US 20070256449A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2007/0256449 A1

Torre (43) Pub. Date: Nov. 8, 2007

(54) MULTI-CHAMBER RECEPTACLE FOR MAINTAINING TEMPERATURE OF CONTENTS

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(21) Appl. No.: **11/409,848**

(22) Filed: **Apr. 24, 2006**

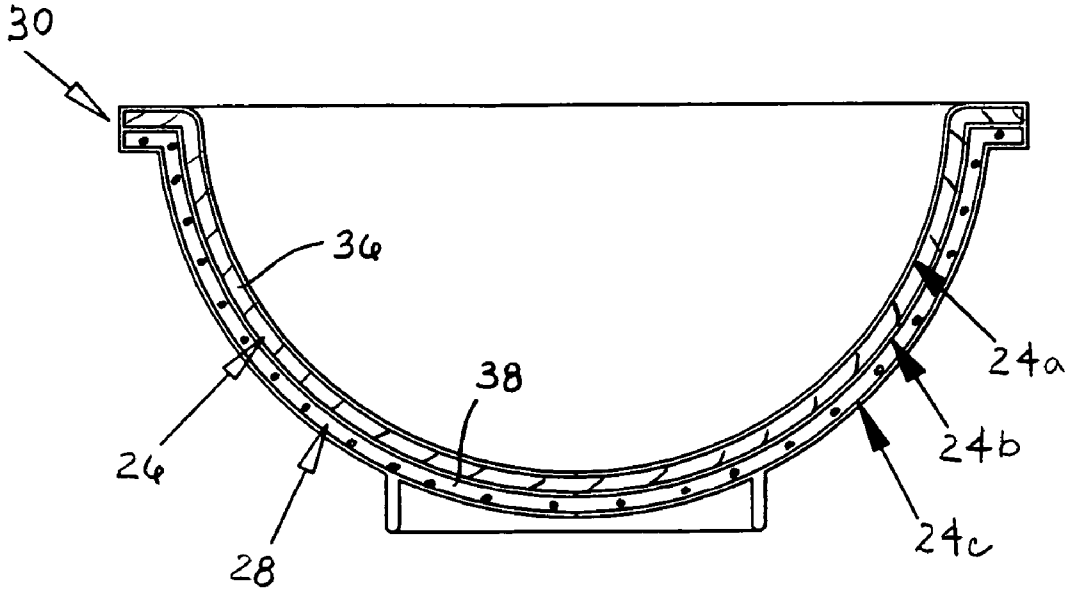
Publication Classification

(51) **Int. Cl.**
F25D 3/08 (2006.01)

(52) **U.S. Cl.** **62/457.6**; 62/371

(57) **ABSTRACT**

A receptacle for maintaining the temperature of its contents. The body of the receptacle is constructed of a triple-walled, dual chamber enclosure. This dual chamber enclosure is comprised of an inner chamber and an adjacent outer chamber occupied, respectively, by a gel and a gaseous matter. Temperature regulating properties of the gel contained within the inner chamber are insulated by the adjacent outer chamber, permitting the temperature regulating properties of the gel to last for a longer period of time.



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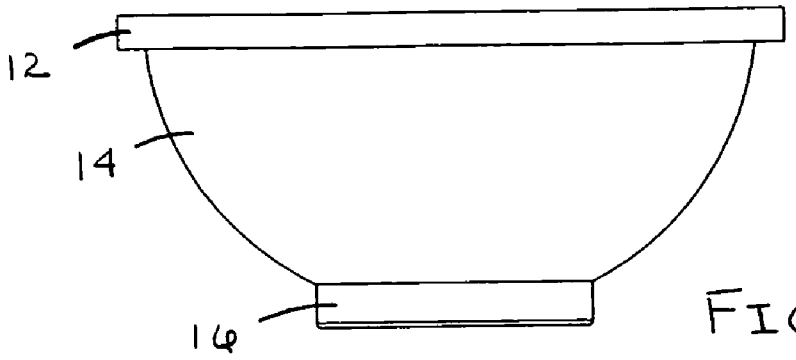

