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(54) **TEMPERATURE CHANGNG PACKAGE**

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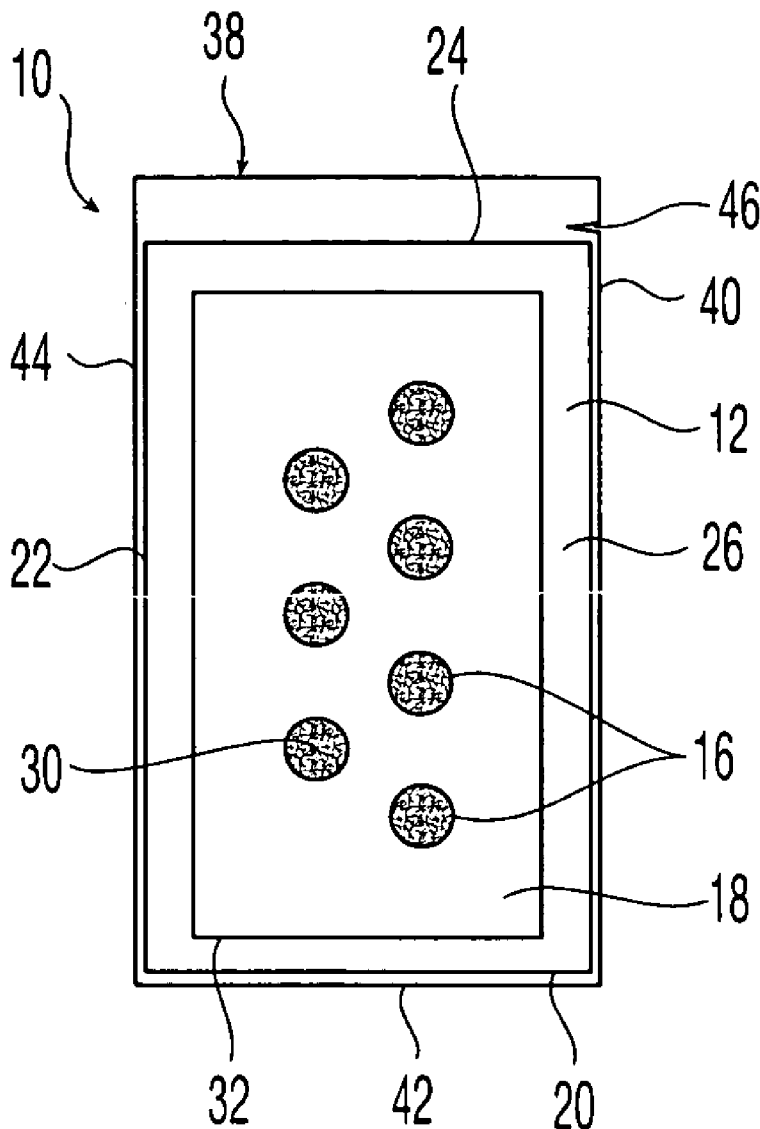
(57) **ABSTRACT**

A temperature-changing package is disclosed that has a compartment for a composition that will either raise or lower the temperature and a cover to protect the composition from accidental initiation. The package may be used to heat or cool a number of products and may be configured with a plurality of packages in a single unit. The package may also have a plurality of composition compartments as well as a number of product compartments.

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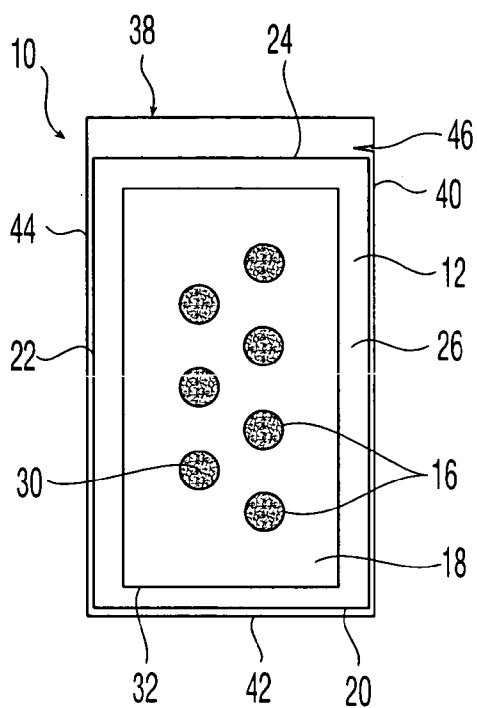


