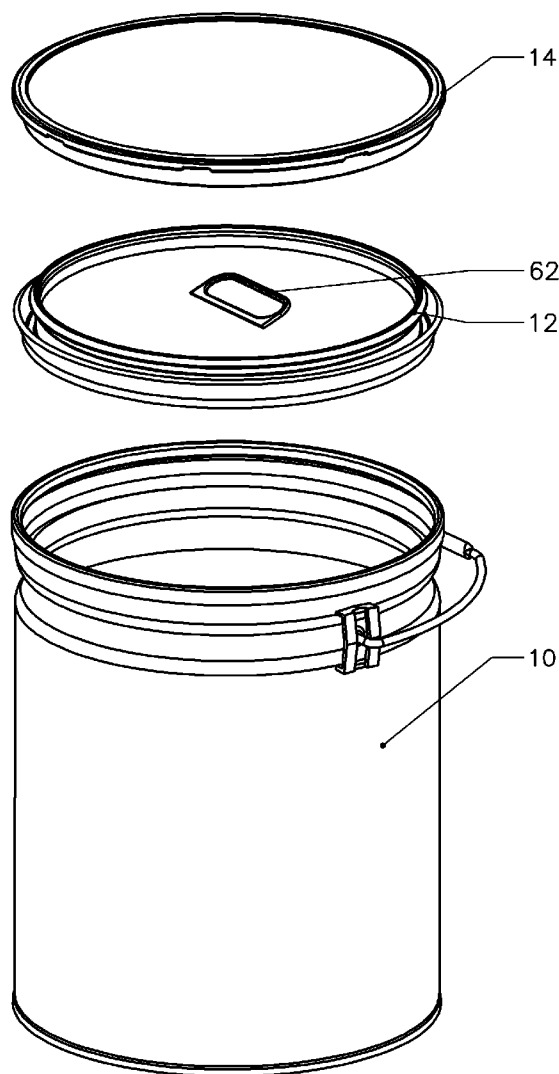




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(19) **United States**(12) **Patent Application Publication**
Cicccone et al.(10) **Pub. No.: US 2011/0186572 A1**(43) **Pub. Date: Aug. 4, 2011**(54) **THREE PIECE THERMOPLASTIC
CONTAINER**(52) **U.S. Cl. 220/212.5; 220/214**(76) Inventors: **Vince Cicccone**, Kleinburg (CA);
Maxwell Bushby, Sydney (AU)(21) Appl. No.: **12/917,864**(22) Filed: **Nov. 2, 2010****Related U.S. Application Data**(60) Provisional application No. 61/257,118, filed on Nov.
2, 2009.**Publication Classification**(51) **Int. Cl.**
B65D 53/02 (2006.01)
B65D 25/28 (2006.01)(57) **ABSTRACT**

A container for a material, wherein the container has a body, a base, and a lid is presented. The base may be with or without a tamper-evident feature, depending on requirements, while the lid is made preferably of a clear, transparent plastic. The body has a bottom and a tubular element defining sides of the body and extending upwardly from a periphery of the bottom. An upper portion of the tubular element forms an aperture of the body. The base has an externally directed annular protrusion which engages a recess in the aperture-forming portion of the tubular element of the body. In this way, a permanent seal is made at the top of the body after filling with the material. A lid is adapted to removably engage a top portion of the base.



