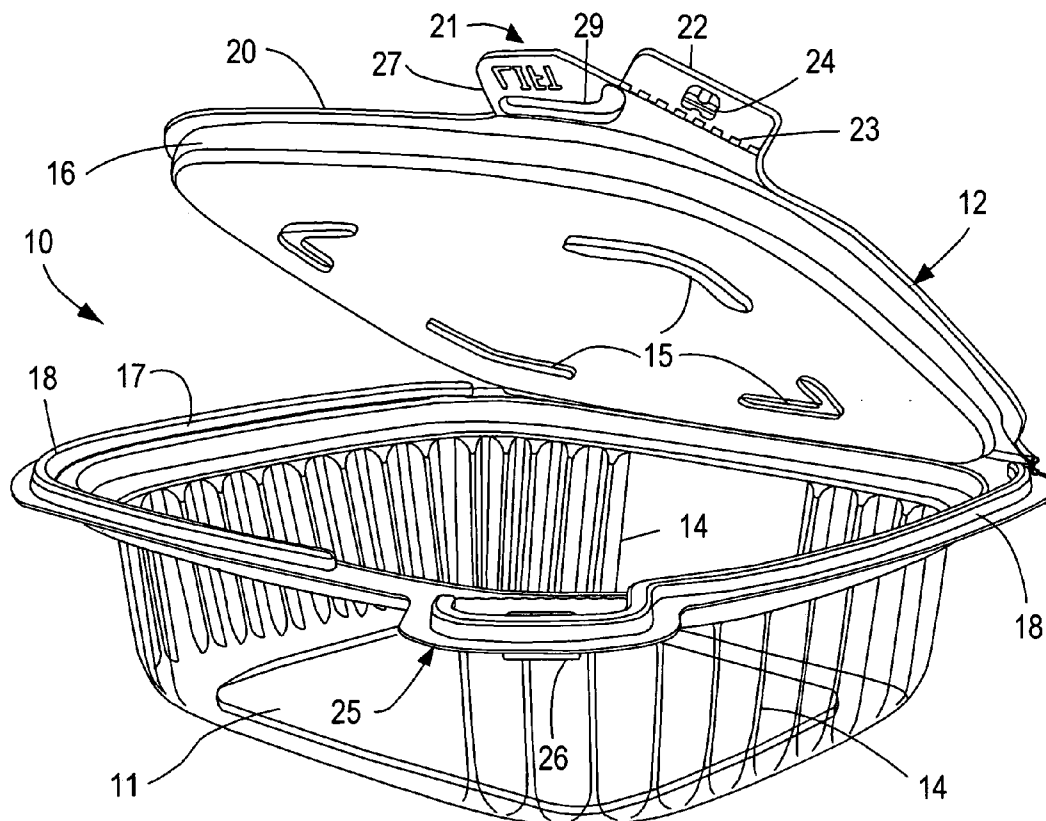
A container comprises a tray body having a top lid portion and a bottom portion. The top lid portion and bottom portion form a re-closable seal around their periphery. A top tab extends from the top lid portion. A bottom tab extends from the bottom portion. A locking mechanism is formed in the top and bottom tabs for substantially permanent engagement. A perforation line in at least one of the top and bottom tabs isolates the locking mechanism, whereby the perforation line must be broken when gaining access inside the tray body.

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Related U.S. Application Data

(60) Provisional application No. 60/713,021, filed on Aug. 31, 2005.