Fig. 1

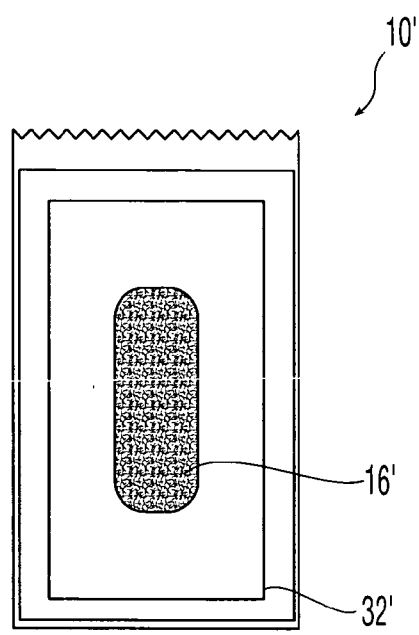


Fig. 3

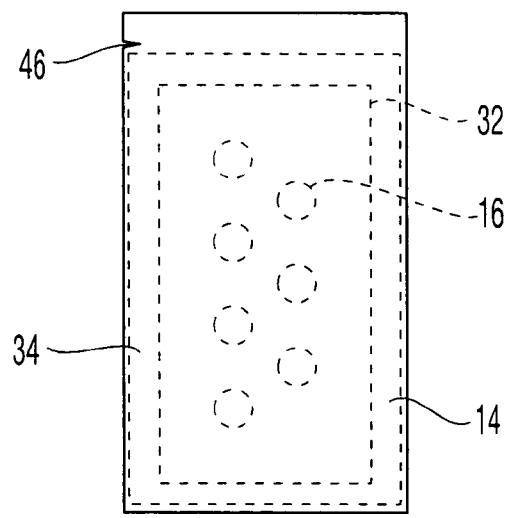


Fig. 2

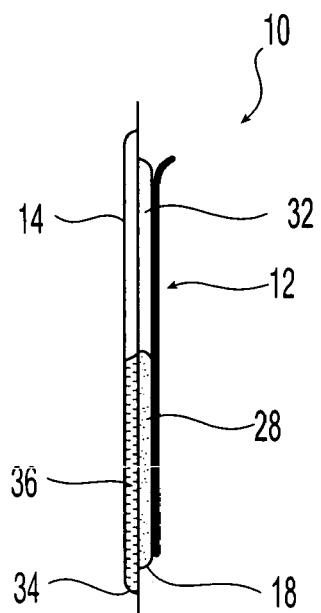


Fig. 4

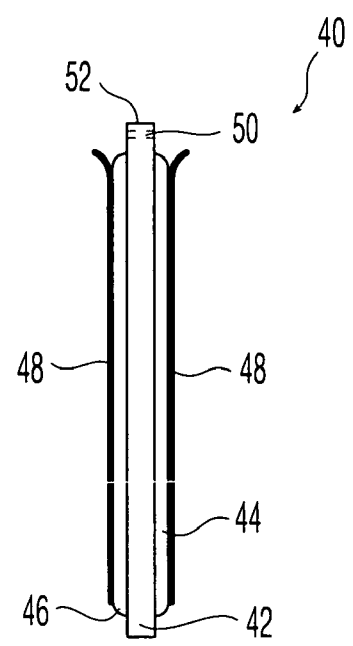