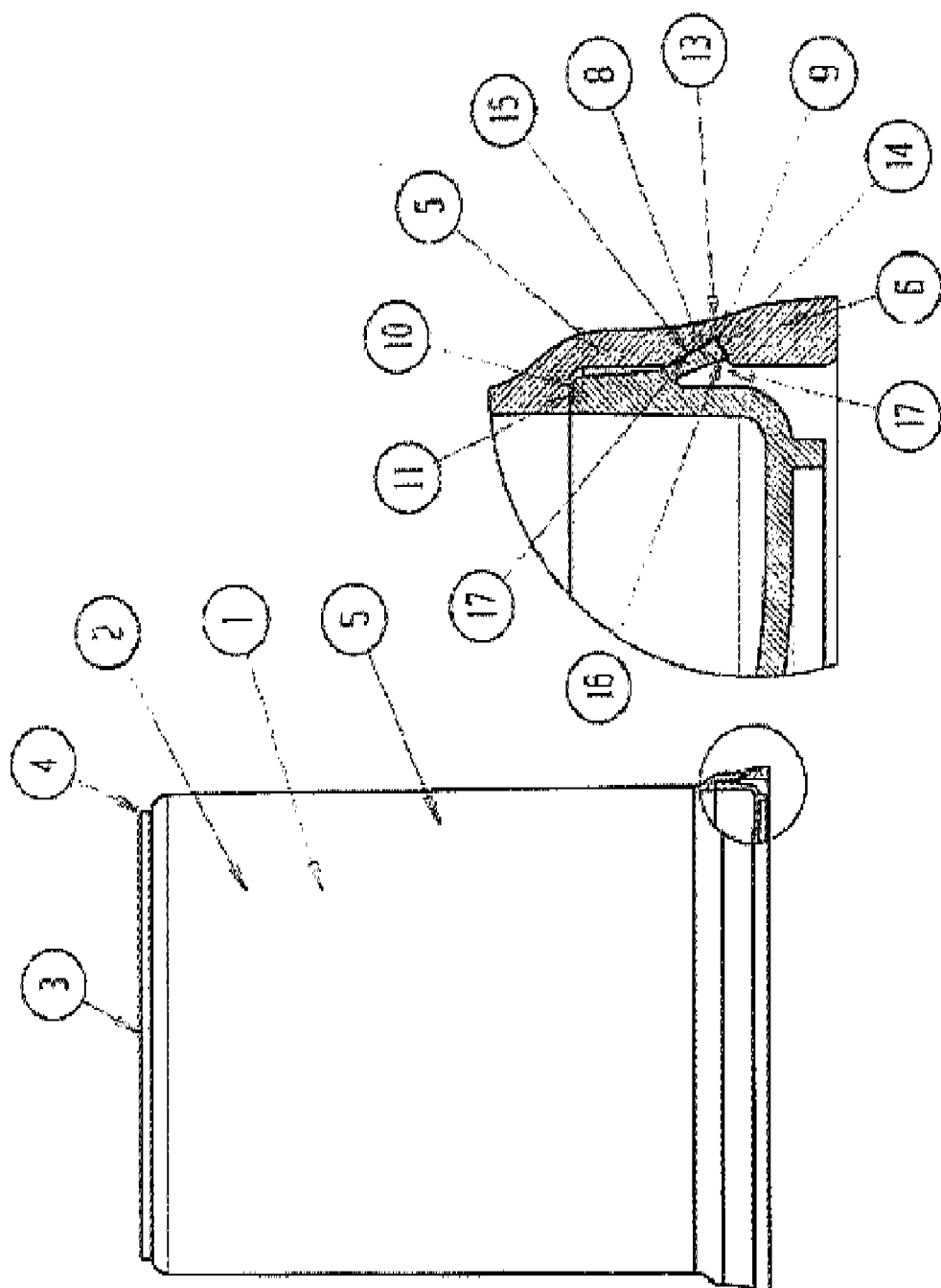
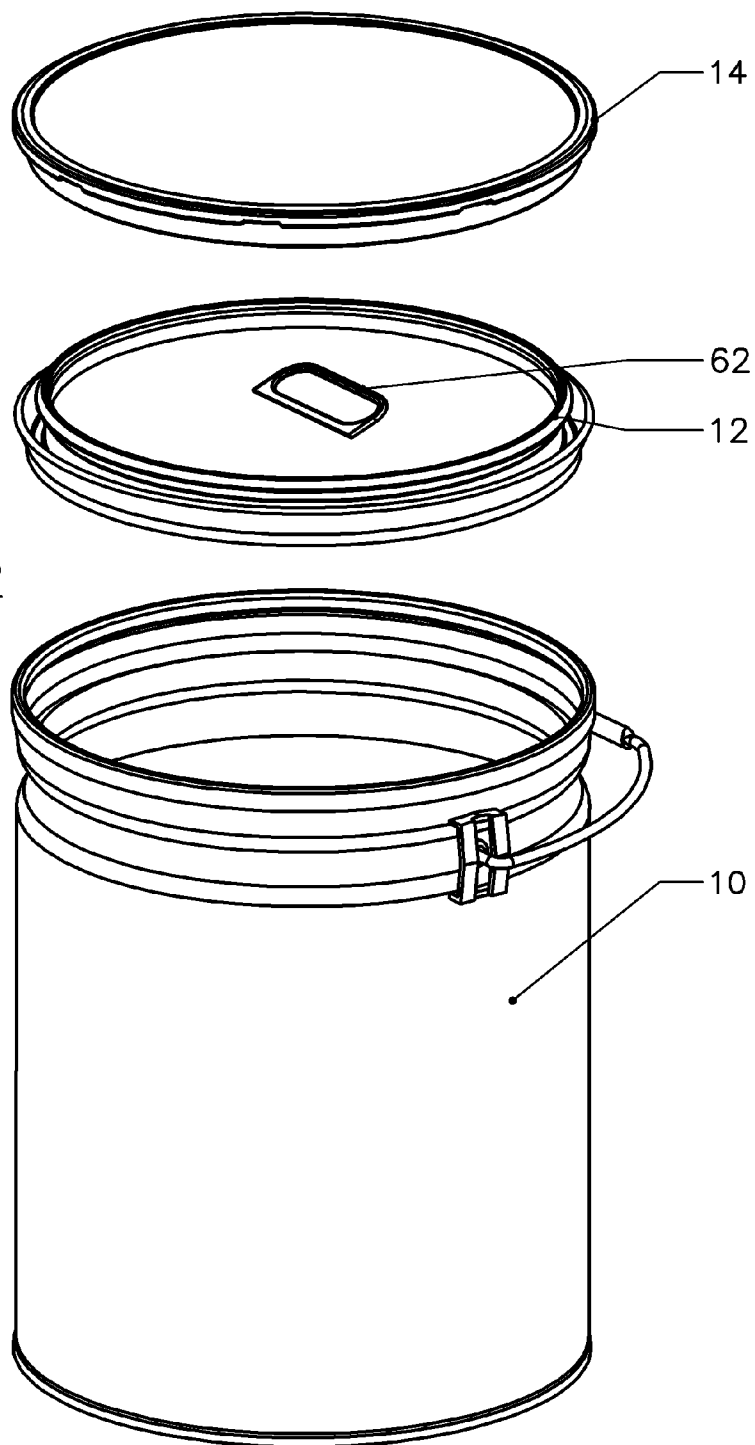


Fig. 1 (Prior Art)