FIG. 1A

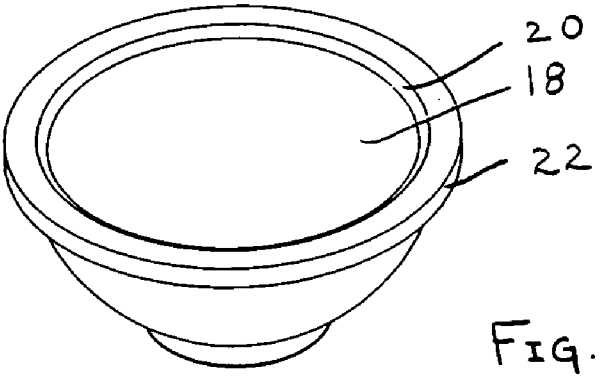

FIG. 1B

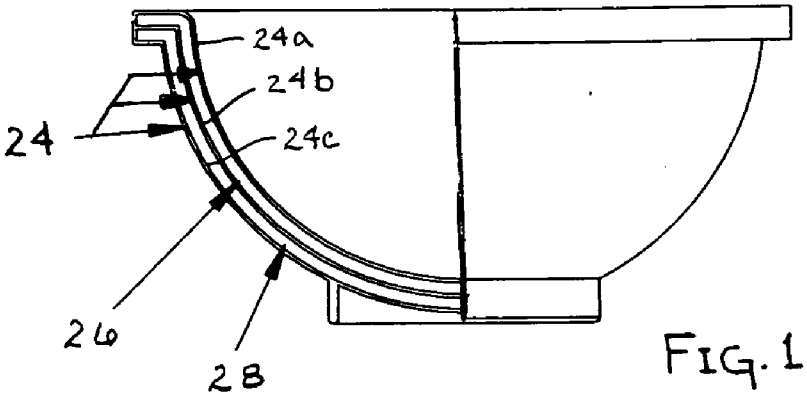

FIG. 1C

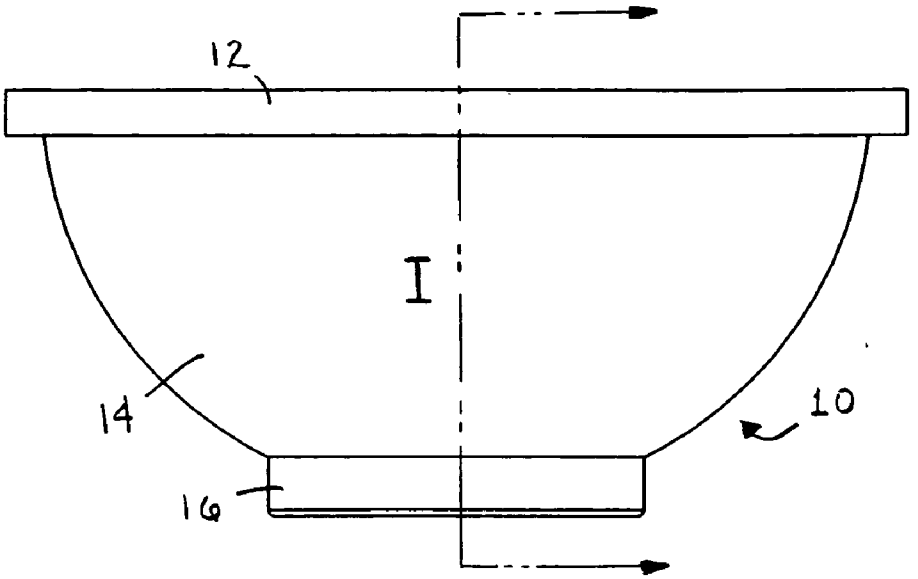

FIG. 2A

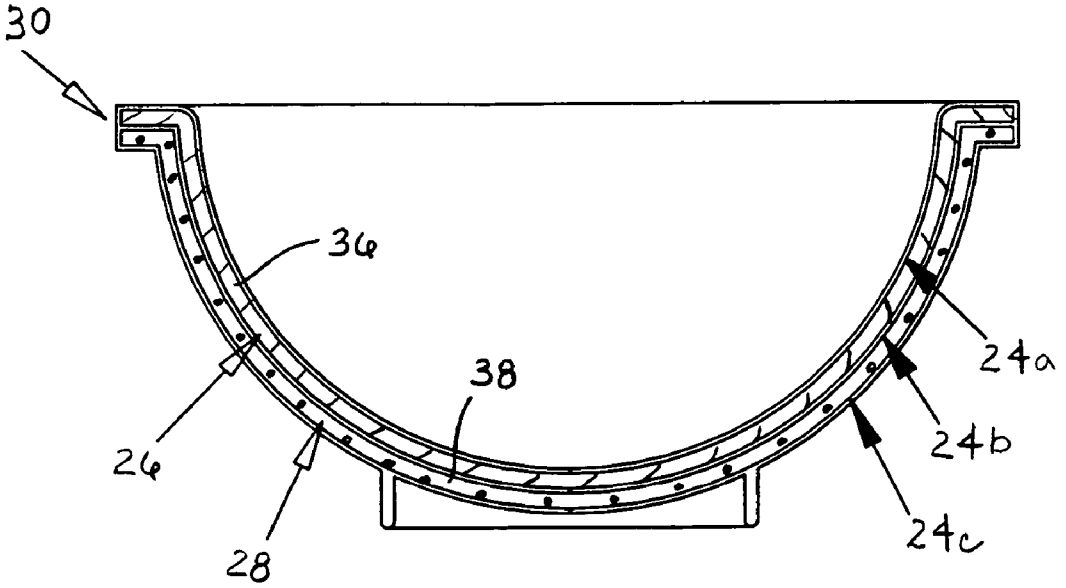

FIG. 2B

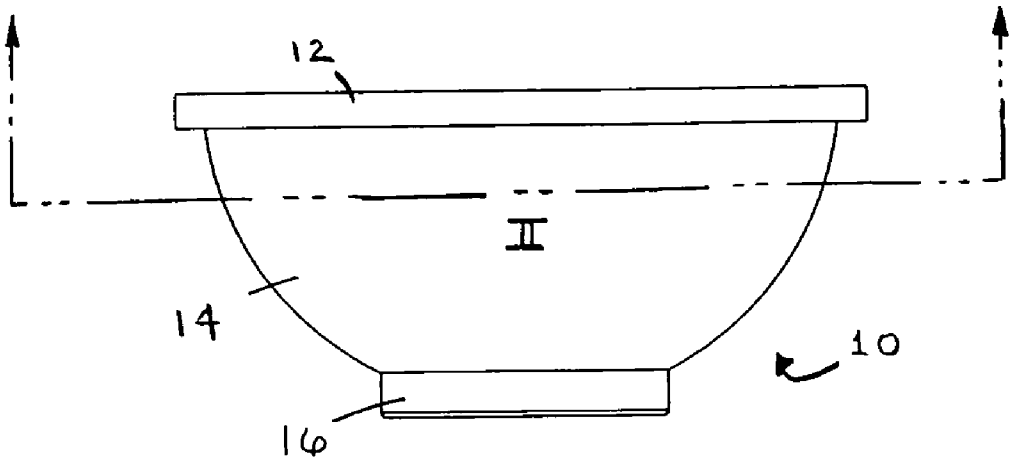

FIG. 3A

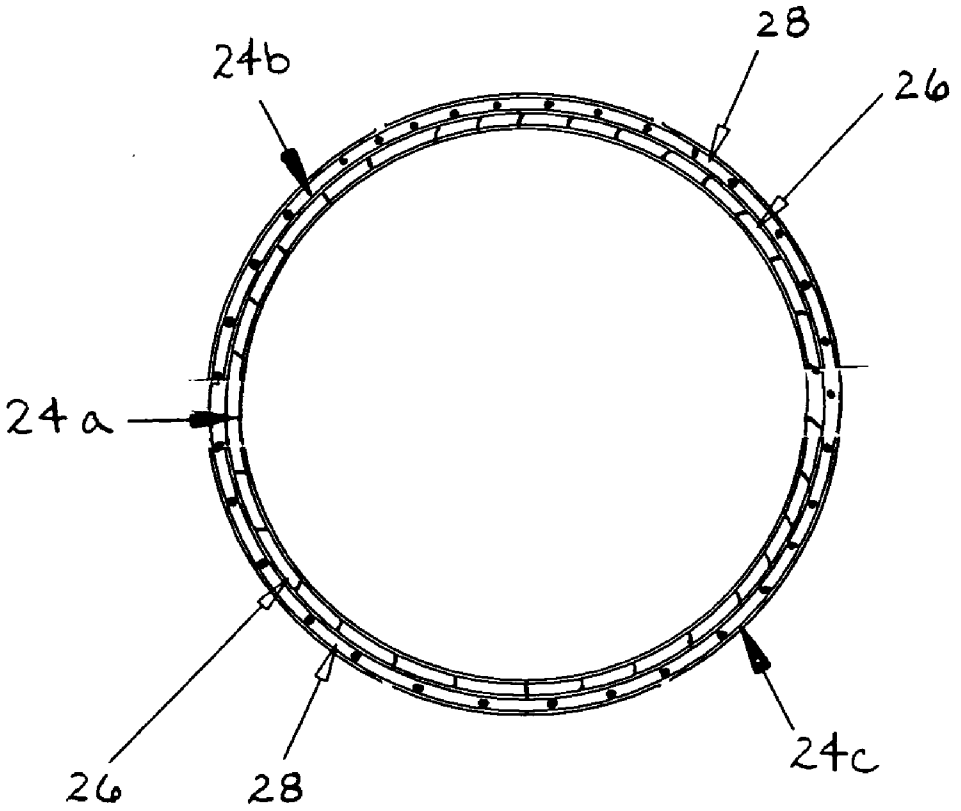

FIG. 3B

MULTI-CHAMBER RECEPTACLE FOR MAINTAINING TEMPERATURE OF CONTENTS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to the field of receptacles. More particularly, the present invention relates to a receptacle with an improved capacity to impede any change in the original temperature of solid or liquid matter retained therein.

[0003] 2. Description of the Prior Art

[0004] Conventional receptacles possessing an ability to maintain the temperature of their contents are typically constructed with a double-walled enclosure. The double-walled