Fig. 5

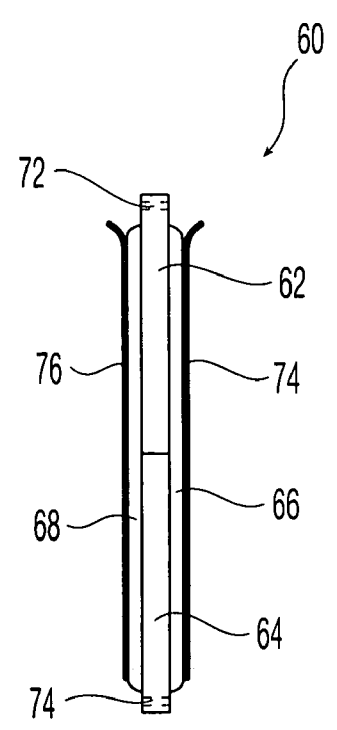


Fig. 6

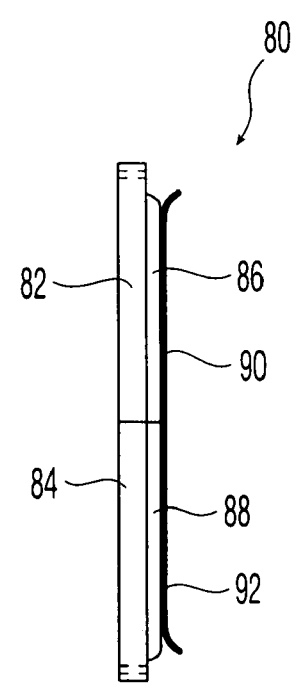


Fig. 7

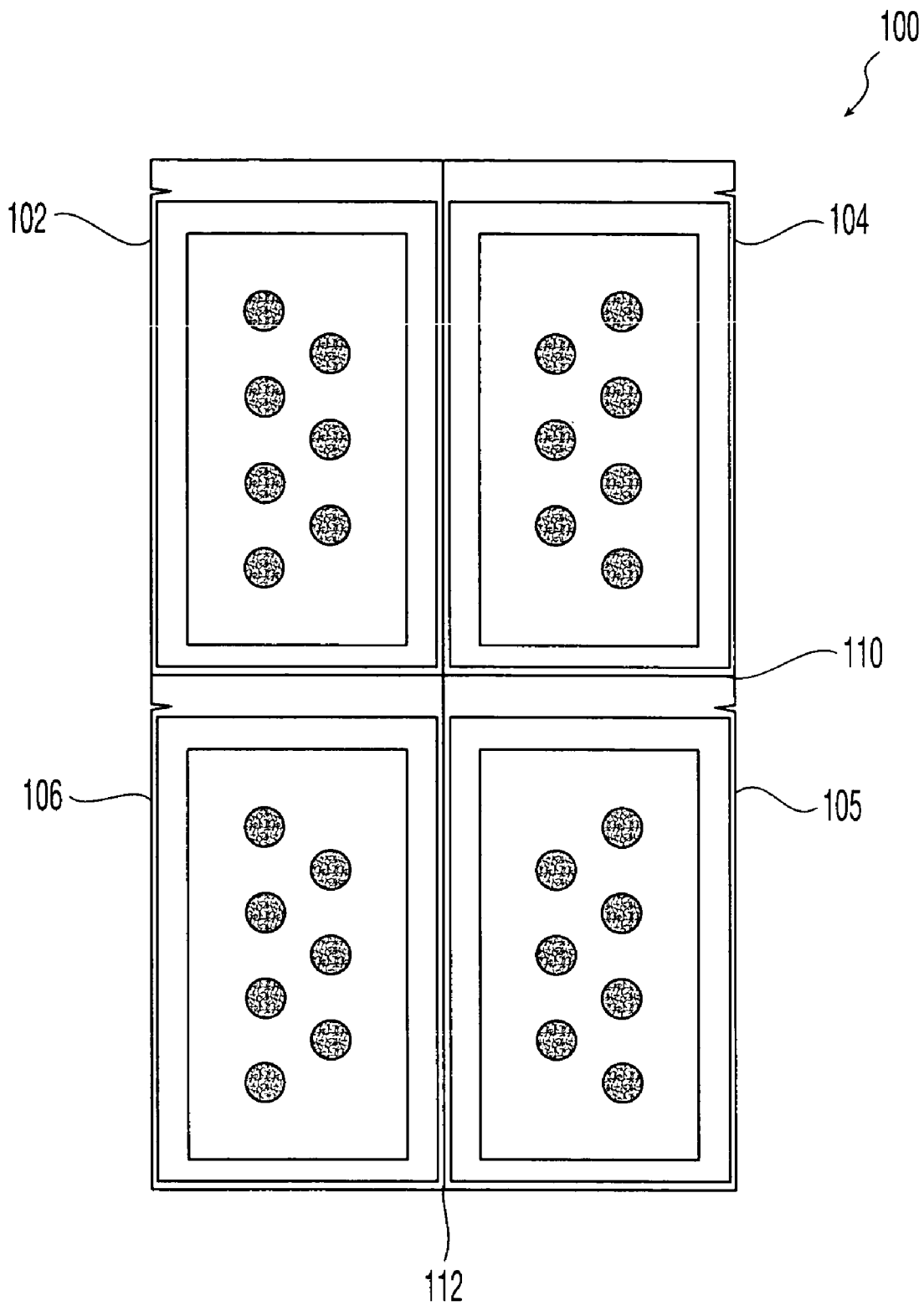