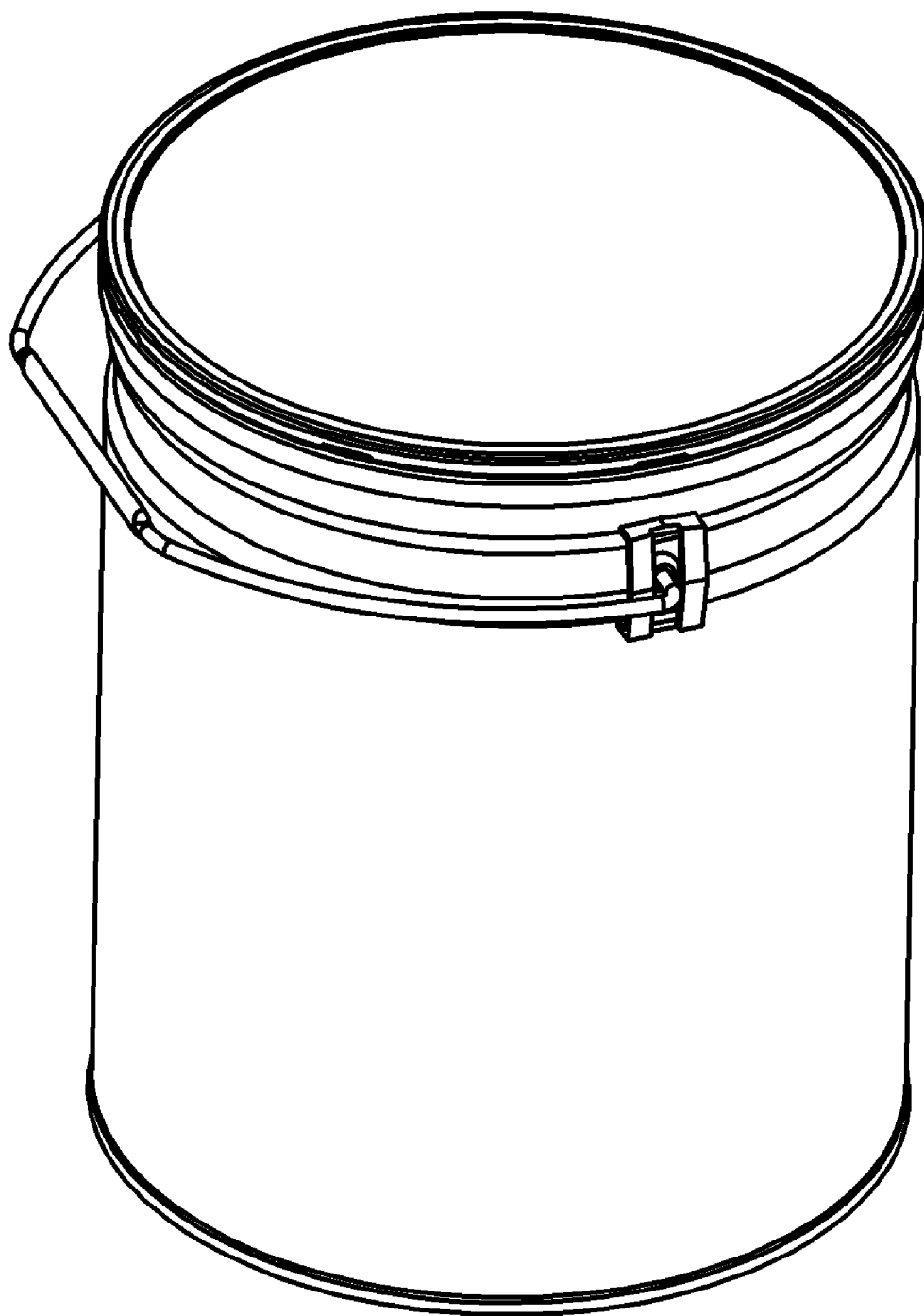
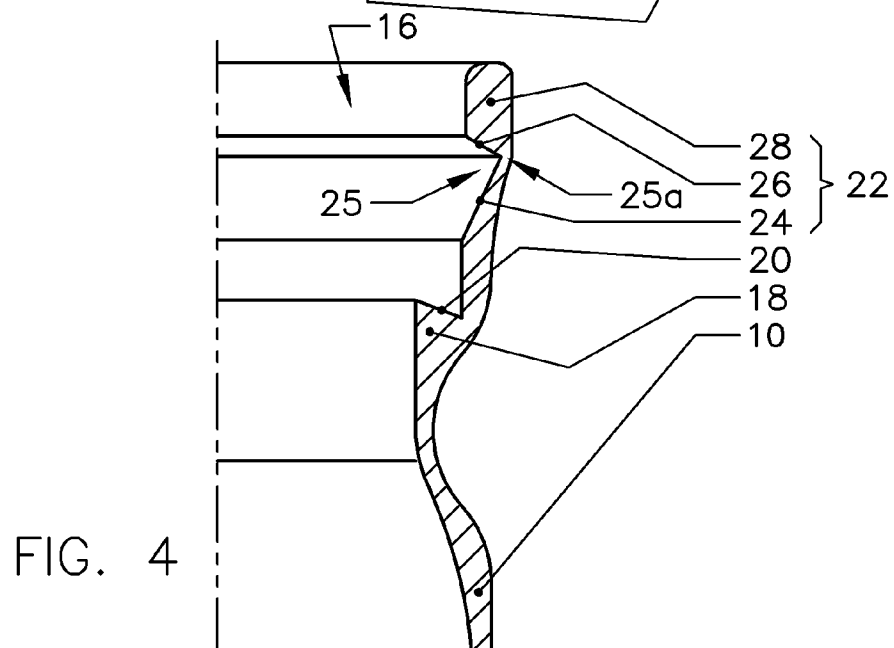