enclosure forms a single chamber circumferentially about the body of the receptacle, wherein the single chamber is typically vacuum sealed or filled with a gas. The vacuum or gas sealed chamber serves as a means for insulating the temperature of matter retained within the receptacle by acting as a barrier, temporarily moderating the rate of transfer of heat into and out of the receptacle.

[0005] Receptacles constructed with a double-walled, single chamber enclosure are readily available. Such receptacles, for example, are disclosed in U.S. Pat. No. 1,706,436 (hereinafter "Bright"), U.S. Pat. No. 5,579,946 (hereinafter "Rowan") and U.S. Pat. No. 6,499,311 (hereinafter "Mahajan"). The receptacles in Bright, Rowan and Mahajan may be suitable for temporarily regulating the transfer of heat into and out of a receptacle, but the aforementioned prior art references are not as efficient as the present invention in their ability to insulate and maintain the temperature of their contents.

[0006] Accordingly, there exists a need for a receptacle with improved properties that provides insulation from the surrounding ambient temperature, and an efficient means for impeding the change in temperature of matter retained therein.

SUMMARY OF THE INVENTION

[0007] It is an object of the present invention to provide a receptacle with an improved means of maintaining the temperature of its contents, while employing a light weight and cost effective design. This and other objects of the present invention are accomplished in accordance with the principles of the present invention. The novelty of the present invention will become apparent from the following detailed description and appended claims.