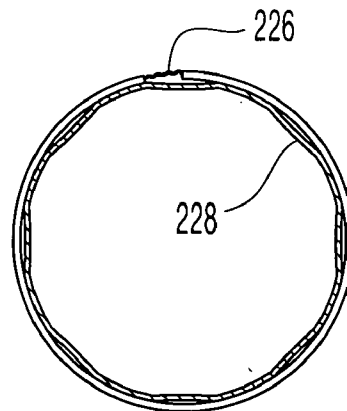
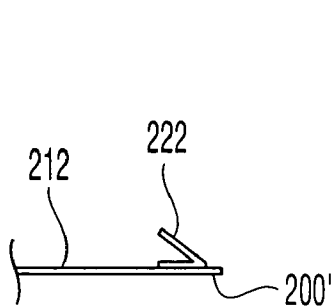
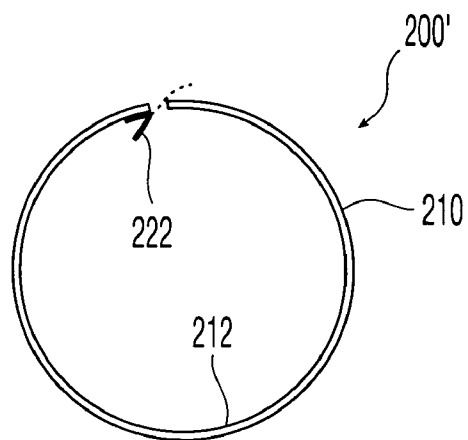
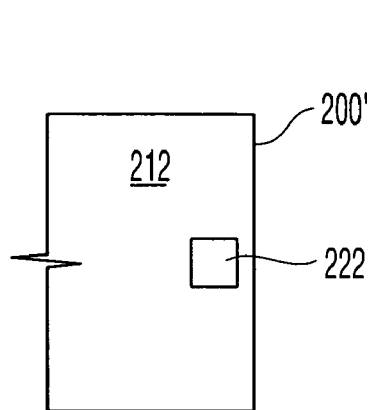
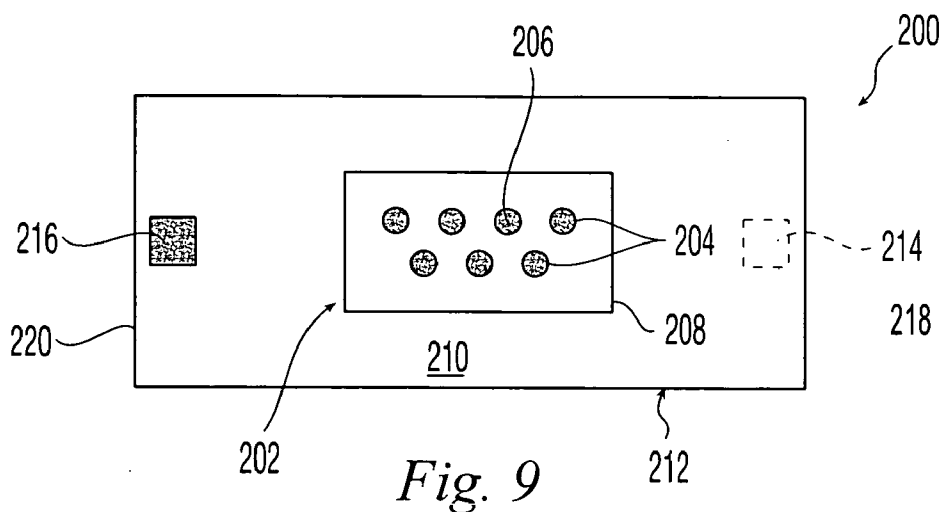


