DISPLAY PACKAGE WITH PLASTIC SLEEVE AND INTERLOCKING INSERT TRAY

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ABSTRACT

A tamper-resistant plastic package having a plastic sleeve with at least one open end into which a product carrier tray, also made of plastic, can be inserted into sliding and interlocking engagement with the sleeve. The sleeve desirably comprises a continuous side wall having sufficient length and cross-sectional area to receive the product carrier tray into sliding engagement therewith. The product carrier tray is preferably thermoformed from another plastic sheet made of the same or a different plastic material. The plastic sheets used to make the sleeve and product carrier tray each preferably further comprise one or more structural elements, as described in greater detail below, that cooperate to provide a mechanical interlock when the product carrier tray is fully inserted into the sleeve.
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BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to plastic packages and, more particularly, to plastic display packages having a sleeve formed from a die-cut plastic sheet, and a thermoformed product carrier tray that is insertable into sliding and interlocking engagement with the sleeve.

[0003] 2. Description of Related Art

[0004] In recent years, tamper-resistant clamshell display packages have become widely used in the retail marketing of consumer goods. So-called “big box” retailers favor use of the packages because they facilitate display in tray-packs or case-packs and significantly reduce shrinkage attributable to shoplifting, pilfering and employee theft. Conventional clamshell packages are typically thermoformed from transparent PVC resin and have two halves that are hinged and can be folded together and sealed after inserting one or more products into recesses formed in one or both sides of the clamshell. Display cards with appropriate graphics or instructions are typically inserted into the packages before they are sealed. Because the PVC is tough and durable, and because the edge closures are typically bonded together by an RF seal, clamshell packages are extremely difficult to open without destroying the package.

[0005] Disadvantages of the conventional clamshell packages to manufacturers include the facts that they are expensive to make, are relatively heavy, are not recyclable, and making the RF seal needed to produce the “destruction bond” consumes time and energy. Consumers, particularly children and senior citizens, are frustrated by conventional clamshell packages because they are extremely difficult, if not impossible, to open following purchase, invite injury from accidental use of sharp or pointed tools needed to access the products, present a disposal problem in that they are neither easily handled nor recyclable. Because clamshell packages typically have irregular thicknesses and tend to have relatively sharp edges, they are also difficult to gift-wrap when the subject products are purchased as gifts.

[0006] More recently, applicant has disclosed in a co-pending application fully recyclable, tamper-resistant packaging in which a product is displayed inside a full-thickness recess in a folded inner box that is insertable into a substantially transparent, plastic outer box, which outer box is then sealed with a destruction bond seal. The use of a transparent, thermoformed tray to support the product within a recess in the inner box is also disclosed.

[0007] Notwithstanding the advantages and benefits achievable through use of such prior art packages, however, there remains a need for rigid, tamper-resistant packages that can be easily and inexpensively fabricated from die-cut plastic sheet material in which products can be attractively and visibly displayed, and that are resistant to theft or pilfering of the contained products without the need for a destruction bond seal.

SUMMARY OF THE INVENTION

[0008] According to a preferred embodiment of the invention, plastic packages for displaying products are disclosed that comprise a plastic sleeve having at least one open end into which a product carrier tray, also made of plastic, can be inserted into sliding and interlocking engagement with the sleeve. The sleeve is preferably formed by folding and joining opposed side portions of a single rigid plastic sheet to create a continuous side wall having sufficient length and cross-sectional area to receive the product carrier tray into sliding engagement therewith. The product carrier tray is preferably thermoformed (sometimes referred to as vacuum-formed) from another rigid plastic sheet made of the same or a different rigid plastic material. The plastic sheets used to make the sleeve and product carrier tray, respectively, each preferably further comprise one or more structural elements, as described in greater detail below, that cooperate to provide a mechanical interlock when the product carrier tray is fully inserted into the sleeve.