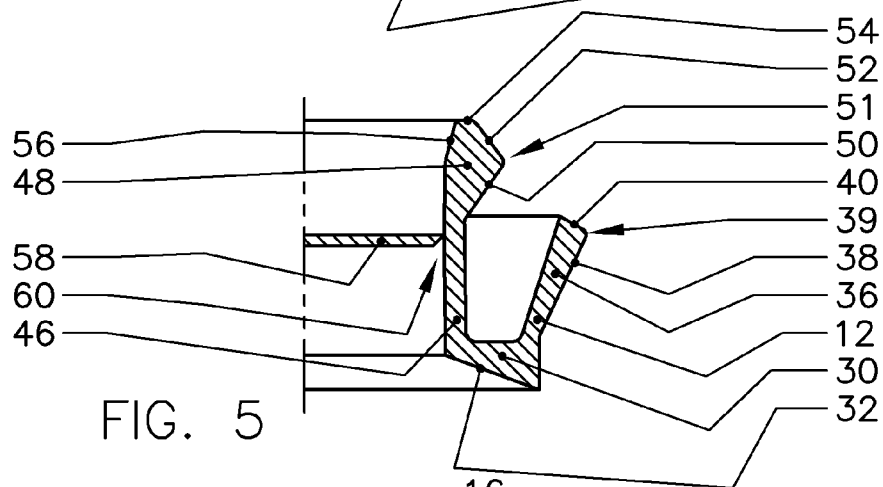
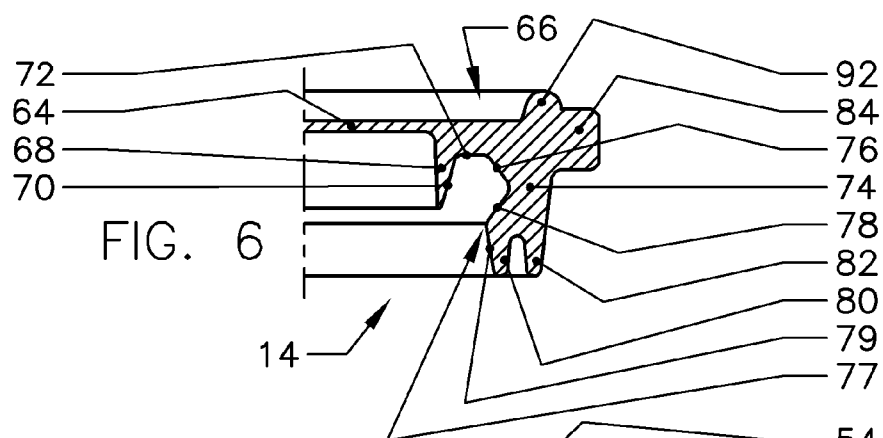