Fig. 8



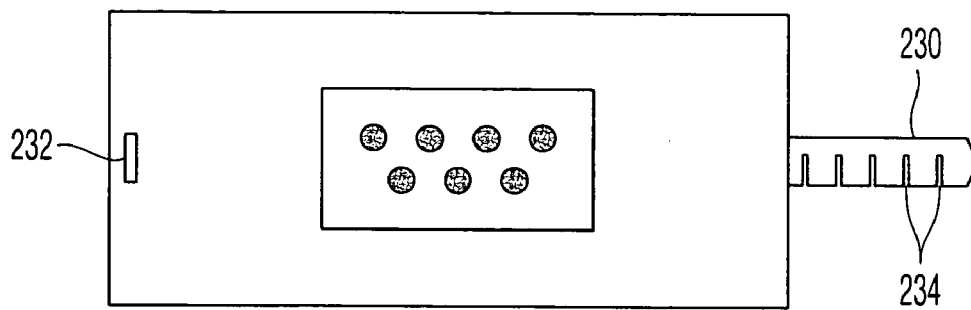


Fig. 14

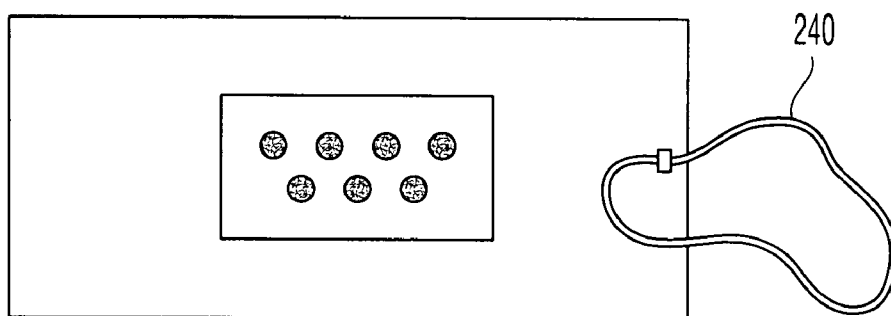


Fig. 15

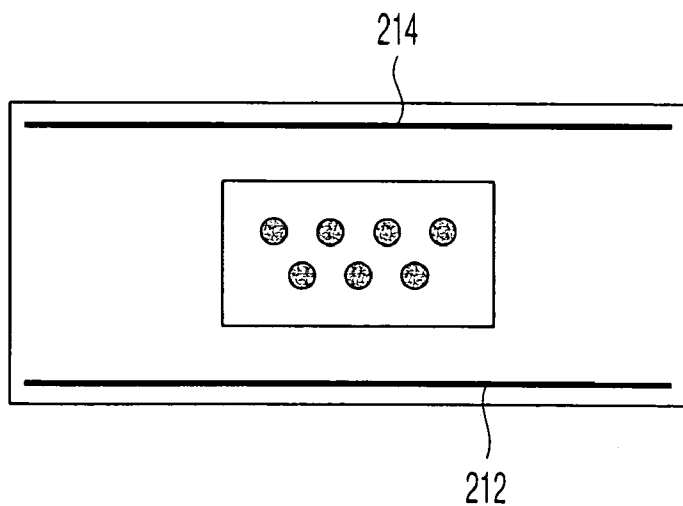


Fig. 16

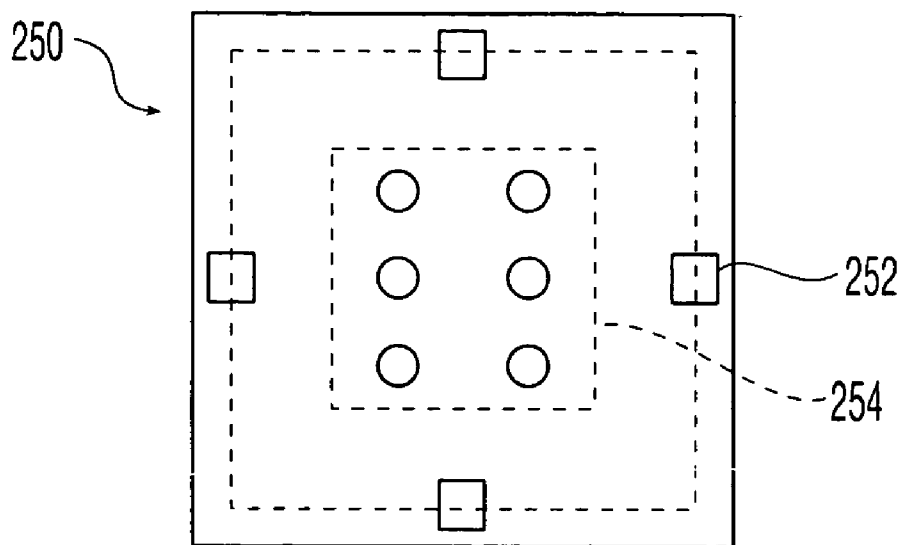


Fig. 17

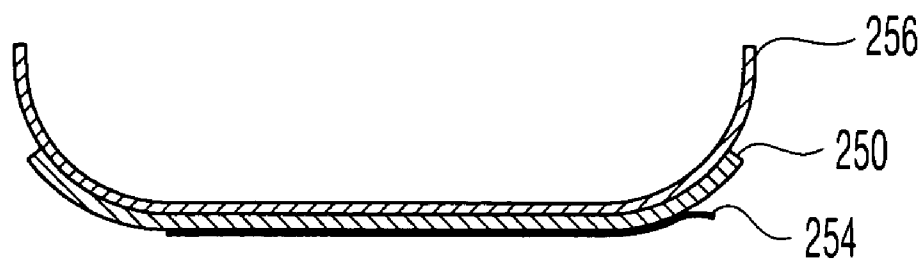


Fig. 18

TEMPERATURE CHANGNG PACKAGE

[0001] The present invention relates to a temperature changing package to heat and/or cool products, and more particularly, a temperature changing package that heats and/or cools when one portion of the package is exposed a liquid to induce the temperature changing materials to initiate a temperature change.

[0002] There are a number of prior art temperature changing packages to heat and/or cool specific products. However, these packages are typically self contained and require no external substance (liquid or otherwise) to initiate the temperature changing reaction. Specifically, some of the products have chemicals in one compartment and a liquid in an adjoining compartment with a frangible seal therebetween. The temperature changing reaction is initiated when the frangible seal is broken. However, this can happen accidentally, causing the product to be heated or cool prematurely. This would be especially true when the package is put into luggage or stuffed into a diaper bag.

[0003] Accordingly, the present invention is directed to a temperature changing package that substantially obviates one or more of the problems and disadvantages in the prior art. Additional features and advantages of the invention will be set forth in the description that follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the apparatus and process particularly pointed out in the written description and claims, as well as the appended drawings.

SUMMARY OF THE INVENTION

[0004] To achieve these and other advantages and in accordance with the purpose of the invention as embodied and broadly described herein, the invention is directed to a temperature-changing package for changing the temperature of a product that includes a first product compartment containing the product, a first composition compartment to hold a first temperature-changing composition, the first composition compartment being in thermal contact with the first compartment and having at least one opening to allow entry of an external component to induce a temperature changing reaction, and a cover to cover the at least one opening.