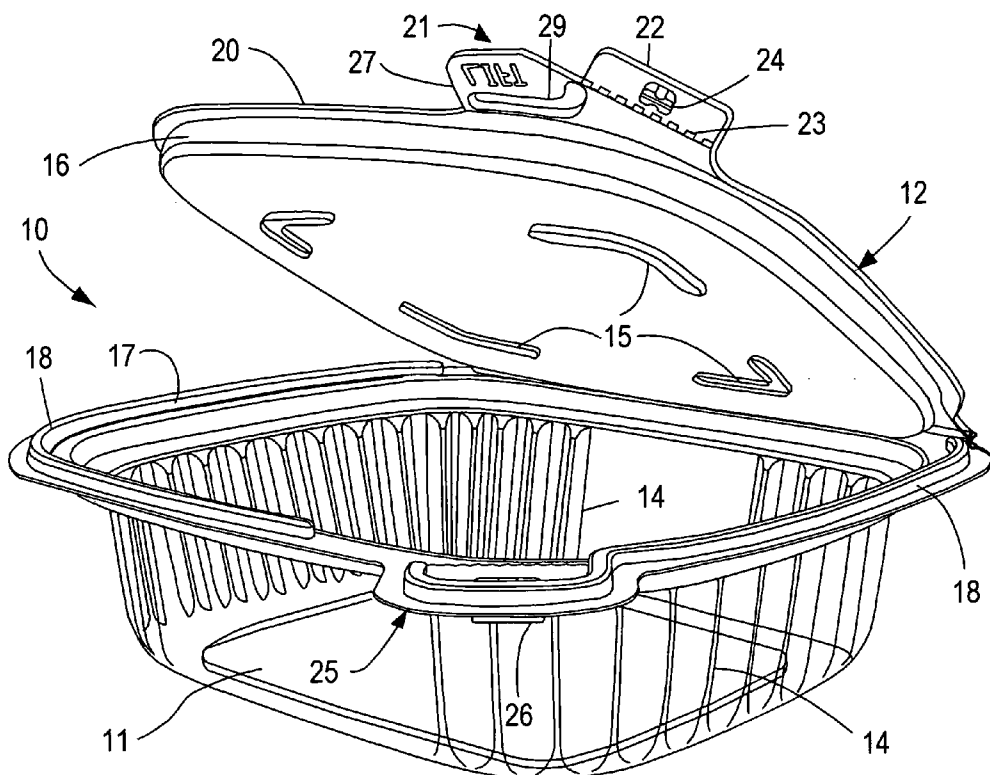


FIG. 1

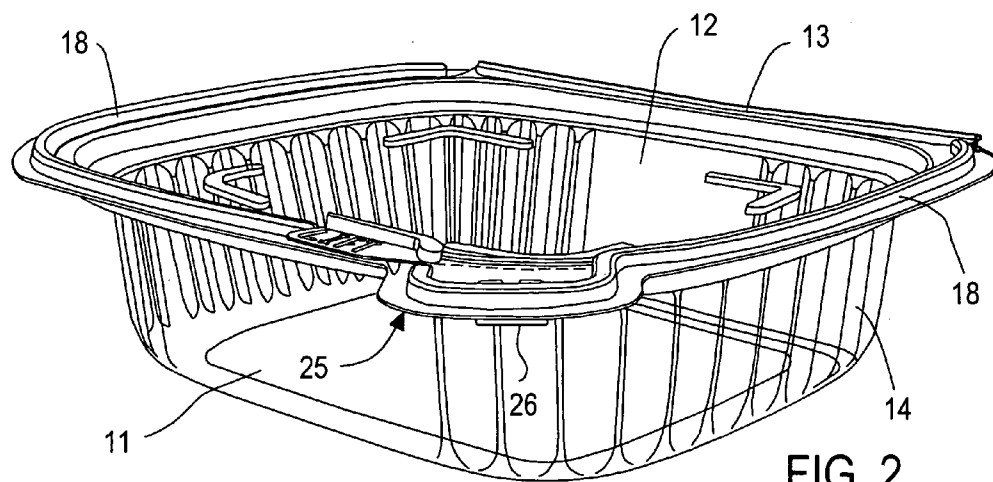


FIG. 2

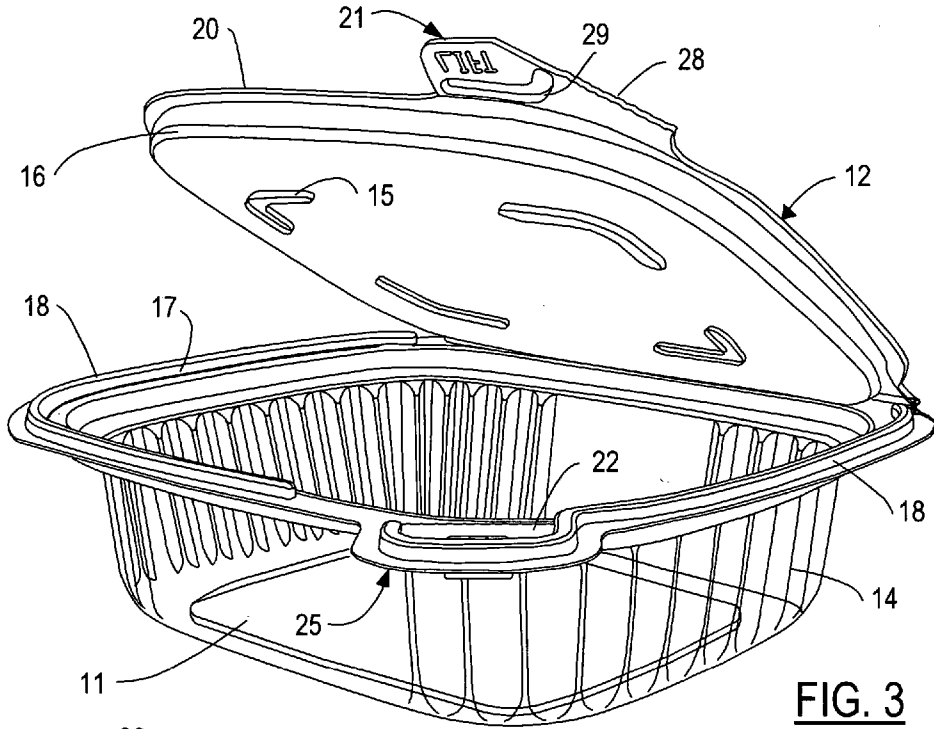


FIG. 3

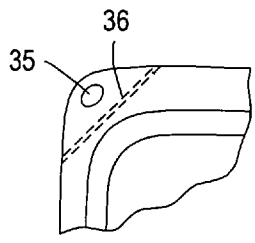


