TAMPER EVIDENT CAP

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ABSTRACT

The present invention is an integrated hinged cover and locking snap to detect tampering of the bung plugs on plastic drums. The locking snaps will break upon an unauthorized attempt to remove the cap from the drum finish. The hinged cover also provides an annular locking ring on the inside surface for engaging an annular ring on the plastic drum finish. The living hinge allows the cap to fit over the annular ring on the drum finish. The living hinge also provides a tear tab member (pull-tab) to remove the cap from the annular locking ring.
TAMPER EVIDENT CAP

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This Present Application is the non-provisional counterpart of my pending U.S. Provisional Patent Application Ser. No. 61/425,336, filed on Dec. 21, 2010, which is incorporated herein by reference in its entirety. The Present Application claims the benefit of and priority to said provisional patent application.

BACKGROUND OF THE INVENTION

[0002] A tamper evident cap is a device that is placed on a container to seal and protect the contents of the container in such a way as to reveal whether the seal has been broken after initial placement. Tamper evident caps are routinely used to seal the contents of steel or plastic drums. They are often fabricated using plastic polymers such as polyethylene. However, they are also often fabricated using metals. Typical devices are described in U.S. Pat. No. 4,625,569, issued to Toei, et al. on Dec. 2, 1986; U.S. Pat. No. 6,360,998, issued to Kline on Mar. 26, 2002, and U.S. Pat. No. 6,688,484, issued to Boulaug, et al. on Feb. 10, 2004.

SUMMARY OF THE INVENTION

[0003] The present invention is an integrated hinged cover and locking snap to detect tampering of the bung plugs on plastic drums. The locking snaps will break upon an unauthorized attempt to remove the cap from the drum finish. The hinged cover also provides an annular locking ring on the inside surface for engaging an annular ring on the plastic drum finish. The living hinge allows the cap to fit over the annular ring on the drum finish. The living hinge also provides a tear tab member (pull-tab) to remove the cap from the annular locking ring.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 is an omnibus view of the Tamper Evident Cap.
[0005] FIG. 1A is a top plan view of the Tamper Evident Cap. This view is shown in greater detail in FIG. 2A.
[0006] FIG. 1B is a front elevation of the Tamper Evident Cap. This view is shown in greater detail in FIG. 2B.
[0007] FIG. 1C is a left-side elevation of the Tamper Evident Cap.
[0008] FIG. 1D is a right-side elevation of the Tamper Evident Cap.
[0009] FIG. 1E is a bottom plan view of the Tamper Evident Cap.
[0010] FIG. 1F is a detail breakout schematic of the locking mechanism.
[0011] FIG. 1G shows the assembly on the neck (finish view).
[0012] FIG. 2 is a detailed breakout from FIG. 1.
[0013] FIG. 2A is a top plan view of the Tamper Evident Cap.
[0014] FIG. 2B is a front elevation of the Tamper Evident Cap.
[0015] FIG. 2C is a front elevational cross section of the Tamper Evident Cap shown as Section A-A of FIG. 1.
[0016] FIG. 2D is a schematic of the locking mechanism.
[0017] FIG. 2E is an enlarged cross sectional view of Section A-A of FIGS. 1 and 2C.