[0005] In yet another aspect, the invention is directed to a method for changing a temperature of a product, the product disposed in a temperature-changing package, the method including the steps of providing a temperature-changing package, the package including a first product compartment containing the product, a first composition compartment to hold a first temperature-changing composition, the first composition compartment being in thermal contact with the first product compartment and having at least one opening to allow entry of an external component to induce a temperature changing reaction, and a cover to cover the at least one opening, removing the cover to expose the at least one opening, and introducing the external component into the at least one opening to initiate the temperature changing reaction.

[0006] In another aspect, the present invention is directed to a temperature-changing package for changing the temperature of a product including a first composition compart-

ment to hold a first temperature-changing composition, the first composition compartment having a first side and a second side, the first side having at least one opening to allow entry of an external component to induce a temperature changing reaction, and the second side configured for being in thermal contact with a product container, a cover to cover the at least one opening in the first side, and attachment means to attach the temperature-changing package to the product container.

[0007] In yet another aspect, the present invention is directed to temperature-changing package for changing the temperature of a product including a first composition compartment to hold a first temperature-changing composition, the first composition compartment having a first side and a second side, the first side having at least one opening to allow entry of an external component to induce a temperature changing reaction, and the second side configured for being in thermal contact with a product container, a cover to cover the at least one opening in the first side, and an attachment member for attaching the temperature-changing package to the product container.

[0008] It is to be understood that the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

[0009] The accompanying drawings are included to provide a further understanding of the invention and are incorporated in and constitute a part of the specification. The drawings illustrate several embodiments of the invention and together with the description serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a front view of one embodiment of a temperature-changing package according to the present invention;

[0011] FIG. 2 is a rear view of the temperature-changing package of FIG. 1;

[0012] FIG. 3 is a front view of another embodiment of a temperature-changing package according to the present invention;

[0013] FIG. 4 is a side view and partial cross section of the temperature-changing package in FIG. 1;

[0014] FIG. 5 is a side view of another embodiment of a temperature-changing package according to the present invention;

[0015] FIG. 6 is a side view of another embodiment of a temperature-changing package according to the present invention;

[0016] FIG. 7 side view of another embodiment of a temperature-changing package according to the present invention;

[0017] FIG. 8 is an front view of another embodiment of a temperature-changing package according to the present invention;

[0018] FIG. 9 is front view of another embodiment of a temperature-changing package according to the present invention with an attachment member;

[0019] FIG. 10 is a partial front view of another embodiment of a temperature-changing package according to the present invention with another embodiment of an attachment member;

[0020] FIG. 11 is a partial side view of the temperature-changing package and attachment member of FIG. 10;

[0021] FIG. 12 is a top view of the temperature-changing package of FIG. 10

[0022] FIG. 13 is a top view of a temperature-changing package according to the present invention with another embodiment of an attachment member around a bottle;

[0023] FIG. 14 is a top view of another a temperature-changing package according to the present invention with an alternative embodiment of an attachment member;

[0024] FIG. 15 is a top view of another a temperature-changing package according to the present invention with an alternative embodiment of an attachment member;

[0025] FIG. 16 is a top view of another a temperature-changing package according to the present invention with an alternative embodiment of an attachment member;

[0026] FIG. 17 is a bottom view of another a temperature-changing package according to the present invention; and

[0027] FIG. 18 is a cross sectional view of the temperature-changing package of FIG. 17 attached to a separate product container.

DETAILED DESCRIPTION OF THE INVENTION

[0028] One embodiment of a temperature-changing package 10 is illustrated in FIGS. 1, 2 and 4. The temperature-changing package 10 has a first side 12 and a second side 14. The first side 12 has a plurality of openings 16 into a first composition compartment 18, the first composition compartment 18 being sealed around the edges 20,22,24,26. The plurality of openings 16 provide communication between the first composition compartment 18 and the outside of the temperature-changing package 10. Inside first composition compartment 18 are the components 28 that initiate a chemical reaction to either increase or decrease the temperature of temperature-changing package 10. Also inside first composition compartment 18 is a porous material 30 to prevent the chemical components 28 from leaving the first composition compartment 18. The porous material 30 is preferably also an absorbent material to assist in wicking a liquid into the first composition compartment 18 to initiate the chemical reaction. Porous material 30 is preferably a cotton material, but any material that wicks the liquid into the first composition compartment 18 and prevents the chemical components 28 from falling out could be used.

[0029] The plurality of openings 16 are covered by a cover 32 that preferably has an adhesive on one side to be removably attached to the first side 12. As shown in FIG. 3, the temperature-changing package 10' may also have a single opening 16' that is typically larger in area than each of the plurality of openings 16 in the first embodiment. A cover 32' is also provided for the single opening 16'. The covers may be clear or may be opaque.