FIG. 7A

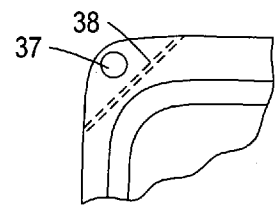


FIG. 7B

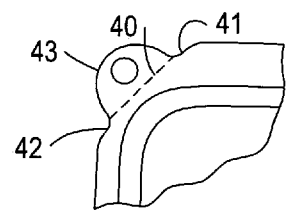


FIG. 7C

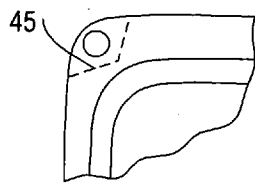


FIG. 7D

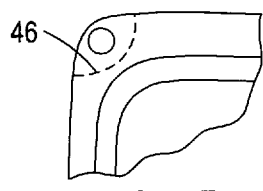


FIG. 7E

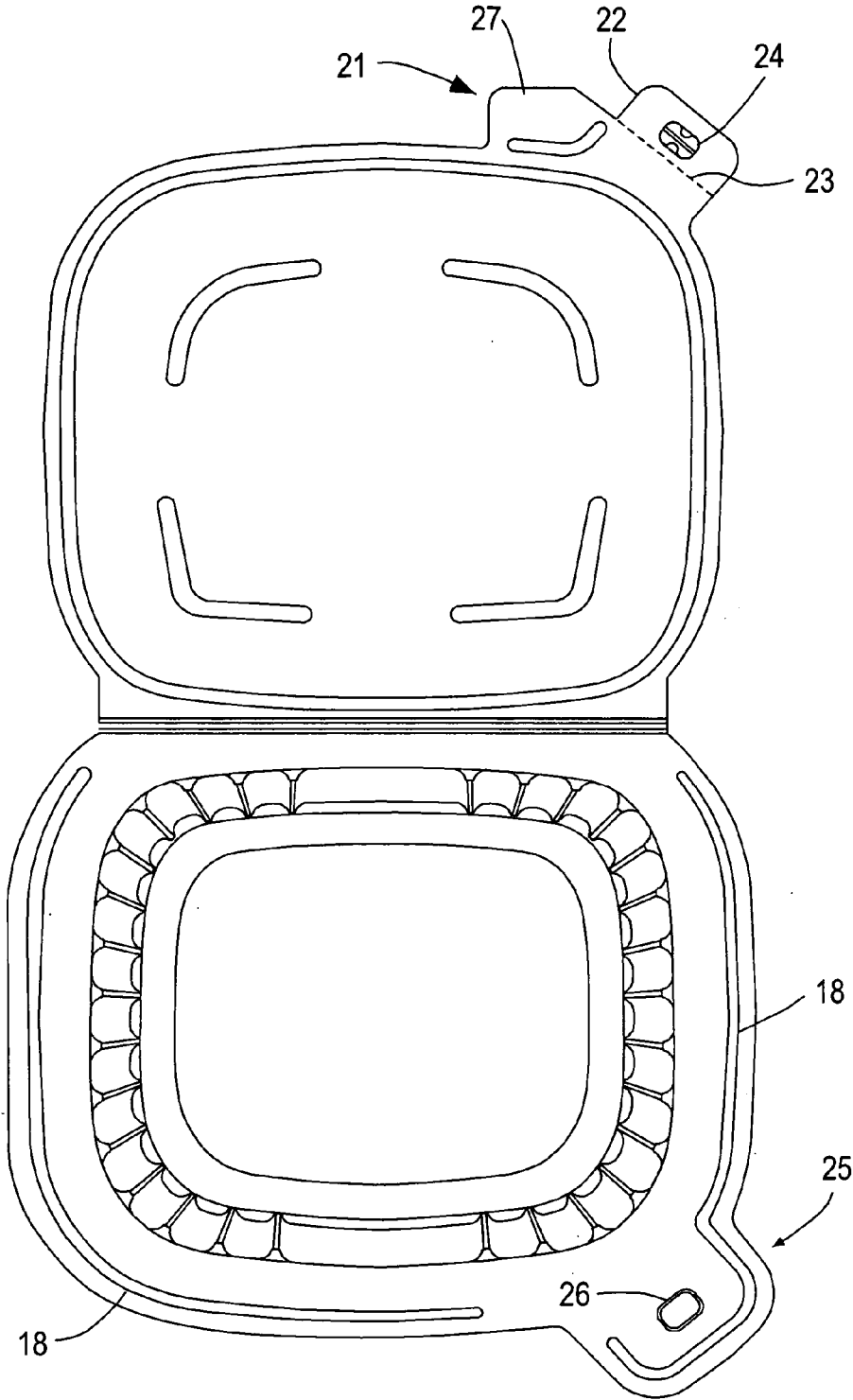


FIG. 4

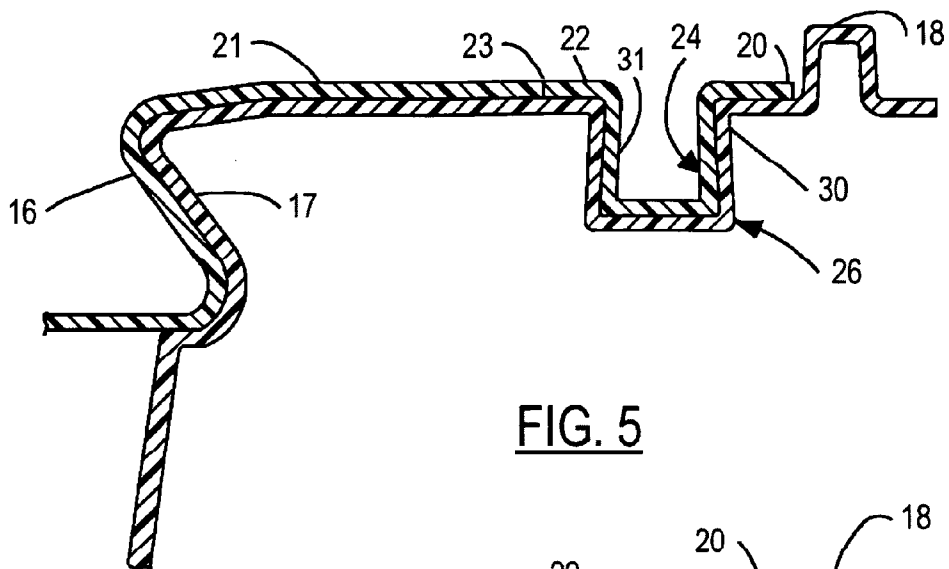


FIG. 5

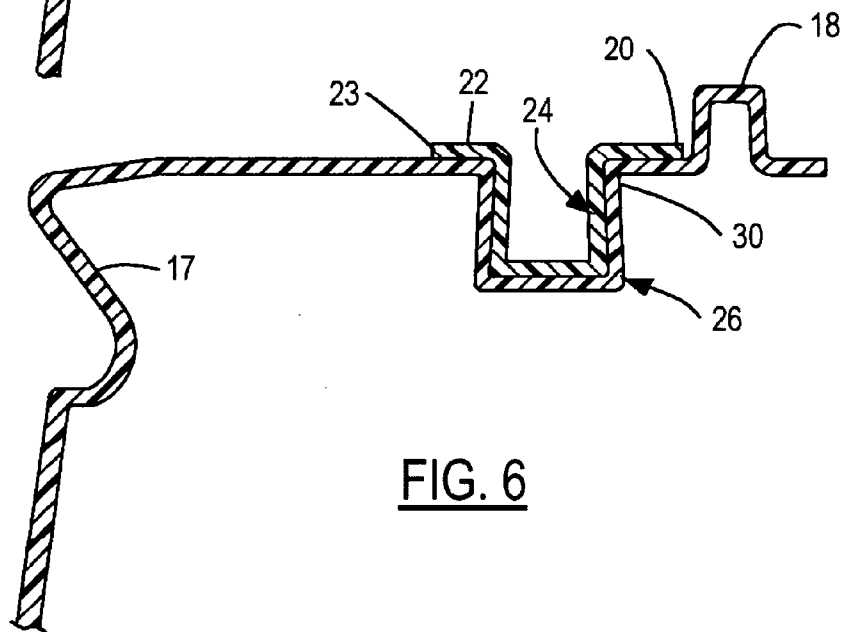


FIG. 6