[0008] The present invention is an improved receptacle having a triple-walled, dual chamber enclosure. The multi-chamber enclosure of the receptacle is comprised of a sealed inner chamber and a sealed outer chamber that are positioned radially adjacent to each other. The multi-chamber enclosure is provided throughout the entire body of the receptacle. The inner chamber may accommodate a gel or oil capable of sustaining a hot or cold temperature. The outer chamber is filled with a gaseous matter (the types of which are identified in the detailed description) to serve as insulation for the thermal properties of the gel or oil housed in the inner chamber. In another embodiment, the inner chamber may also be made suitable to accommodate a gel or a gaseous matter having insulating properties. This novel construction of the receptacle significantly retards the rapid change in temperature that occurs by means of radiation, convection and conduction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The above and other objects and advantages of the present invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which like reference characters refer to like parts throughout, and in which:

[0010] FIGS. **1**A, **1**B and **1**C illustrate, respectively, a side view, an angled top view and a partial cross-sectional view of a bowl-shaped receptacle in accordance with a preferred embodiment of the present invention.

[0011] FIGS. **2**A and **2**B illustrate a vertical cross-sectional view of the triple-walled, dual chamber enclosure of a bowl-shaped receptacle in accordance with a preferred embodiment of the present invention.

[0012] FIGS. **3**A and **3**B illustrate a horizontal cross-sectional view below a protruding lip portion of the triple-walled, dual chamber enclosure of the bowl-shaped receptacle in accordance with the preferred embodiment of the present invention.

[0013] It is to be understood that the above-identified drawing figures are for purposes of illustrating the concepts of the invention and may not be to scale, and are not intended to be limiting in terms of the range of possible shapes and proportions of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] The present invention is directed towards an improved receptacle capable of maintaining the temperature of solid or liquid matter retained therein for a prolonged period of time. For purposes of clarity, and not by way of limitation, illustrative views of the present invention are described with references made to the above-identified figures. Various modifications obvious to one skilled in the art are deemed to be within the spirit and scope of the present invention.

[0015] FIGS. **1**A, **1**B and **1**C illustrate various views of a receptacle **10** in accordance with the preferred embodiment of the present invention. Receptacle **10** of FIG. **1**A resembles an otherwise conventional bowl having a protruding lip portion **12**, a containment portion **14** and a base portion **16**. Receptacle **10** is preferably constructed of a stainless steel material, however, other suitable metallic or non-metallic materials or any combination of a metallic, plastic and polymer material may be used.

[0016] The angled top view of receptacle **10**, illustrated in FIG. **1**B, shows an opening provided at the top of receptacle **10** to permit access to a cavity **18** provided in containment portion **14**. Protruding lip portion **12** of receptacle **10** is defined by an interior perimeter **20** and an exterior perimeter **22**. Interior perimeter **20** or exterior perimeter **22** of protruding lip portion **12** may be adapted to allow for a lid (not shown) to be used in conjunction with receptacle **10**. The lid would preferably be constructed of the same material, as

well as the same structure (i.e., the dual chamber enclosure), as that of receptacle **10**. The lid could be used to seal the opening to cavity **18**.

[**0017**] It should be made clear that this particular design of receptacle **10** is provided solely for the purposes of illustrating the functionality of the present invention and may be designed to include or exclude other suitable bodily features. For example, protruding lip portion **12** is not an essential design feature that is critical to the functionality of the present invention. Protruding lip **12** may be advantageous in that it allows for wall members **24** (described in detail below) to be joined together in their nested formation absent the need of an additional support structure for provide suitable spacing between the members. However, receptacle **10** could easily be designed without protruding lip portion **12**. For example, the nested formation of receptacle **10** could be sustained by spacing structures placed at proper locations between wall members **24**. Thereafter, wall members **24** could be joined together by a horizontal welding member seated against their adjacent rims. This and other various modifications to the multi-chamber structure of the present invention are foreseeable to those skilled in the art.

[**0018**] A partial cross-sectional view of receptacle **10** is illustrated in FIG. **1**C. Receptacle **10** is essentially comprised of an inner receptacle member **24***a*, a middle receptacle member **24***b* and an outer receptacle member **24***c*, collectively referred to as wall members **24**. Wall members **24** are nested together with space between the members to form an inner chamber **26** and an outer chamber **28**. Inner chamber **26** is enclosed by inner receptacle member **24***a* and middle receptacle member **24***b*. Outer chamber **28** is enclosed by outer receptacle member **24***c* and middle receptacle member **24***b*.