[0030] The temperature-changing package 10 also has a first product compartment 34 that is in thermal communi-

cation with the first composition compartment 18 and contains a product 36 to be either heated or cooled. The first product compartment 34 is also sealed at its edges 38,40, 42,44, which may be the same as edges 20,22,24,26 as the first composition compartment 18, or, as shown in FIGS. 1 and 4, may be different edges. The first product compartment 34 may also have a tear notch 46 or a perforation as described in conjunction with other embodiments below. The tear notch 46 allows the consumer to gain entrance to the product 36 in first product compartment 34 without gaining access to the components 28 in first composition compartment 18.

[0031] The temperature-changing package 10 is preferably made of a disposable, environmentally friendly material so that the consumer may appropriately discard the package when finished with it. Such materials include paper, thin metals (such as aluminum), or any other materials. It should be noted that since the components 28 react to water, as indicated in more detail below, the materials should be anhydrous and prevent water from entering into the first composition compartment 18 accidentally, since that would initiate a reaction. The materials, especially in the case of paper, may also be lined with a plastic or wax material, as long as they are anhydrous.

[0032] The components 28 may be activated to either increase or decrease the temperature of the product 36 in first product compartment 34. In the event that the product 36 is to be heated, the chemicals are preferably a mixture of iron, magnesium, with salt (NaCl) added to enhance the thermal dissipation of the external component that initiates the chemical reaction. These materials were chosen due to their superior safety, cost, ease of availability, and environmental qualities. However, other materials may also be used, including potassium permanganate with glycerol added to initiate the reaction. If the iron/magnesium materials are used, the ratio of the mixture of iron and magnesium may be from 30/70 to 70/30. However, in order to keep the cost down, the ratio of 70/30 is preferred since iron is cheaper than magnesium. Typically, the same amount (weight) of salt is added to the iron/magnesium mixture in first composition compartment 18, depending on the amount of heat that is required to heat the product 36. It is also preferred that the components are ball milled to produce a larger surface area for better reaction. To initiate the chemical reaction, an external component is added, which is water in the preferred embodiment. The components 28 are exposed by removing the cover 32. The consumer then adds water to the openings 16, which is wicked to the components 28 by the porous material 30. The source of water can be any external source, i.e., running it under the faucet, pouring a liquid that contains water (e.g., coffee, tea, etc.) into the openings 16.

[0033] It is envisioned that the product 36 is a consumer cosmetic product, such as a shaving cream or gel, but it could be any consumer product that could be heated or cooled, as explained below. For example, if shaving gel were used, then a 0.17 oz sample would have the temperature raised to 158° F. in 12 seconds with 0.25 g of a 70/30 mixture of iron/magnesium with 0.25 g of salt and 1.0 ml of water. If, however, the potassium permanganate and glycerol were used, then 0.5 g of each raised 0.3 oz of shave cream to about 140° F.

[0034] Similarly, the components 28 in first composition compartment 18 could also cause the temperature of tem-

perature-changing package **10** to decrease instead. It is known that mixing ammonium nitrate and water will cause an endothermic reaction, causing the temperature to decrease. Therefore, the components **28** would be ammonium nitrate and the external component would once again be water.

[0035] Other configurations of temperature-changing package are illustrated in **FIGS. 5-7**, with different groupings of the temperature-changing package illustrated in **FIG. 8**. As illustrated in **FIG. 5**, a temperature-changing package **40** with a product compartment **42** is contained between two composition compartments **44,46**. The composition compartments are similar to those in **FIGS. 1 and 3**, i.e., they have at least one opening with a porous material disposed therein. Each of the openings would also have a cover **48** for each of the composition compartments **44,46**. The consumer may choose to only use one of the two composition compartments **44,46** or may use them both together to get a higher temperature more quickly. It should be noted that the product compartment **42** has a perforation **50** along one edge **52** of the temperature-changing package **40** to allow access to the product. The perforation **50** does not intersect the two composition compartments **44,46** so that the consumer does not access the chemicals contained therein.

[0036] The temperature-changing package **60** in **FIG. 6** is similar to the previous embodiments, but illustrates two product compartments **62,64** with two composition compartments **66,68** to heat and/or cool either or both of the product compartments **62,64**. The operation and construction is similar to the prior embodiment, except that there are two product compartments **62,64** rather than one. It should also be noted that each of the two product compartments **62,64** have a perforation **70,72** to gain access to the product in the compartments. Similarly, the two composition compartments **66,68** each have a cover **74,76**. While a composition compartment **66,68** is illustrated on each side of the two product compartments **62,64**, each of the composition compartments **66,68** could further be divided to provide for four composition compartments to allow only the composition compartments that are immediately adjacent the product compartments to be initiated.

