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(54) Title: CONTAINER ASSEMBLIES INCLUDING METAL CLOSURES AND THERMOPLASTIC CONTAINERS AND METHODS OF HOT-FILLING FOOD AND BEVERAGE PRODUCTS

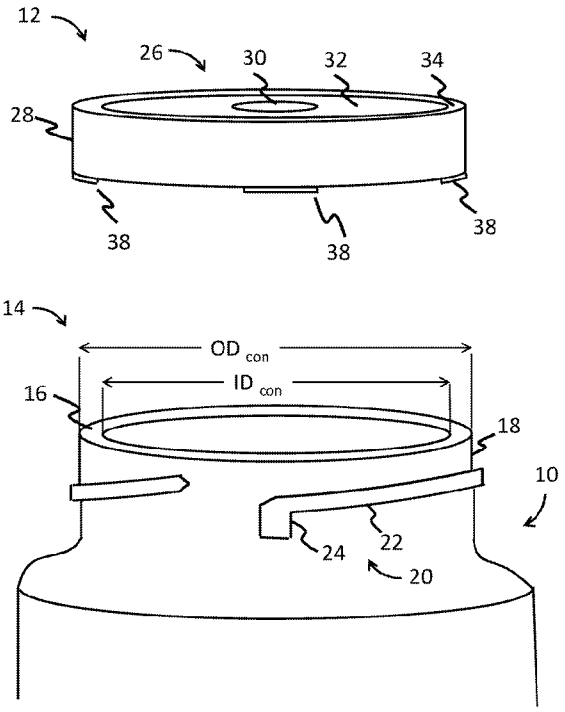

Fig. 1

(57) Abstract: Container assemblies are described herein that include a metal closure and a container including a plastic finish. The container assemblies may be characterized by improved performance including reproducibility of force needed to remove the closure. Furthermore, the container assemblies described herein may be compatible for use with hot-fill packaging processes.

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[Continued on next page]

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1. A container assembly comprising:

a plastic container including an opening and a finish, said finish including a plastic material that is softer than glass;

wherein said finish includes one or more threads; and

a metal closure including four lugs;

wherein said lugs are configured to engage said one or more threads when said metal closure is placed and rotated on said plastic container to pull said plastic container and said metal closure together in order to provide an engaged configuration;

wherein one or more of said lugs include a top portion and an inner portion;

wherein at least one of said top portion and said inner portion is flattened;

wherein a shape of said lugs is configured to minimize a sample-to-sample variation of a force needed to open said container assembly when said container assembly is in said engaged configuration.

2. The container assembly of claim 1 wherein said top portion has a radius of curvature of between about 2.5 mm and about 3.5 mm.

3. The container assembly of claim 1 wherein said inner portion has a radius of curvature of between about 1.5 mm and about 2.5 mm.

4. The container assembly of claim 1 wherein said plastic material is a thermoplastic material.

5. The container assembly of claim 1 wherein said plastic material is polyethylene terephthalate.

6. The container assembly of claim 1 wherein said lugs are evenly spaced about said metal closure.

7. The container assembly of claim 1 wherein said metal closure comprises an inner diameter of about 38 mm.

8. The container assembly of claim 1 wherein said finish comprises an inner diameter of about 28 mm to about 32 mm.

9. The container assembly of claim 1 wherein said finish comprises an outer diameter of about 33 mm to about 37 mm.

10. The container assembly of claim 1 wherein said metal closure comprises a cylindrical sidewall.

11. The container assembly of claim 1 wherein said metal closure comprises a gasketing material configured for sealing engagement with a top edge of said finish.

12. A beverage product comprising:

a beverage sterilized using a hot-fill packaging process; and

a container assembly in which said beverage is disposed and including a metal closure engaged on a container that includes a thermoplastic finish having one or more threads in order to provide sealing engagement between said container and said metal closure;

wherein said container includes an opening of about 28 mm to about 32 mm;

wherein said metal closure includes four lugs, each of said lugs including a top portion and an inner portion, at least one of said top portion and said inner portion being flattened;

wherein said lugs are configured to engage said one or more threads in order to provide said sealing engagement between said container and said metal closure, a shape of said lugs being configured to minimize disruption of said sealing engagement due to thermoplastic deformation of said thermoplastic finish during said hot-fill packaging process.

13. (***Canceled***)

14. (***Canceled***)

15. The product of claim 12 wherein said top portion has a radius of curvature of between about 2.5 mm and about 3.5 mm.

16. The product of claim 12 wherein said inner portion has a radius of curvature of between about 1.5 mm and about 2.5 mm.

17. A method of packaging a food or beverage product comprising:

treating a food or beverage product to a condition that includes application of an elevated temperature greater than about 50°C;

partially cooling the food or beverage product;

adding the food or beverage product to a container comprising a thermoplastic finish having at least one thread;

capping the food or beverage product in said container by rotating a metal closure onto said finish, said metal closure comprising four lugs engaged with said at least one thread sufficient to provide an air-vacuum tight seal;

wherein each of said lugs comprises a top portion and an inner portion;

wherein at least one of said top portion and said inner portion is flattened;

maintaining the food or beverage product and the container at a hold temperature less than said elevated temperature; and

further cooling the food or beverage product and the container.

18. The method of claim 17 wherein said elevated temperature is no greater than about 100°C and wherein said hold temperature is between about 65°C to about 90°C.

19. The method of claim 17 wherein said metal closure comprises a vacuum-indicating top panel.

20. The method of claim 17 wherein said capping further comprises engaging said lugs with a sidewall of said finish.