[**0019**] The illustrated bowl-shaped design of wall members **24** is provided merely as an example. Wall members **24** could easily be constructed with different curvatures and angles to provide a receptacle of various shapes and sizes. For example, wall members **24** may be shaped in a manner that provides a receptacle that is circular, elliptical or rectangular in nature so as to construct a receptacle that is useful as a casserole dish, a platter, a pan, a pitcher, a drinking cup, an ice bucket or any other container or vessel. This permits the receptacle to be accommodating for various applications.

[**0020**] Cross-sectional views of the triple-walled, dual chamber enclosure of receptacle **10** are illustrated in FIGS. **2** and **3**. Referring to FIGS. **2**A and **3**A, a vertical cross-sectional and a horizontal cross-sectional of receptacle **10** are taken, respectively, along a line I and a line II. As can be seen in FIGS. **2**B and **3**B, inner chamber **26** and outer chamber **28** may extend throughout the entire body of receptacle **10**, including protruding lip portion **12**, containment portion **14** and base portion **16** (FIG. **1**A).

[**0021**] Inner chamber **26** is filled with a gel **36** and outer chamber **28** is filled with a gaseous matter **38**. Outer chamber **28** serves to insulate inner chamber **26** and cavity **18** from the outside ambient temperature of a room and to prevent the outer surface of receptacle **10** from sweating. More specifically, outer chamber **28** helps to retain the temperature of gel **36** occupying inner chamber **26**. By insulating the heating or cooling gel element housed in inner chamber **26**, rather than providing a direct insulation barrier between the retained solid or liquid matter and the ambient air, the solid or liquid matter retained in cavity **18** of receptacle **10** can be exposed to heat or cold for a more constant and prolonged period. This in turn impedes the change in temperature of contents retained in the receptacle due to exposure to ambient conditions.

[**0022**] Gel **36** may be any gel that demonstrates an ability to retain hot or cold temperatures. Heating and cooling thermal gels are readily available and well known in the medical and food handling arts, typically have a high specific heat, and can be made to have differing viscosities, and different heat absorptive and heat retaining or releasing properties, depending on the application in which they will be used. See, for example, U.S. Pat. No. 6,141,801 at columns **10-11**, which are hereby incorporated by reference.

[**0023**] When heating or chilling receptacle **10**, gel **36** retains the desired hot or cold temperature. Gel **36** may then transfer heat to or absorb heat from the contents of receptacle **10**. Gaseous matter **38** may simply be ambient air at or near ambient pressure. Similarly, nitrogen or carbon dioxide gas may be used in outer chamber **28** to provide insulation to inner chamber **26**.

[**0024**] In another embodiment, inner chamber **26** may also be filled with an oil possessing similar thermal properties of gel **36**. In yet another embodiment, inner chamber **26** may be filled with an insulator itself, impeding any change in temperature of matter retained in receptacle **10**. Thereafter, if a hot or cold substance is placed in cavity **18** of receptacle **10**, the insulator may restrict the movement of heat through inner chamber **26**. Outer chamber **28** could then serve as an additional insulator, contributing to the insulating properties of inner chamber **26**. Any suitable gel or gas possessing similar thermal insulating properties could be used to line the inside of inner chamber **26**.

[**0025**] Once inner chamber **26** and outer chamber **28** are occupied with gel **36** and gaseous matter **38**, respectively, they are sealed, preferably by welding the outer circumferential edge of protruding lip portion **12** (FIG. **1**A), wherein inner receptacle member **24***a*, middle receptacle member **24***b* and outer receptacle member **24***c* extending into protruding lip portion **12** all have a similar outer diameter **22** (FIG. **1**B). A weld seam is indicated by arrow **30** depicted in FIG. **2**B. Alternatively, inner and outer chambers **26** and **28** may be sealed by gluing or by utilizing any other suitable sealing method known in the art. If receptacle **10** is constructed without protruding lip portion **12** (as previously described), the rims of inner receptacle member **24***a*, middle receptacle member **24***b* and outer receptacle member **24***c* may be joined together, using any of the aforementioned sealing methods, to seal inner chambers **26** and **28** of receptacle **10**.