[0009] As used herein, the terms “rigid plastic” or “rigid sheet” refers to plastic sheet material, typically cut from rolls formed from extruded webs of thermoplastic resin, that can be die-cut, scored, folded, thermoformed, and tacked or glued, for example, to make packaging components such as the sleeve and product carrier tray identified above. Although said to be “rigid,” the sleeves and product carrier trays disclosed herein are understood to be flexible when subjected to manually applied pressure. Such “rigid plastics” or “rigid sheets” are to be distinguished and differentiated, however, from web rolls of flexible, thin-film plastics such as those commonly used to make products like stretch wrap, shrink wrap or over-wrap, even when made from the same polymeric resins as the “rigid sheets,” and also from injection molded plastic packages such as CD and DVD cases. Plastic resins that can be used in making the packages of the invention include, for example, polyethylene terephthalate (PET), amorphous polyethylene terephthalate (APET), polyvinyl chloride (PVC), polylactic acid (PLA), polypropylene (PP), polystyrene (PS) and high density polyethylene (HDPE), all of which are well known to those of skill in the art.

[0010] According to a particularly preferred embodiment of the invention, the product carrier tray further comprises at least one end portion adapted to close each open end of the sleeve when the product carrier tray is fully inserted into interlocking engagement with the sleeve. The product carrier tray can also be made with at least one hinge member that enables a portion of the tray to be folded back against itself prior to insertion into the sleeve to form the package of the invention. Preferred structures for use as mechanical interlocks between the sleeves and product carrier trays in the packages of the invention include, for example,

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The apparatus of the invention is further described and explained in relation to the following drawings wherein:

[0012] FIG. 1 is a front perspective view of a preferred embodiment of the tamper-resistant display package of the invention;

[0013] FIG. 2 is an exploded front perspective view showing the tamper-resistant package of FIG. 1 prior to insertion of the product carrier tray into the sleeve;

[0014] FIG. 3 is a top plan view of the die-cut sheet used to make the sleeve of FIG. 2;

[0015] FIG. 4 is a simplified end view in which the die-cut sheet of FIG. 3 is partially assembled;

[0016] FIG. 5 is a simplified end view of the sleeve of FIG. 2;
FIG. 6 is an enlarged front view of the product carrier tray as in FIG. 2;
FIG. 7 is an enlarged, cross-sectional elevation view of the product carrier tray, taken along line 7-7 of FIG. 6;
FIG. 8 is a front perspective view of another preferred embodiment of the tamper-resistant package of the invention;
FIG. 9 is an exploded front perspective view showing the tamper-resistant package of FIG. 8 prior to insertion of the product carrier tray into the sleeve;
FIG. 10 is a top plan view of the die-cut sheet used to make the sleeve of FIG. 9;
FIG. 11 is a simplified end view in which the die-cut sheet of FIG. 10 is partially assembled;
FIG. 12 is a simplified end view of the sleeve of FIG. 9;
FIG. 13 is a front perspective view of the product carrier tray as in FIG. 9;
FIG. 14 is an enlarged, cross-sectional side elevation view of the product carrier tray, taken along line 14-14 of FIG. 13;
FIG. 15 is a front perspective view of another preferred embodiment of the tamper-resistant package of the invention;
FIG. 16 is an exploded front perspective view showing the tamper-resistant package of FIG. 15 prior to insertion of the product carrier tray into the sleeve;
FIG. 17 is a top plan view of the die-cut sheet used to make the sleeve of FIG. 16;
FIG. 18 is a simplified end view in which the die-cut sheet of FIG. 17 is partially assembled;
FIG. 19 is a simplified end view of the sleeve of FIG. 16;
FIG. 20 is a right side elevation view of the product carrier tray as in FIG. 16;
FIG. 21 is a rear perspective view of the product carrier tray of FIG. 16; and
FIG. 22 is a rear perspective view of the product carrier tray as in FIG. 21 but showing the two halves unfolded around the longitudinally extending hinge disposed between them.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Three different principal embodiments of the invention are further described and explained below, although it should be appreciated that these three embodiments are merely illustrative, and not limiting, as to the many package configurations that can be made within the scope of the invention. The subject packages are preferably transparent, either clear or tinted, to facilitate viewing of a product contained inside, although will be apparent to those of skill in the art upon reading this disclosure that such packages can also comprise printed images and graphics, holographic images, opaque wall sections, and the like.