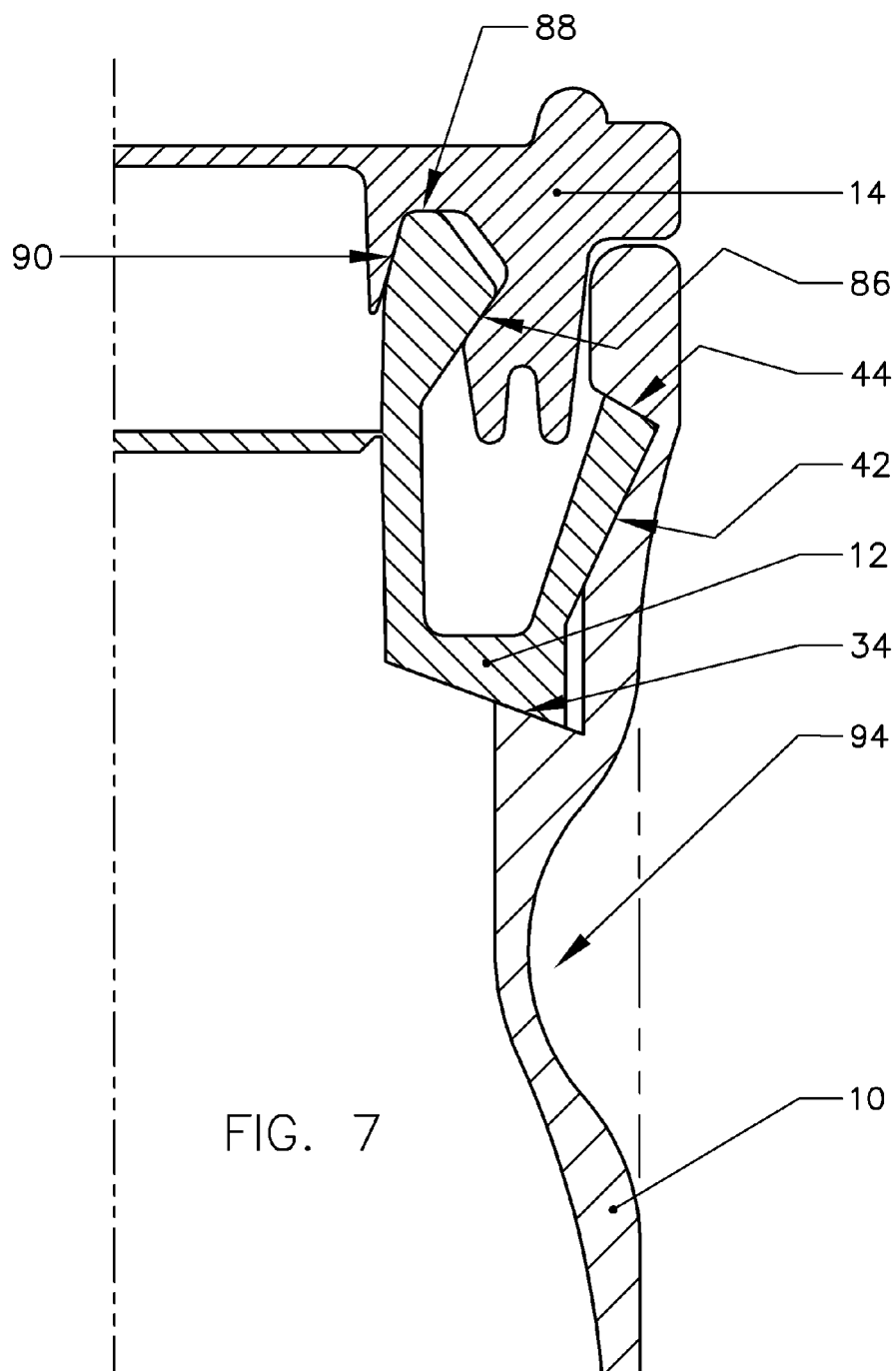
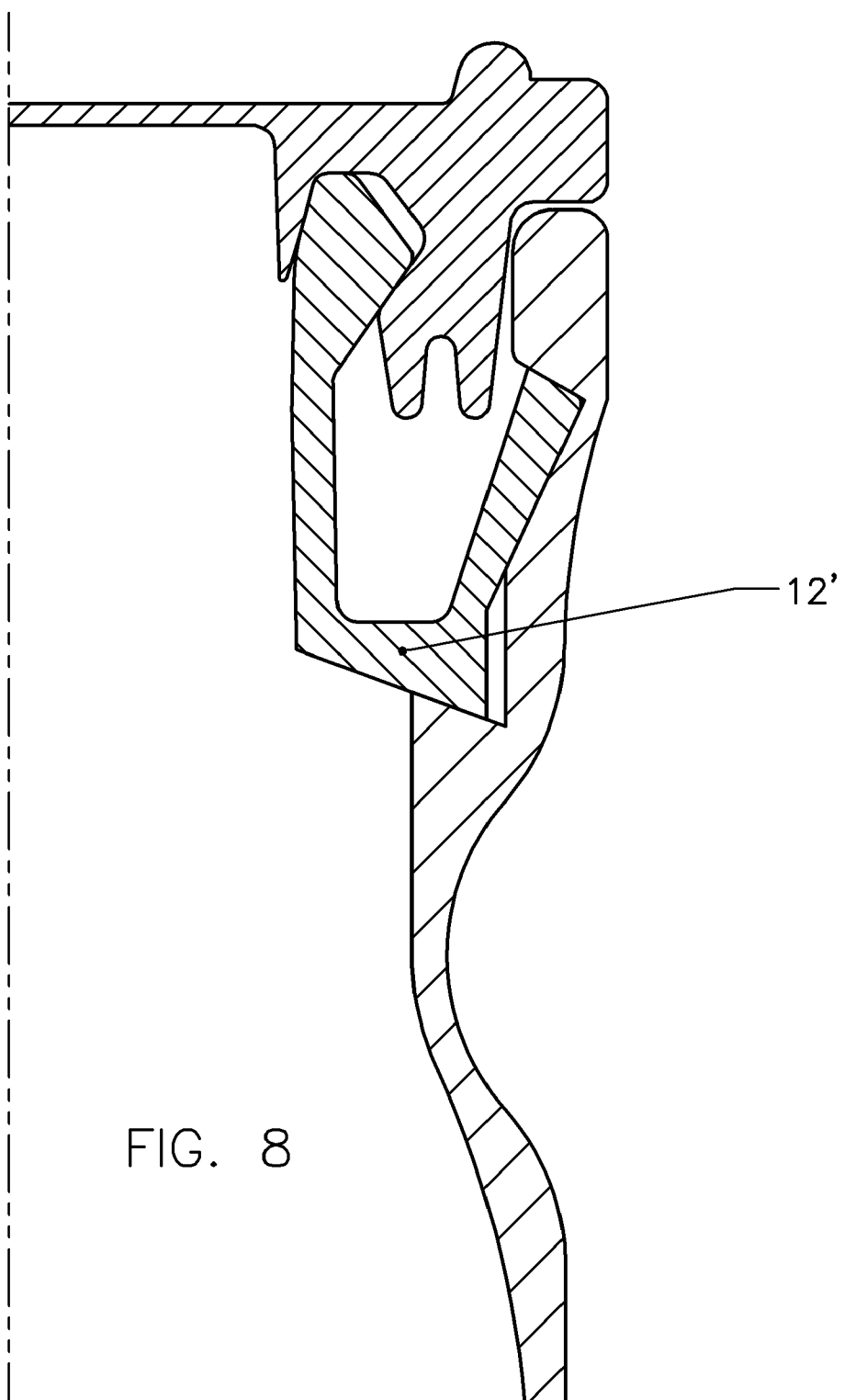