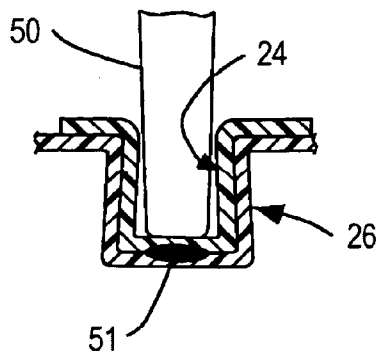


FIG. 8

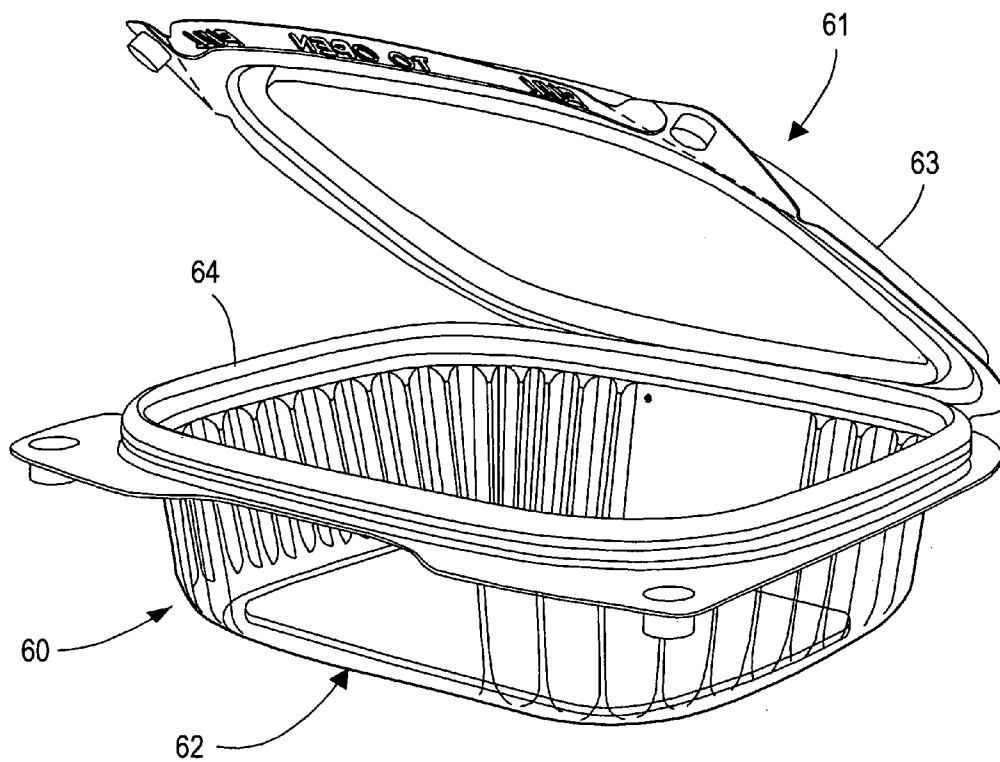


FIG. 9

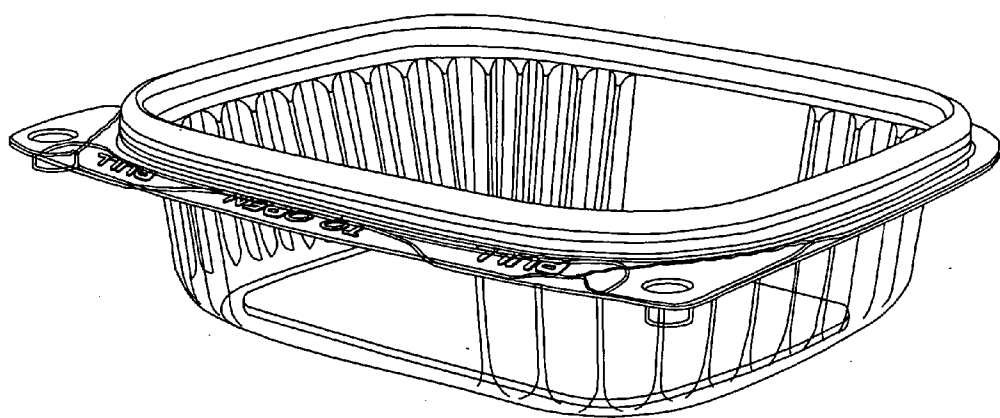
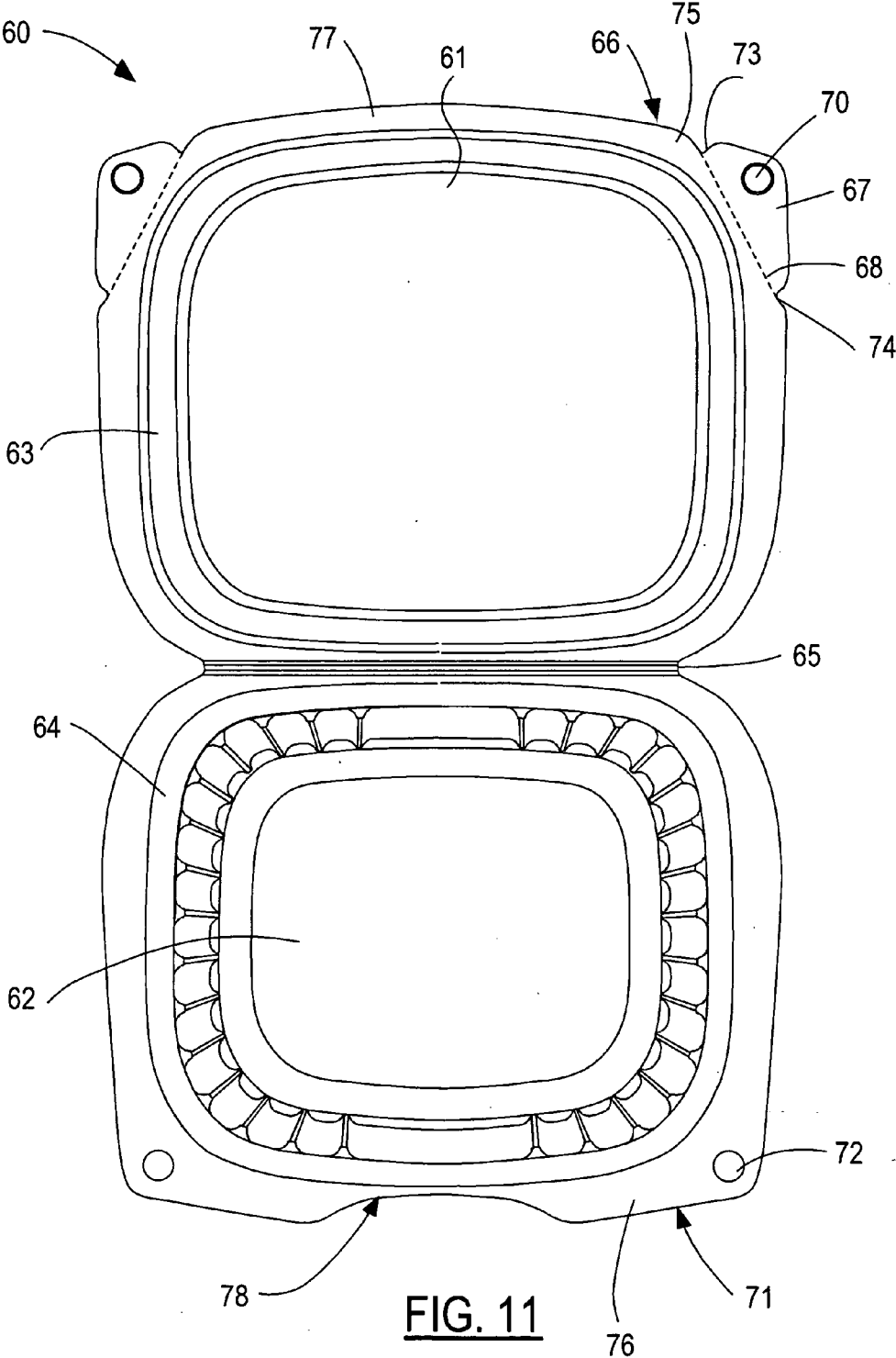