[0018] FIG. 5 is an Omnibus view of the Tamper Evident Cap that incorporates a pull-tab.
[0019] FIG. 5A is a top plan view of the Tamper Evident Cap.
[0020] FIG. 5B is a front elevation of the Tamper Evident Cap.
[0021] FIG. 5C is a left-side elevation of the Tamper Evident Cap.
[0022] FIG. 5D is a right-side elevation of the Tamper Evident Cap.
[0023] FIG. 5E is a bottom plan view of the Tamper Evident Cap.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Referring to FIG. 1, the top row shows:
[0025] View C—C—a left side elevation of the Tamper Evident Cap.
[0026] A top plan view of the Tamper Evident Cap. This is shown in more detail in FIG. 2A.
[0027] View B—B—a right side elevation of the Tamper Evident Cap.
[0029] The second row shows:
[0030] A front elevation of the Tamper Evident Cap. This is shown in more detail in FIG. 2B.
[0031] A breakout of the Tamper Evident Lock. This is shown in more detail in FIG. 3.
[0033] The bottom row shows a front elevational cross section of the Tamper Evident Cap. This is shown in more detail in FIGS. 2C and 4.
[0034] The Tamper Evident Cap of the Present Invention is fabricated from a plastic polymer material, such as polyethylene. Referring to FIG. 1A, from the top, the cap is viewed as a plane circular covering having a seam that divides the cap into two semi-circles. (FIG. 2A is a more detailed view of FIG. 1A.) FIG. 1F is a breakout of the locking mechanism 2 (annotated in FIGS. 2 through 5). FIG. 1A shows that a user can pry the cap open at 3 on both sides to open the lock. This action will break the lock 2. Referring to FIG. 1E, when viewed from the bottom, a plane annular surface is evident as the bottom plane of the cap. Connecting the top circular plane to the bottom annular plane is a cylindrical surface, wherein the cylindrical diameter is equal to the top circular diameter. This forms a cylindrical channel that fits around the bung plug of the drum. There are two locking grooves 4 that surround the bung plug, which lock the cap into place. The two semi-circles seen from above represent the top halves of semi-cylinders that form the cap. The Assembly on Neck Finish View illustrated in FIG. 1G shows how this channel surrounds the bung plug to fit snugly on the drum opening.
[0035] Referring to FIG. 2A, the two semi-cylindrical halves of the cap are joined to each other using two living hinges 1 that reside on the top circular plane of the cap. In the center of the cap, between the two semi-circular halves is a rectangular cutout. The two opposite sides of the rectangle along its length both comprise the living hinges. Only one of the living hinges is shown in the figure for clarity. However, the opposite side is also a living hinge. Other than being joined together by the living hinges, the two semi-cylindrical halves are separate and free to rotate around the living hinges from an angle of 0° to approximately 210°. At the bottom of the cylindrical surface are two identical diametrically
opposed locking mechanisms 2. The locking mechanisms are located just above the bottom annular plane at the junction of the semi-cylindrical halves. The bottom planes of the locking mechanisms coincide with the bottom plane of the cap. This is shown if FIGS. 2B and 2C. FIG. 2B is a more detailed (magnified) view of FIG. 1B. FIG. 2C is a more detailed (magnified) view of Section A-A of FIG. 1 (at the bottom of the drawing). Details of the locking mechanism 2 are shown in FIG. 2C.

[0036] FIG. 3 shows the details of the locking mechanism 2. Note that the orientation of the locking mechanism is upside down from the orientation shown in FIG. 1F. The lock 2 comprises a tongue 5 and a groove 6. The male member 5 has an arrow shaped cross section comprising a shaft and an arrowhead. The female groove 6 comprises two small flaps that are jointed to the groove using living hinges. The flaps form an acute angle to each other, but they are not jointed at their angular apex. In order to lock the cap, the male tongue is inserted into the female groove. The arrowhead of the tongue pushes the flaps further apart the tongue is fully inserted into the groove. The flaps then return to their original position. These flaps hold the tongue firmly in place. If someone attempts an unauthorized removal of the cap from the drum, the cap will detach, but the tongue will break off and separate from the locking mechanism. The cap will no longer be able to be locked in place. This condition will serve as evidence that tampering has occurred.

[0037] FIG. 4 shows the cross sectional view of Section A-A in greater detail. In the figure, the two semi-cylinders are locked in place by the locking mechanism. Note how the tongue is held in place in the groove by the groove flaps pressing against the tongue arrowhead.

[0038] FIG. 5 shows an exemplary embodiment of the Tamper Evident Cap that incorporates a pull-tab 7. The purpose of the pull-tab is to allow for easy removal of the cap from the bung plug opening. When the tab is pulled, there is a sufficient separation from the cap so as to permit the two halves of the cap to separate, and the cap may be removed as shown in the “Assembly On Neck Finish View” drawing of FIG. 1. The lock rim 8 in FIGS. 5D and 5E serve the same purpose as the locking groove 4 in FIG. 1E. Lock rim 8 surrounds the bung plug and holds the cap in place.

We claim:
1. A cap that fits over and around a bung plug, said cap comprising:
   a) two opposing semi-cylindrical flaps connected together by and pivoting around a living hinge, such that the two semi-cylindrical flaps can be brought together to form an annulus, wherein each semi-cylindrical flap comprises a semi-circular top surface, a semi-cylindrical surface comprising a side, top and bottom, said semi-cylindrical surface integrated at its top with the semi-circular top surface, and an annular section locking groove or lock rim integrated with the semi-cylindrical surface at the bottom of said semi-cylindrical surface; and
   b) two lock mechanisms each comprising an arrow shaped male tongue and corresponding female groove, wherein the arrow and the tongue of each lock mechanism are integral to the semi-cylindrical surface of each of the opposing semi-cylindrical flaps, such that when the two semi-cylindrical flaps are brought together, the male tongue of each lock mechanism inserts and locks into place in the corresponding female groove, thereby locking the two semi-cylindrical flaps together.

2. The cap of claim 1 wherein the two semi-cylindrical flaps are free to pivot around the living hinge from an angle of 0° to approximately 210°.

3. The cap of claim 1 further comprising an element that permits a user to pry open the cap, thereby disconnecting the two semi-cylindrical flaps from each other.

4. The cap of claim 2 further comprising a pull-tab.

5. The cap of claim 1 wherein removal of the male tongue from the female groove of either lock mechanism causes the tongue to break.

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