FIG. 3







THREE PIECE THERMOPLASTIC CONTAINER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of priority to U.S. provisional patent application Ser. No. 61/257,118 filed Nov. 2, 2009, now pending, the disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention relates to the field of containers, and more particularly to thermoplastic cans for shipping and storing materials.

BACKGROUND OF THE INVENTION

[0003] The current application incorporates by reference the Thermoplastic Can presented by U.S. Pat. No. 7,419,068, hereinafter referred to as the '068 patent, granted on Sep. 2, 2008 to Maxwell Bushby; international publication no. WO/2003/055754 (info enclosed). International counterparts are as follows: Australian Patent No. 2002351876 (info enclosed); South African Patent No. 2004/5794; Australian Design Registration No. 152397 (info enclosed); New Zealand Patent No. 533257 (info enclosed); Indian Patent No. 208441 (info enclosed); Philippines Patent Appl. No. 12004450967; and Malaysian Patent No. 20042500. The Abstract of patent '068 specifies: "A thermoplastic can (1) comprising a thermoplastic body (2) having a disc like top (3) molded as one with a tubular element (5) defining the sides of the body (2) and extending downwardly from the peripheral portions of the top (3); an openable portion associated with the top to facilitate use of the can contents by an end user, a thermoplastic base member (7) having an externally directed protrusion (8) engaged in a relatively thin walled recess (9) in the radially internally facing lower peripheral portion of the body thereby effecting a permanent seal at the base of the container after filling thereof; the resistance to permanent inward deformation of the externally directed protrusion exceeding the resistance to permanent outward deformation of the thin walled recess; the wall thickness of the lower peripheral portion of the body below the thin walled recess exceeding that of the thin walled recess."

[0004] The majority of paints on the market are supplied in tin cans with tin covers, either lacking tamper-evident features or having tamper-evident features constructed of a different material, such as plastic, the combination of materials not only requiring a complicated manufacturing and installation process, but rendering such containers un-recyclable in facilities where separation cannot be achieved by use of machinery.

[0005] The present invention relates to a thermoplastic can of a three piece design comprising a paint can (container), a base, and a lid, wherein a permanent base to container seal is effected between a peripheral portion of the base and an internally facing surface adjacent the aperture of the can (similar with the seal of the '068 patent), further presenting an openable attachment of lid to base, the lid being made of preferably transparent plastic to allow visibility to the contents of the can package. Paint can, base and lid are made of thermoplastic material, hence being recyclable as a unit.

BRIEF SUMMARY OF THE INVENTION

[0006] The present application builds on the design of the '068 thermoplastic can, presenting a can-to-base closure with

three circumferential seals similar in principle to the seal of the '068 patent, and further adding a lid-to-base closure with another set of three circumferential seals. The base may be with or without tamper-evident feature, depending on requirements, while the lid is made preferably of a clear, transparent plastic that allows instant color verification (i.e. a re-opening of the lid for color verification is not necessary). While the object of the present invention is intended for use as paint can package, it may be used for any applications where it is desired for the contents of the can to be visible without opening the lid. No particular comments are made regarding the size of the paint can package, other than to specify it is envisioned for a comprehensive range of sizes as to be commercially useful.

DESCRIPTION OF THE DRAWINGS

[0007] For a fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawings, in which:

[0008] FIG. 1 (prior art) presents the thermoplastic can of patent '068 (copy of Sheet 1 of 4 of '068 patent, showing FIGS. 1 and 3).

[0009] FIG. 2 is a perspective view of the paint can, base and lid in accordance with the present invention, shown before installation.

[0010] FIG. 3 is a perspective view of the paint can, base and lid in accordance with the present invention, shown after installation.

[0011] FIG. 4 is a cross-section through the opening of the paint can, showing its key features.

[0012] FIG. 5 is a cross-section through the periphery of the base according to a preferred embodiment of the invention, showing its key features.

[0013] FIG. 6 is a cross-section through the periphery of the lid, showing its key features.

[0014] FIG. 7 is a cross-section through the closure of the paint can, base and lid of a preferred embodiment of the invention, showing the three circumferential seals between lid and base, and the three circumferential seals between base and body of paint can, the base having tamper-evident feature.

[0015] FIG. 8 is a cross-section through the closure of the paint can, base and lid of a second embodiment of the invention, presenting a base without tamper-evident feature.

DETAILED DESCRIPTION OF THE INVENTION

[0016] A detailed description of the preferred embodiment of the invention follows with reference to FIGS. 2-7.

[0017] As can be seen in FIG. 7, the easy-mix paint can package is formed by a paint can 10, a base 12, and a lid 14.

[0018] With reference to FIG. 4, paint can 10 has an aperture 16 presenting an annular protrusion 18 having an angular surface 20 projecting upwardly and radially inwardly from the paint can wall, with an angle between 0° and 45° measured from the horizontal, but preferably 15°-25°. A periphery 22 of paint can further presents sloped surfaces 24 and 26, followed by a thickened rim 28. Sloped surfaces 24 and 26 form a thin walled recess or undercut 25, the thickness of the membrane 25a between corner of undercut 25 and outer surface of paint can 10 being substantially thinner than the thickness of rim 28.

[0019] As can be seen in FIG. 5, base 12 has a somewhat U-shaped periphery, with a bottom portion 30 having a bottom surface 32 sloped to match surface 20 of the paint can. An externally directed annular protrusion 36 of base 12 extends

upwardly and outwardly, having sloped surfaces 38 and 40 matching sloped surfaces 24 and 26 of the paint can.