FIG. 10



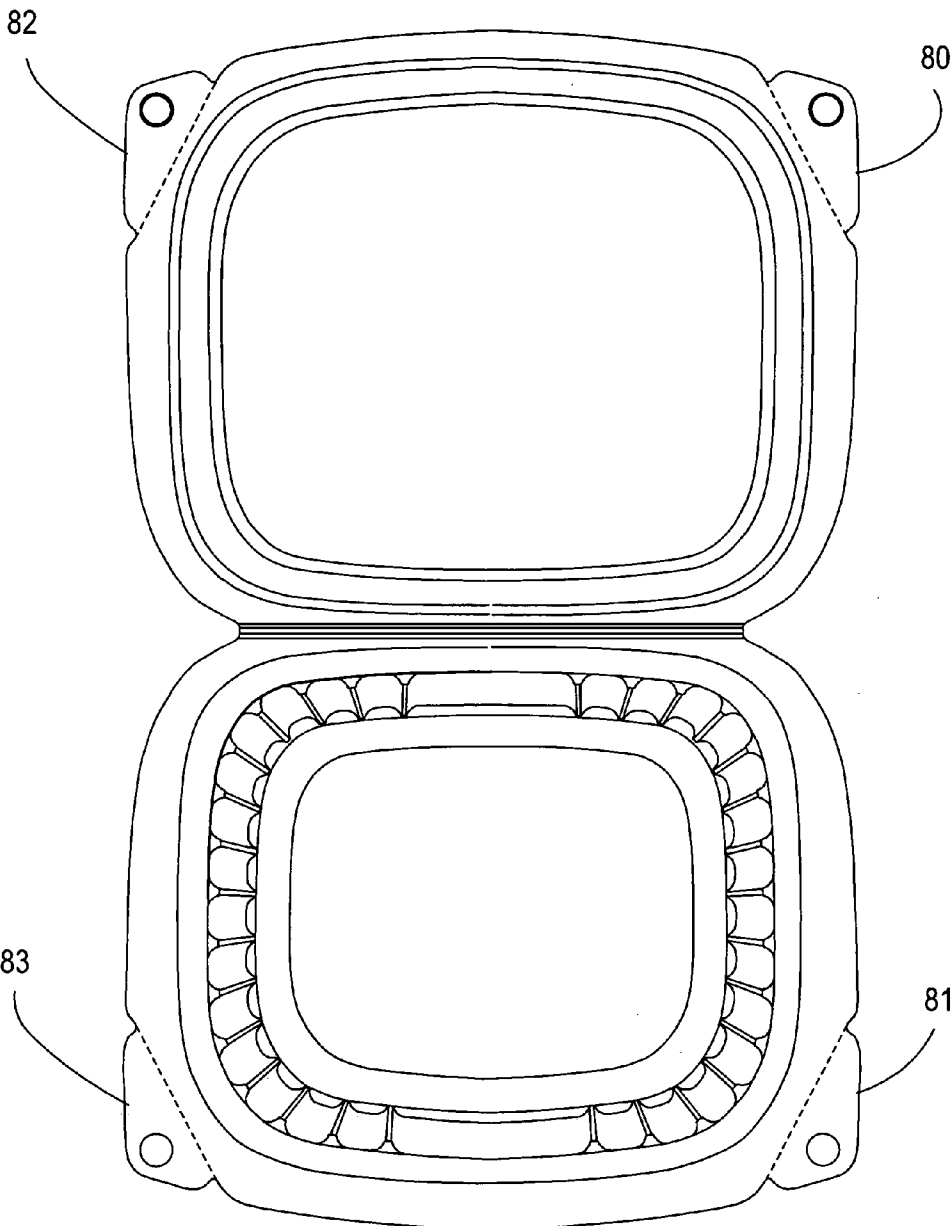


FIG. 12

TAMPER EVIDENT THERMOFORMED CONTAINERS

BACKGROUND OF THE INVENTION

[0001] The present invention relates in general to plastic containers and, more particularly, to improving the tamper evidence of plastic containers having a resealable lid or cover.

[0002] Resealable plastic containers are well known in the art. See, for example, U.S. Pat. No. 5,339,973, to Edwards et al, and U.S. Pat. No. 5,413,239, to Rider, Jr. These containers are most typically used for packaging perishable items (e.g., foods) and other items being packaged on a small scale and/or close to the point of sale (e.g., a grocery store). Containers may be two-piece with a bottom tray and a top tray or lid, or may be one-piece with a hinge connecting the tray and lid. Transparent plastics such as PET or PLA are commonly used, and the containers are typically made by thermoforming in a mold.

[0003] Because of the possibility of tampering with the contents of plastic trays of this type, they are typically not used for packaging food or similar items by large scale manufacturers because the items pass through many hands in the distribution chain and the potential for tampering is greater. Thus, it would be desirable to improve the tamper evidence of resealable plastic containers.

[0004] Consumer appeal of resealable plastic containers comes both from the high level of freshness maintained, the convenience of resealability, and the ability to visually inspect the contents without opening. Any attempts to increase tamper evidence of the container should not compromise these other desirable properties. Moreover, it is desirable to provide a container that can be used by the packager without requiring special equipment.

SUMMARY OF THE INVENTION

[0005] A preferred embodiment of the invention employs a single-piece thermoformed tray consisting of a bottom portion and a top portion joined by a hinge, incorporating one or more sets (pairs) of male and female locking mechanisms joining the top and bottom portions at one or more mating tabs at the opposite side of the tray from the hinge. A perforation line is disposed in the top and/or bottom portions (e.g., in a mating tab) between a locking mechanism and the main body of the tray to allow one-time tamper evidence when access is gained to the interior of the tray.

[0006] The shape, size, type, and number of locking mechanisms vary to accommodate different usages of the container. Locking features can be created in the container during initial formation or incorporated at a later stage. Locking mechanisms are located to the outside of the perforation lines. One preferred locking mechanism uses male/female mating parts that interlock and prevent removal once inserted. Alternatively, a machine closing operation can be used such as heat staking.

[0007] The length, shape, pattern, gate size, orientation, and number of gates of each perforation line vary to accommodate different tray dimensions, volumes, degree of tamper evidence, and ease of separation. A perforation line is provided between each lock and the container seal. The

number of paired perforations/locking mechanisms may vary according to tray dimensions, volumes, or degree of tamper evidence desired.

[0008] In one aspect of the invention, a container is provided comprising a tray body having a top lid portion and a bottom portion. The top lid portion and bottom portion form a re-closable seal around their periphery. A top tab extends from the top lid portion. A bottom tab extends from the bottom portion. A locking mechanism is formed in the top and bottom tabs for substantially permanent engagement. A perforation line in at least one of the top and bottom tabs isolates the locking mechanism, whereby the perforation line must be broken when gaining access inside the tray body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is an isometric view of an open container according to a first preferred embodiment prior to locking.

[0010] FIG. 2 is an isometric view of the container of FIG. 1 after closing and locking.

[0011] FIG. 3 is an isometric view of the container of FIG. 2 after being re-opened, showing the lock separated along the perforation line.

[0012] FIG. 4 is a top view of the open container of FIG. 1.

[0013] FIG. 5 is a cross-sectional view of the lock of FIG. 2 with the lock parts engaged.

[0014] FIG. 6 is a cross-sectional view of the lock of FIG. 3 after re-opening and showing the male lock part separated from the lid.

[0015] FIGS. 7A through 7E are plan views showing examples of perforation lines that can be used in the present invention.

[0016] FIG. 8 is a cross section showing another preferred embodiment of obtaining a lock using heat staking.

[0017] FIG. 9 is an isometric view of an open container according to another preferred embodiment prior to locking.

[0018] FIG. 10 is an isometric view of the container of FIG. 9 after closing and locking.

[0019] FIG. 11 is a top view of the open container of FIG. 9.