[**0026**] One skilled in the art will appreciate that the present invention can be practiced by other than the described embodiments, which are presented for purposes of illustration and not by way of limitation, and the present invention is limited only by the claims that follow.

What is claimed is:

1. A multi-chamber receptacle, comprising:

an inner receptacle member having a first rim and defining a cavity for receiving a substance;

a middle receptacle member having a second rim and shaped complementary to the inner receptacle member for nesting with the inner receptacle member;

an outer receptacle member having a third rim and shaped complementary to the middle receptacle member for nesting with the middle receptacle member;

wherein the inner, middle and outer receptacle members are nested to form a first chamber between the inner receptacle member and the middle receptacle member and a second chamber between the middle receptacle member and the outer receptacle member, and wherein the first, second and third rims are joined to seal the first chamber and the second chamber;

a gel disposed within the sealed first chamber; and

an insulator disposed within the sealed second chamber.

2. The multi-chamber receptacle of claim 1, wherein the insulator is a gas.

3. The multi-chamber receptacle of claim 2, wherein the gas is selected from the group consisting of ambient air, nitrogen and carbon dioxide.

4. The multi-chamber receptacle of claim 1, wherein the gel is a thermal gel.

5. The multi-chamber receptacle of claim 1, wherein the gel is a cooling gel.

6. The multi-chamber receptacle of claim 1, wherein the gel is a heating gel.

7. The multi-chamber receptacle of claim 1, wherein the gel is an insulating gel.

8. The multi-chamber receptacle of claim 1, wherein the gel is a high specific heat gel.

9. The multi-chamber receptacle of claim 1, wherein the first rim, the second rim and the third rim are joined by welding them together.

10. The multi-chamber receptacle of claim 1, wherein the first rim, the second rim and the third rim are joined by gluing them together.

11. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises a material selected from the group consisting of a metal, a polymer and combinations thereof.

12. The multi-chamber receptacle of claim 1, wherein the inner receptacle member, the middle receptacle member and the outer receptacle member are stainless steel.

13. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises a bowl.

14. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises a casserole dish.

15. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises a platter.

16. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises a pan.

17. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises a pitcher.

18. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises a drinking cup.

19. The multi-chamber receptacle of claim 1, wherein the multi-chamber receptacle comprises an ice bucket.

20. The multi-chamber receptacle of claim 1, further comprising a lid to seal the cavity of the multi-chamber receptacle.

21. A multi-chamber receptacle, comprising:

an inner receptacle member having a first rim and defining a cavity for receiving a substance;

a middle receptacle member having a second rim and shaped complementary to the inner receptacle member for nesting with the inner receptacle member;

an outer receptacle member having a third rim and shaped complementary to the middle receptacle member for nesting with the middle receptacle member;

wherein the inner, middle and outer receptacle members are nested to form a first chamber between the inner receptacle member and the middle receptacle member and a second chamber between the middle receptacle member and the outer receptacle member, and wherein the first, second and third rims are joined to seal the first chamber and the second chamber;

an oil disposed within the sealed first chamber; and

an insulator disposed within the sealed second chamber.

22. The multi-chamber receptacle of claim 21, wherein the insulator is a gas.

23. The multi-chamber receptacle of claim 21, wherein the gas is selected from the group consisting of ambient air, nitrogen and carbon dioxide.

24. The multi-chamber receptacle of claim 21, wherein the first rim, the second rim and the third rim are joined by welding them together.

25. The multi-chamber receptacle of claim 21, wherein the first rim, the second rim and the third rim are joined by gluing them together.

26. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises a material selected from the group consisting of a metal, a polymer and combinations thereof.

27. The multi-chamber receptacle of claim 21, wherein the inner receptacle member, the middle receptacle member and the outer receptacle member are stainless steel.

28. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises a bowl.

29. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises a casserole dish.

30. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises a platter.

31. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises a pan.

32. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises a pitcher.

33. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises a drinking cup.

34. The multi-chamber receptacle of claim 21, wherein the multi-chamber receptacle comprises an ice bucket.

35. The multi-chamber receptacle of claim 21, further comprising a lid to seal the cavity of the multi-chamber receptacle.

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