One preferred embodiment of the package of the invention is further described and explained in relation to FIGS. 1-7. Referring to FIGS. 1 and 2, package 10 comprises sleeve 12 and at least one product carrier tray 14. The length, thickness and cross-sectional configuration of sleeve 12 and product carrier tray 14 are preferably such that product carrier tray 14 is slidably insertable into sleeve 12. Sleeve 12 and product carrier tray 14 are each preferably made from a rigid, die-cut sheet of the same or a different plastic. Plastic resins useful for making either sleeve 12 or product carrier tray 14 include polyethylene terephthalate (PET), amorphous polyethylene terephthalate (APET), polyvinyl chloride (PVC), polyactic acid (PLA), polycaprolactone (PP), polystyrene (PS) and high density polyethylene (HDPE), and other similarly effective polymeric materials that are well known to those of skill in the art. Sleeve 12 and product carrier tray 14 preferably each comprise at least one structural element that is useful for establishing a mechanical interlock between the two parts whenever product carrier tray 14 is fully seated inside sleeve 12.

As used herein, the term “mechanical interlock” refers to a structural relationship in which at least one structural element of either sleeve 12 or product carrier tray 14 abuts against or is blocked by at least one cooperating structural element of the other part to prevent the product carrier tray 14 from being easily disengaged from sleeve 12 without the use of tools or without otherwise deforming package 10. The nature of the mechanical interlock is preferably such that product carrier tray 14 can be easily inserted inside sleeve 12, and, when fully inserted, a portion of the sleeve or tray is biased into an engagement with the other that cannot thereafter be disengaged or defeated simply by reversing the direction of travel of the tray relative to the sleeve. In the embodiment of FIGS. 1-7, the mechanical interlock occurs between projection 34 and window 16.

FIGS. 3-5 disclose how sleeve 12 is formed from a die-cut plastic sheet. Referring to FIG. 3, the sheet used to form sleeve 12 preferably comprises sidewall panel sections 20, 22 that, when folded about fold line 28, cooperate to form a substantially continuous sidewall for package 10 of FIG. 1. Flap 18, connected to sidewall panel section 20 at fold line 26, preferably comprises window 16 that cooperates with a projecting structure on the product carrier tray 14, as discussed below, to form a mechanical interlock with product carrier tray 14. Tabs 17, 19, opposite slot 21 and indention 23, respectively, are preferably provided to allow clearance around the end portions without causing window 16 of flap 18 to disengage from projection 34 as disclosed below. Flap 24, provided for use in securing sleeve 12 in a closed position, is connected to sidewall panel section 22 at fold line 30. FIG. 4 depicts an intermediate stage in the assembly of sleeve 12 wherein sidewall panel sections 20, 22 have been flexed around fold line 28, and wherein flap 18 has been folded inwardly around fold line 26. Flap 24 is preferably folded inwardly toward sidewall panel section 22 around fold line 30. FIG. 5 depicts an end view of sleeve 12 when fully assembled, with flap 24 being secured in facing engagement to that portion of inwardly folded flap 18 that is adjacent to fold line 26. Flap 24 is preferably secured to flap 18 by any commercially available adhesive well known to those of skill in the art to be suitable for use in permanently securing two facing and contacting surfaces made of the particular polymeric resin selected for use as sleeve 12.

It should be appreciated that the cross-section depicted in FIG. 5 is simply one of many different configurations in which packages 10 of the invention can be made. One advantage of this particular configuration is that the curvature of sidewall panel sections 20, 22 serve as guides to position the free end of flap 18 just inwardly of the apex formed by fold line 28, thereby adding more rigidity to sleeve 12. By holding flap 18 in position relative to sidewall panel sections 20, 22 in this manner, sleeve 12 causes
window 16 as shown in FIG. 3 to be biased into engagement with cooperating projection 34 of product carrier tray, as shown in FIG. 7.