[0020] FIG. 12 is a top view of an open container according to yet another embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0021] A general description of performance of the tray is as follows. In order to seal and protect the tray contents, the container is closed to engage the peripheral re-closable seal between the top and bottom portions. Likewise, the male (e.g., top) and female (e.g., bottom) locks are snapped together. Lock engagement is permanent, such that the male part cannot be removed from the female part without either destroying them or altering them so that they cannot re-lock. Once the locks are closed, any force applied to open the container will partially or completely break one or more perforation lines, thus providing clear tamper evidence.

[0022] The perforations must be broken to access the contents of the container. The perforation lines can be separated by simply pulling the cover away from the base or by bending and then ripping along the perforation lines, for example. In order to ease the task of separating the locks and/or breaking the perforation lines, one or more flaps may be provided. The flaps may also assist in opening the re-closable seal of the tray during subsequent use.

[0023] A perforation line comprises a series of aligned cuts (i.e., gates) or indentations into or through the surface of a tab or flap that goes between two edges of the tab or flap so that a locking mechanism is completely isolated. The perforation line can also comprise a continuous indentation or other weakening of the tab or flap, or may comprise a series of cuts completely through the tab with the intervening areas being partially cut or indented. When using a series of discontinuous cuts or indentations, the number of gates may be between 5 and 11 per inch. The linear length of each gate may be between about 0.10 and 0.25 inches. In one preferred embodiment, a perforation line comprises 7 gates, each gate being 0.167 inches long. The shape of a perforation line may be other than straight in order to better show evidence of tampering.

[0024] Instead of being joined by a hinge, the top cover and base could alternatively comprise two separate pieces. Locking mechanisms and corresponding perforation lines would be placed around the periphery of the tray at a sufficiently close spacing to prevent entry into the tray without breaking a perforation line (e.g., locking mechanisms at four corners of the tray).

[0025] Turning now to the drawings, FIGS. 1-4 show a transparent container 10 formed of PET or PLA and having a bottom tray portion 11 and an upper lid portion 12 joined by a hinge portion 13. Bottom tray portion 11 has reinforcing ribs 14, and lid portion 12 has reinforcing ribs 15. An inner circumferential flange 16 extends downward from lid portion 12 to sealingly mate with an outer circumferential flange 17 formed along the lip of bottom tray portion 11. A guard rib 18 is provided around the periphery of outer flange 17 to receive an outer edge 20 of lid portion 12 to help defeat attempts at prying apart portions 11 and 12 at areas away from hinge 13 and the lock mechanism to be described next. Guard rib 18 may be continuous or may include separate sections spaced around the periphery as shown in FIGS. 1-4.

[0026] A top tab 21 extends from lid portion 12 and includes an isolated section 22 separated from lid portion 12 by a perforation line 23. Isolated section 22 has a male lock part 24 extending in the direction of bottom tray portion 11. A bottom tab 25 extends from bottom tray portion 11 and has a female lock part 26 for lockingly receiving male lock part 24. Male lock part 24 may have a generally figure-8 shaped profile with crosscuts and/or lateral indentations which allow male lock part to compress during insertion into female lock part 26 and subsequently expand after insertion. Female lock part 26 may include a narrowed upper neck that acts to compress male lock part 24 during insertion and then block any removal of male lock part 24. Other configurations for interlocking parts will be readily apparent to those skilled in the art. Moreover, the invention also encompasses locating a male lock part on the bottom tab and a female lock part on the top tab.

[0027] Top tab 21 includes a grasping section 27 to facilitate opening of container 10. Section 27 may preferably be scored with a legend such as "LIFT" or other instruction to the user so that it will be apparent that the container can

be opened by pulling apart bottom tab 25 and grasping section 27. As these are separated, isolated section 22 tears away from top tab 21 along perforation line 23. Isolated section 22 remains locked with bottom tab 25. After tearing, top tab 21 exhibits a roughened edge 28 which is distinguishable after re-closing container 10, thereby making evident any tampering. A decorative rib 29 may be provided on grasping section 27 to provide a fill-in between different sections of guard rib 18 and/or to facilitate grasping by a user.

[0028] FIG. 5 illustrates a cross section through top and bottom tabs 21 and 25 when container 10 has been closed and locked. Female lock part 26 has narrowed upper neck 30 to retain an expanded portion 31 of male lock part 24. The main compartment of the container is sealed as a result of the sloped and interference mating of flanges 16 and 17. FIG. 6 illustrates a similar cross section after the locked container has been opened. Perforation line 23 has been separated so that isolated section 22 remains locked in place but does not interfere with subsequent re-closing of the container at flanges 16 and 17.

[0029] Many useful configurations of the locking parts and the perforation line can be used in the present invention. Some such configurations are shown in FIGS. 7A to 7E. These Figures show a locking mechanism at one corner of a rectangular tray. Other tray shapes and other locations of the locking mechanism away from the hinge are possible and are within the scope of the invention.

[0030] FIG. 7A shows locking parts 35 having a generally elliptical profile. A perforation line 36 includes gates in two parallel lines with the individual gates being staggered or offset between the lines. FIG. 7B shows locking parts 37 having a generally circular profile and a perforation line 38 having gates in two parallel lines with the individual gates being side-by-side. A single, straight perforation line 40 is shown in FIG. 7C along with cut-outs 41 and 42 on either side of isolated section 43. Cut-outs 41 and 42 may provide for easier grasping of the lid portion and/or the top tab when the container is closed. They also provide a lead-in for perforation line 40. As shown in FIG. 7C, perforation line 40 preferably includes gates that intersect the edges of isolated section 43 to make tearing easier.

[0031] As shown in FIGS. 7D and 7E, non-straight perforation lines such as a cornered perforation line 45 or a curved perforation line 46 may be used. A non-straight line can make the torn condition of the tab more noticeable to a user after the container is re-closed, thereby making tampering done prior to purchase more evident.