[0020] As base 12 is installed in paint can 10 at the aperture 16, protrusion 36 flexes inwardly to ride over the inner surface of rim 28, flexing outwardly again to bite into recess 25 while its sloped bottom surface 32 comes into contact with sloped surface 20 of paint can. The thickness differential between membrane 25a and rim 28 allows the membrane to flex radially outwardly as base 12 is installed. Once protrusion 36 comes to rest in recess 25, the superior 'memory' of the thickened rim 28 returns it to its original diameter. Similar to the behavior explained in the '068 patent, this succession of motions is possible due to the fact that the thin membrane 25a undergoes some plastic deformation, while the thickened rim 28 undergoes an elastic deformation during installation of base into paint can. A membrane thickness of 0.006" to 0.032" is recommended in order for the thin walled recess to deform outwardly during installation of the base and thereafter.

[0021] Once installation has thus been achieved, base 12 and paint can 10 form a first seal 34 at surfaces 20 and 32, a second seal 42 at surfaces 24 and 38, and a third seal 44 at surfaces 26 and 40.

[0022] The thickness of annular projection 36 is such that its resistance to permanent inward deformation exceeds the resistance to permanent outward deformation of thin walled recess 25 due to the fact that protrusion 36 has a 30-35% thicker cross-section than that of thin walled recess 25. It is obvious that once the base is installed in the paint can, it cannot be disengaged without permanently damaging these two components.

[0023] The outermost edge 39 of protrusion 36 (which bites into thin walled recess 25) should preferably be rounded. While a larger radius would ease installation of base into paint can, it should however be sufficiently small to not overly reduce the surface area coverage of seals 42 and 44, values of R0-0.030" being a suitable compromise.

[0024] Similar to the design of the '068 patent, the paint can and base should preferably have a slight interference or friction fit, such that when the base is secured between surfaces 20 and 26 of paint can, there is an interference of 0.000"-0.002". With reference to the embodiment presented here, surfaces 26 and 40 should have an angle between 15° and 45° with the horizontal, but preferably 24°-32°. Further similar with the '068 patent, the angle of protrusion 36 is recommended to be between 20° and 45° with the vertical.

[0025] Furthermore, the maximum diameter of protrusion 36 is larger than the maximum diameter of recess 25 into which it is fitted. This interference fit is critical to the seal of the paint can, and, while dependent on capacity and size of paint can, it is preferably in the range of 0.004" to 0.028".

[0026] Further with reference to FIGS. 2 and 5, base 12 has an inner annular projection 46 extending upwardly into a thickened rim 48. Rim 48 has outer sloped surfaces 50 and 52, a flat top surface 54, and an inner sloped surface 56 meeting the predominantly vertical inner surface of annular projection 46. A preferred embodiment of the invention presents base 12 with a horizontal continuous panel 58, connected to the inner surface of annular projection 46 by a thin tear-tab membrane 60. On the top surface of panel 58, an easy-pull tear-tab handle 62 projects towards the aperture side of the paint can. When color mixing is desired, panel 58 is removed from base 12 by pulling on tear-tab handle 62 and breaking the tear-tab membrane 60 all around its circumference.

[0027] As can be seen in FIG. 6, lid 14, preferably made of transparent plastic, has a continuous central panel 64 and a substantially reinforced periphery 66. Periphery 66 presents

two downwardly-projecting portions, a first portion in the shape of a ridge 68 with a tapered surface 70 matching that of surface 56 of base 12, followed by a flat portion 72, and a second downwardly-projecting portion 74 having sloped surfaces 76 and 78, surface 78 with an angle matching that of surface 50 of base. Lid 14 further has two downwardly projecting ridges 80 and 82, and an external, substantially horizontal projection 84. As lid 14 is installed on base 12 (itself installed on paint can 10), lid and base form a first seal 86 at surfaces 50 and 78, a second seal 88 at surfaces 54 and 72, and a third seal 90 at surfaces 56 and 70. Therefore, and with reference to FIG. 7, when the paint can, base and lid are fully assembled, no fewer than six circumferential seals protect the contents of the can.

[0028] In order for the thickened rim 48 to snap into its seat in the lid, surface 52 rides along the tip and inner surface of ridge 80, slightly flexing radially inwardly while forcing ridge 80 to flex radially outwardly. As rim 48 reaches up and into contact with ridge 68 of lid, it is guided along both sides into its seat. As can be seen in FIG. 6, to allow such installation, all edges involved in contact and guiding should preferably be rounded. Edge 51 of thickened rim 48 should preferably be rounded to help it ride against inner surface 79 of ridge 80. The bottom of ridge 80 should preferably be fully rounded, while inner surface 79 should preferably be sloped at an angle of 5°-15°, preferably 7°-10° to the vertical. Furthermore, inner edge 77 (formed between sloped surfaces 79 and 78) should be rounded.

[0029] As rim 48 snaps into its seat in the lid, it is held snugly between surfaces 78, 72, and 70, forming the three circumferential seals described above.

[0030] As can be seen in FIGS. 5, 6, and 7, surfaces 52 and 76 are designed with clearance, and while parallel to each other in the embodiments presented here, they need not necessarily be so. The only requirement is that they not interfere with each other, the angle of surface 52 being selected mainly with the purpose of easing installation in the manner described above, while keeping the thickness of rim 48 sufficiently substantial for long term performance of the closure, a value of 15°-45° from the vertical being recommended. The angle of surface 76 should derive accordingly, to allow sufficient clearance, ideally 0.020"-0.040". A similar clearance should be achieved in the space between seals 34 and 42 of container to base, as can be seen in FIG. 7.