[0039] Product carrier tray 14 and the mechanical interlock between sleeve 12 and product carrier tray 14 are further described and explained in relation to FIGS. 6 and 7. Product carrier tray 14 is preferably thermoformed from a rigid plastic sheet 33, and further comprises a product cavity 32, projection 34, and end portions 36, 38 and 40. End portion 40 is preferably connected to end portion 38 by hinge 42 and is foldable around hinge 42 as indicated by arrow 44 to provide a closer fit inside sleeve 12. As will be apparent from FIG. 7, product cavity 32 desirably has sufficient depth and an appropriate configuration to enable a product to be held in a preferred alignment within package 10 during shipment and display. Cavity 32 does not, however, have to be sufficiently deep to hold the entire product, as clearance between cavity 32 and the surrounding sleeve 12 is also provided by the projection of end portions 36, 38 beyond sheet 33. As shown in FIGS. 6 and 7, cavity 32 has a configuration that conforms to a product in the form of tube. It is understood, however, that cavity 32 can be similarly made to conform to other products having an infinite number of other configurations and sizes as desired. As product carrier tray 14 is inserted into sleeve 12, as described above, projection 34 of the tray is biased into engagement with window 16 of sleeve 12, thereby preventing tray 14 from being easily removed from sleeve 12. Although it is not shown in FIGS. 1-7, a tear strip such as tear strip 60 described in relation to the embodiment of FIGS. 9 and 10 below can also be provided in sleeve 12 of this embodiment to facilitate entry into package 10 by the consumer following purchase.

[0040] Another preferred package 50 of the invention is described and explained in relation to FIGS. 8-14. Package 50 preferably comprises plastic sleeve 52 and product carrier tray 54, both of which are preferably fabricated using methods and materials as disclosed above for sleeve 12 and product carrier tray 14 of package 10. Product carrier tray 54 is slidably inserted into sleeve 52 to form package 50, and, when fully seated inside sleeve 52, is held in place by a mechanical interlock formed between die-cut tab 56 on product carrier tray 54 and slot 58 inside sleeve 52. Referring particularly to FIGS. 9 and 10, sleeve 52 further comprises a tear strip 60 that can be easily removed by a purchaser to disengage tab 56 from slot 58 and thereby facilitate removal of a product from package 50 prior to use.

[0041] FIGS. 10-12 disclose how sleeve 52 is formed from a die-cut plastic sheet. Referring to FIG. 10, the sheet used to form sleeve 52 preferably comprises sidewall panel sections 62, 64 that, when folded about fold line 72, cooperate to form a substantially continuous sidewall for package 50 of FIG. 8. Flaps 66, 68, 70, connected to sidewall panel section 64 by fold lines 74, 76, 78, respectively, are provided to facilitate sealing sidewall panel sections 62, 64 together on the side opposite fold line 72. Elongate slot 58 is desirably formed along fold line 78, and cooperates with projecting tab 56 on product carrier tray 52 (as shown in FIGS. 8 and 9) to form a mechanical interlock similar to that previously discussed in relation to window 16 and projection 34 of package 10.

[0042] FIG. 11 depicts an intermediate stage in the assembly of sleeve 52 wherein sidewall panel sections 62, 64 are flexed around fold line 72, and wherein flaps 66, 68, 70 have been sequentially folded in alternating directions around fold lines 74, 76 and 78, respectively. When flap 68 is folded downwardly from the position shown in FIG. 11 into facing engagement against flap 66, as shown in FIG. 12, flap 70 is drawn into facing engagement with the inside surface of sidewall panel 64, where it can be adhered to panel 64 by means of tape, adhesive, heat sealing or any other conventional attachment means suitable for use with such materials and package configurations. When the outwardly facing side of flap 66 is then pressed into facing engagement with the inside surface of the free end portion of sidewall panel section 62 and adhered thereto by the same or similarly effective means, flaps 66, 68 and 70 cooperate to form a bracket attaching the otherwise open ends of side panels 62, 64 in close proximity while simultaneously positioning elongate slot 58 in such manner that it can receive tab 56 when product carrier tray 54 is inserted into and fully seated inside sleeve 52 as shown in FIG. 8. FIG. 12 depicts an end view of sleeve 52 when fully assembled.