[0032] FIG. 8 shows an alternative locking mechanism employing a heat staking machine having a heater tip 50. After inserting male lock part 24 into female lock part 26, tip 50 is pressed against the bottom well of the lock parts and generates sufficient heat to cause melting between the lock parts at 51. Alternatively, male and female lock parts can be eliminated (e.g., the top and bottom tabs may be flat) and the lock created by heat staking the flat tabs together at the isolated section. In another alternative embodiment, male and female lock parts can be used without compression or expansion so that they can be freely joined and separated until they are heat staked. Either of these two alternative embodiments would allow a manufacturer or filler of the container to close and re-open the container before activating the locking mechanism.

[0033] FIG. 9 is an isometric view of an alternative embodiment of a container 60 wherein an outside-fit lid 61

seals to a bottom tray 62. A flange 63 extends upward along the periphery of lid 61 and sealingly receives a flange 64 extending upward from bottom tray 62. This embodiment is referred to as outside-fit because the peripheral seal extends outward from the container, as opposed to the inside-fit embodiment of FIGS. 1-4 wherein the sealing flanges extend inward into the container.

[0034] FIG. 10 is an isometric view of container 60 in a closed and locked condition. FIG. 11 is a top view of open container 60 prior to locking. Substantially identical locks are provided at adjacent corners of the rectangular container on the side of the container opposite a hinge 65. One of the locks includes a top tab 66 extending from lid 61 including an isolated section 67 separated from lid 61 by a perforation line 68. Isolated section 67 has a male lock part 70 extending in the direction (when closed) of bottom tray 62. A bottom tab 71 extends from bottom tray 62 and has a female lock part 72 for lockingly receiving male lock part 70. In the present embodiment, lock parts 70 and 72 have an interfering circular profile. Female lock part 72 may include a narrowed upper neck that acts to compress male lock part 70 during insertion and then block any removal of male lock part 70.

[0035] Top tab 66 includes cut-outs 73 and 74 providing lead-ins to perforation line 68. Cut-out 73 is located between isolated section 67 and a grasping section 75 to facilitate opening of container 60. A grasping section 76 on bottom tab 71 coincides with cut-out 73 so that grasping sections 75 and 76 can be grasped with different hands and easily separated in a manner that tears perforation line 68 to open container 60. Another grasping section 77 may be provided in top tab 66 by making a cut-out 78 in bottom tab 71 so that it is possible with smaller containers to break perforation lines at both corners of the container simultaneously.

[0036] FIG. 12 shows another alternative embodiment wherein locks are completely removed from a container in order to open it. Thus, one lock comprises an isolated section 80 on the top tab which locks with an isolated section 81 on the bottom tab. Another lock comprises an isolated section 82 on the top tab which locks with an isolated section 83 on the bottom tab. The locked isolated sections are torn off along the perforation lines and discarded to open the container. The slightly rough edges of the perforation lines remain in order to provide tamper evidence.

What is claimed is:

- 1. A container comprising:
 - a tray body having a top lid portion and a bottom portion, the top lid portion and bottom portion forming a re-closable seal around their periphery;
 - a top tab extending from the top lid portion;
 - a bottom tab extending from the bottom portion;
 - a locking mechanism formed in the top and bottom tabs for substantially permanent engagement; and
 - a perforation line in at least one of the top and bottom tabs for isolating the locking mechanism, whereby the perforation line must be broken when gaining access inside the tray body.
- 2. The container of claim 1 wherein the tray body further includes a hinge joining the top lid portion and the bottom portion.

3. The container of claim 1 wherein the locking mechanism comprises:

- a male lock part in one of the top or bottom tabs; and
- a female lock part in the other one of the top or bottom tabs;

wherein the male lock part undergoes compression during insertion into the female lock part and subsequently expands after being inserted into the female lock part.

4. The container of claim 1 wherein the top and bottom tabs are heat-staked together.

5. The container of claim 1 wherein the perforation line comprises a weakening of a selected one of the top or bottom tabs.

6. The container of claim 5 wherein the top or bottom tab other than the selected one lacks a perforation line.

7. The container of claim 5 wherein the weakening comprises a series of aligned cuts in the selected tab.

8. The container of claim 7 wherein the aligned cuts penetrate completely through the selected tab.

9. The container of claim 5 wherein the weakening comprises an indentation into the selected tab.

10. The container of claim 5 wherein the selected tab includes an isolated section and a grasping section separated by the perforation line, wherein the locking mechanism is formed at the isolated section.

11. The container of claim 10 wherein the selected tab is shaped to provide a cut-out creating a lead-in to the perforation line.

12. The container of claim 10 wherein the tab other than the selected tab includes a grasping section.

13. The container of claim 1 wherein the re-closable seal comprises:

- a first flange around a periphery of the top lid portion; and
- a second flange around a periphery of the bottom portion, wherein the first and second flanges sealingly mate when the locking mechanism is engaged.

14. The container of claim 13 wherein the first and second flanges provide an inside-fit lid.

15. The container of claim 14 wherein the bottom portion further comprises a raised guard rib around at least a portion of the periphery of the bottom portion for receiving an edge of the top lid portion.

16. A method for providing tamper evidence of a container having a tray body with a top lid portion and a bottom portion, the top lid portion and bottom portion forming a re-closable seal around their periphery, the top lid portion having a top tab and the bottom portion having a bottom tab, the method comprising the steps of:

- filling the tray body with desired contents;
- closing the container to mate the re-closable seal;
- locking the top and bottom tabs for substantially permanent engagement at a locking position on the top and bottom tabs such that the locking position is isolated from the top lid portion and the bottom portion by a perforation line so that the perforation line must be broken when gaining access inside the tray body.