[0031] The overwhelming majority of paint cans on the market are tin cans with tin lids, having no tamper-evident feature. White paint is supplied, with the tint being added upon sale of the paint. After color blending, the seller typically opens the lid to reveal the color to the customer, and may smear a smidge of paint on the lid as further visual proof of the content.

[0032] The invention presented here brings considerable improvement over existing art. Firstly, panel 58, molded integrally with base 12, provides a tamper-evident feature over current designs. The three circumferential seals of base 12 to paint can 10, together with the three circumferential seals of base 12 to lid 14, protect the paint while preventing leaks.

[0033] Another major improvement of the present invention is that by using a transparent lid, the color is visible without necessitating a re-opening of the paint can for color verification. This provides not only for faster service, but also prolongs the life of the paint by preventing air or contaminants from entering the paint can cavity until the end user accesses the paint.

[0034] As can be seen in FIG. 6, lid 14 is provided with an annular bump 92 on its top surface, near the periphery, the

purpose of this bump being to center paint cans for stacking purposes, as is common procedure in the field of plastic containers and lids.

[0035] A second embodiment of the invention is presented with reference to FIG. 8. The base 12' is similar with base 12 of the preferred embodiment, less the central panel 58. This is an alternative for applications not requiring a tamper-evident feature, also allowing for a more economical option by reducing the amount of plastic injected in the base.

[0036] The closure of the '068 design presented in FIG. 1 (prior art) is at the bottom of the container. The embodiments presented here have the closure at the top end of the container, allowing installation, capping and filling in the same orientation, hence simplifying the filling process, which ultimately results in financial savings.

[0037] As can be noticed in FIG. 7, the paint can is shaped with a neck-like portion 94 below seal 34, to minimize wall thickness while allowing a sufficiently sturdy construction of annular protrusion 18 to support the base without buckling during installation or usage. The wall outline projects along the same line above and below the neck-like portion. This feature minimizes the overall diameter of the paint can, reducing spatial requirements with regards to transportation and storage.

[0038] As shown in FIGS. 2 and 3, the paint can is provided with a handle of a suitable construction for safely lifting and carrying the weight of the filled can.

[0039] Furthermore, while the embodiments presented here are of circular design, it should be understood that rectangular, square, oval and oblong cross-sections are also considered.

[0040] Although the present invention has been described with respect to one or more particular embodiments, it will be understood that other embodiments of the present invention may be made without departing from the spirit and scope of the present invention. Hence, the present invention is deemed limited only by the appended claims and the reasonable interpretation thereof.

What is claimed is:

1. A container for holding a material, the container comprising:

a body having a bottom and a tubular element defining sides of the body and extending upwardly from a periphery of the bottom, wherein an upper portion of the tubular element forms an aperture of the body;

a base having an externally directed annular protrusion which engages a recess in the aperture-forming portion of the tubular element of the body thereby effecting a permanent seal at the top of the body after filling thereof; and

a lid adapted to removably engage a top portion of the base.

2. The container of claim 1, wherein one or more of the body, the base, or the lid are formed from a thermoplastic material.

3. The container of claim 2, wherein one or more of the body, the base, or the lid are fabricated from a Polyolefin such as PET or PEN.

4. The container of claim 2, wherein one or more of the body, the base, or the lid is transparent.

5. The container of claim 1, wherein the aperture-forming portion of the tubular element further comprises an internally

directed annular protrusion configured to stop further insertion of the base when the base is inserted into the aperture of the body and contacts the internally directed annular protrusion.

6. The container of claim 1, wherein the externally directed annular protrusion extends externally and upwardly and is therefore capable of flexing inwardly whilst being introduced into the aperture of the body of the container prior to coming to rest in the recess.

7. The container of claim 1, wherein the resistance to permanent inward deformation of the externally directed protrusion exceeds the resistance to permanent outward deformation of the recess due to the radially externally directed protrusion being fabricated from thicker thermoplastic material than that present in the recess.

8. The container of claim 1, wherein the radially externally directed protrusion comprises 3 surfaces each of which, when the base is disposed in the aperture of the body, forms a seal with a corresponding surface of the aperture-forming portion of the tubular element of the body.

9. The container of claim 1, wherein the base further comprises:

an inner annular projection extending upward; and

a horizontal continuous panel for enclosing the material in the container.

10. The container of claim 8, wherein the body further comprises a handle disposed on the horizontal continuous panel, and the horizontal continuous panel is configured to be removed from the base by applying force to the handle.

11. The container of claim 1, wherein the lid further comprises a continuous central panel, continued to enclose the material in the container when the lid is engaged with the base.

12. The container of claim 1, wherein the lid further comprises a first downwardly projecting portion for sealing engagement with an inner surface of a rim of the base and a second downwardly projecting portion for sealing engagement with an outer surface of the rim of the base.

13. The container of claim 1, wherein a base-engaging portion of the lid comprises 3 surfaces each of which, when the lid is affixed to the base, forms a seal with a corresponding surface of a rim of the base.

14. The container of claim 1, wherein the lid comprises a bump on a top surface of the lid, the bump configured for stacking a second containers.

15. The container of claim 1, wherein when the lid is engaged with the base, the lid also contacts the body.

16. A method of enclosing a material in a tamper evident container, the method comprising the steps of:

providing a body, the body having a bottom and a tubular element extending upwardly from a periphery of the bottom;

placing the material into the body;

inserting a base into a top aperture of the body, the base having a tamper-evident horizontal continuous panel, wherein the base is configured to be permanently affixed to the body once inserted; and

engaging a removable lid on the base.

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