[0043] Product carrier tray 54 and the mechanical interlock between sleeve 52 and product carrier tray 54 are further described and explained in relation to FIGS. 13 and 14. Product carrier tray 54 is preferably thermoformed from a rigid plastic sheet 80, and further comprises a product cavity defined by recess 82, and end portions 84, 86, 88 and 90. End portion 88 is preferably connected to end portion 84 by hinge 92 and is foldable around hinge 92 as indicated by arrow 96 to provide a closer fit when inserted into sleeve 52. As will be apparent from FIG. 14, product cavity 32 desirably has sufficient depth and an appropriate configuration to enable a product to be held in a preferred alignment within package 50 during shipment and display. The product cavity does not, however, have to be sufficiently deep to hold the entire product, as clearance between the product cavity and the surrounding sleeve 54 is also provided by the outward projection of paired end portions 84, 88 and 86, 90, respectively, beyond sheet 80. As with cavity 32 shown in FIGS. 6 and 7, it is understood that the product cavity in product carrier tray 54 of package 50 can be similarly made to conform to other products having an infinite number of other configurations and sizes as desired. As product carrier tray 54 is inserted into sleeve 52, as described above, projection 56 of the tray is biased into engagement with elongate slot 58 of sleeve 52, thereby preventing tray 54 from being easily removed from sleeve 52.

[0044] Another preferred package 100 of the invention is described and explained in relation to FIGS. 15-22. Package 100 preferably comprises plastic sleeve 102 and product carrier tray 104, both of which are preferably fabricated using methods and materials as disclosed above for sleeves 12, 52 and product carrier trays 14, 54 of packages 10, 50. Product carrier tray 104 is slidably insertable into sleeve 102 to form package 100, and, when fully seated inside sleeve 102, is held in place by a mechanical interlock formed between die-cut flap 112 of sleeve 102 and end portions 130, 132 of product carrier tray 104 when tray 104 is fully seated inside sleeve 102. Referring particularly to FIGS. 9 and 10, sleeve 102 can further comprises a tear strip 60 that can be easily removed by a purchaser to expand sleeve 102 and thereby disengage flap 112 from between end portions 130, 132 to facilitate removal of a product from package 100 prior to use.

[0045] FIGS. 17-19 disclose how sleeve 102 is formed from a die-cut plastic sheet. Referring to FIG. 17, the sheet
used to form sleeve 102 preferably comprises sidewall panel sections 106, 108 that, when folded about fold line 116, cooperate to form a substantially continuous sidewall for package 100 of FIG. 15. Flap 105, connected to sidewall panel 106 at fold line 114, and flap 110, connected to sidewall panel 108 at fold line 118, are provided to facilitate sealing sidewall panels 106, 108 together on the side opposite fold line 116. Flap 112, connected to flap 110 at fold line 120, is provided for use in achieving a mechanical interlock with product carrier tray 104.

[0046] FIG. 18 depicts an intermediate stage in the assembly of sleeve 102 wherein sidewall panel sections 106, 108 are flexed around fold line 116 and wherein flaps 110, 112 are folded around fold line 118. FIG. 19 depicts an end view of sleeve 102 when fully assembled, with flap 105 being secured in facing engagement to that portion of inwardly folded flap 110 that is adjacent to fold line 118. Flap 24 is preferably secured to flap 18 by any commercially available adhesive well known to those of skill in the art to be suitable for use in permanently securing two facing and contacting surfaces made of the particular polymeric resin selected for use as sleeve 12.

[0047] Product carrier tray 104 is further described and explained in relation to FIGS. 20-22. Product carrier tray 104 is preferably thermoformed from a rigid plastic sheet, and is similar to product carrier trays 14, 54 described above except that tray 104 comprises two thermoformed sheet portions 126, 128 joined by longitudinal hinge 146. The two sheet portions each further comprise centrally disposed product cavity sections 158, 160, respectively, that cooperatively form an enclosure for the packaged product. Each sheet portion also comprises longitudinally spaced, laterally projecting end portions 130, 132 and 134, 136, respectively. When a product is inserted into one of the two product cavities 158, 160, sheet portions 126, 128 are folded together at hinge 146, causing projecting bosses 138, 140 to enter and frictionally engage receptacles 142, 144, thereby holding the two sheet portions in facing and contacting engagement to confine a product inside the space defined by combined cavities 158, 160. Package 100 (FIG. 15) is then assembled by inserting product carrier tray 104 into sleeve 102. Flap 112 is pressed against an inside wall of sleeve 102 as the end portions on the leading end of product carrier tray 14 are inserted into the sleeve. When product carrier tray 104 is fully seated inside sleeve 102, flap 112 of sleeve 102 drops into position between the longitudinally spaced end portions on one side of tray 104, thereby creating a mechanical interlock that prevents tray 104 from being conveniently removed from sleeve 102 by moving tray 104 in a direction opposite to the direction of insertion.

[0048] Other alterations and modifications of the invention will likewise become apparent to those of ordinary skill in the art upon reading this specification in view of the accompanying drawings, and it is intended that the scope of the invention disclosed herein be limited only by the broadest interpretation of the appended claims to which the inventors are legally entitled.

We claim:
1. A tamper-resistant plastic display package comprising a sleeve having at least one open end, a product carrier tray slidably insertable into the at least one open end, the sleeve having a first interlocking structure, the product carrier tray having a second interlocking structure, and the first and second interlocking structures cooperating to retain the product carrier tray inside the sleeve when the product carrier tray is inserted into and fully seated inside the sleeve.
2. The package of claim 1 wherein the sleeve is made of a polymeric material selected from the group consisting of polyethylene terephthalate (PET), amorphous polyethylene terephthalate (APET), polyvinyl chloride (PVC), polylactic acid (PLA), polypropylene (PP), polystyrene (PS) and high density polyethylene (HDPE).
3. The package of claim 1 wherein the product carrier tray is made of a polymeric material selected from the group consisting of polyethylene terephthalate (PET), amorphous polyethylene terephthalate (APET), polyvinyl chloride (PVC), polylactic acid (PLA), polypropylene (PP), polystyrene (PS) and high density polyethylene (HDPE).
4. The package of claim 1 wherein the sleeve comprises a substantially continuous sidewall formed from a die-cut sheet of rigid plastic.
5. The package of claim 1 wherein the product carrier tray is formed from a die-cut sheet of rigid plastic.
6. The package of claim 1 wherein the sleeve comprises two open ends.
7. The package of claim 1 wherein the sleeve comprises a weakened tear strip.
8. The package of claim 7 wherein the weakened tear strip is formed by scoring a portion of the sleeve.
9. The package of claim 4 wherein the sleeve further comprises a flap disposed inwardly of the sidewall.
10. The package of claim 9 wherein the flap is engageable with at least one projection on the product carrier tray.
11. The package of claim 9 wherein the flap is engageable between two cooperating projections on the product carrier tray.
12. The package of claim 11 wherein the two cooperating projections are outwardly projecting end portions of the product carrier tray.
13. The package of claim 9 wherein the flap comprises an opening that is engageable with a projection on the product carrier tray.
14. The package of claim 13 wherein the opening is a window.
15. The package of claim 1 wherein the product carrier tray further comprises at least one end structure that substantially occludes the at least one open end of the sleeve when the product carrier tray is fully seated inside the sleeve.
16. The package of claim 6 wherein the product carrier tray comprises two end structures that substantially occlude the two open ends of the sleeve when the product carrier tray is fully seated inside the sleeve.
17. The package of claim 16 wherein at least part of at least one of the end structures is connected by a hinge to the remainder of the product carrier tray.
18. The package of claim 1 wherein the product carrier tray comprises a cavity into which at least a portion of a product is receivable.
19. The package of claim 18 wherein the product carrier tray is thermoformed.
20. The package of claim 10 wherein the opening is a slot and wherein the projection is a tab.
21. The package of claim 5 wherein the product carrier tray comprises first and second portions that are foldable around a hinge.