[0037] Another embodiment of a temperature-changing package is illustrated in **FIG. 7**. In this embodiment, temperature-changing package **80** has at least two product compartments **82,84**, with a corresponding composition compartment **86,88**. Each of the composition compartments **86,88** has a cover **90,92**, which cover at least one opening (not shown, but similar to those illustrated and described above) in the composition compartments **86,88**. The two product compartments **82,84** are shown to be connected to one another; however, they may also be separable from one another, as illustrated in **FIG. 8**.

[0038] The temperature-changing package **100** illustrated in **FIG. 8** has **4** separate product/composition packages connected to one another. Each of the packages **102,104, 106,108**, have the same general construction, e.g., as illustrated in **FIG. 1**. However, each of packages **102,104,106, 108** may have the same or different products in each of the product compartments. Similarly, the composition in the composition compartments may also be the same or different, e.g., some be cooling and some be heating. The packages **102,104,106,108** may also be permanently connected

to one another, or have perforations along the lines **110,112**. If there are perforations, then each of the packages **102,104, 106,108** could be detached and used separately by the consumer.

[0039] Another embodiment of a temperature-changing package **200** is illustrated in **FIG. 9**. In this embodiment, the temperature-changing package **200** has only a composition compartment **202** and no product compartment. As with the other embodiments, the composition compartment **202** has a composition within the compartment **202**, at least one opening **204**, porous material **206** disposed within the compartment **202** and adjacent the at least one opening **204** to prevent the composition from exiting the compartment **202**, and a cover **208**. The at least one opening **204** and cover **208** are on a first side **210** of the temperature-changing package **200**, while the second side **212** is typically used to be placed against the object to be warmed or cooled. The temperature-changing package **200** preferably has a way to be attached to the object to be warmed and/or cooled. For example, as illustrated in **FIG. 9**, the temperature-changing package **200** also has two corresponding parts **214,216** of a hook and loop fastener at opposite ends **218,220**. The temperature-changing package **200** can be wrapped around an object and the two corresponding parts **214,216** are brought together to hold temperature-changing package **200** in close proximity to the object. The object may be, for example, a baby's bottle that needs to be warmed, requiring that the composition in the composition compartment **202** increase in temperature upon activation. Similarly, the object may be a soft drink or other drink container that needs to be chilled, and the composition in the composition compartment **202** causes a decrease in temperature upon activation.

[0040] The temperature-changing package **200'** illustrated in **FIG. 10** shows that an adhesive tab **222** could be used to secure the ends **218,220** of the temperature-changing package **200'**. The adhesive tab **222** is attached to itself on one side of the temperature-changing package **200'**, and as seen in **FIG. 11** the tab **222** is lifted off of the temperature-changing package **200'**, exposing the sticky surface. The tab **222** is then rotated about 180° to attach to the other side of the temperature-changing package **200'**. The tab **222** can be attached to either side **210,212** of the temperature-changing package **200'**. As illustrated in **FIGS. 10-12**, the tab **222** is preferably attached to the second side **212** of the temperature-changing package **200'**, so that the openings **204** are on the outside when the temperature-changing package **200'** is secured around the can or other object.

[0041] Other methods of securing the temperature-changing package are also possible and are illustrated in **FIGS. 13-16**. In each of these embodiments, the temperature-changing package is similar to that in **FIG. 9**. However, in **FIG. 13**, there is an elastic insert **226** that joins the two ends of the temperature-changing package. This allows the temperature-changing package to closely fit the object, such as a bottle **228**, as illustrated in **FIG. 13**. The elastic insert **226** could be welded or otherwise secured into the seams at the ends of the temperature-changing package or could be attached to either of the sides of the temperature-changing package by any method.

[0042] In **FIG. 14**, there is a tab **230** that can be inserted into an opening **232** to secure the temperature-changing package around an object. The tab **230** has a number of slots

234 to allow the temperature-changing package to be adjusted appropriately around the object. The tab **230** is inserted into the opening **232** and then the slots **234** engage the temperature-changing package to prevent the temperature-changing package from falling away from the object that is to be either heated or cooled.

[0043] **FIG. 15** illustrates a temperature-changing package that has an elastic member **240** secured to one side. The temperature-changing package is placed around the object to be heated or cooled, and the elastic member **240** may be extended around the object and the temperature-changing package, in a manner similar to the elastic insert **226** noted above. The manner in which the elastic member **240** is attached to the temperature-changing package is not important and may be done in any appropriate manner, i.e., secured with an adhesive, etc.

[0044] The temperature-changing package in **FIG. 16** has two metallic members **246,248**, that are embedded in the temperature-changing package and may be formed around the object to be heated or cooled. The two metallic members **246,248** may either simply be wires that are malleable and bendable. However, the wires must be of a sufficient strength to hold the temperature-changing package against the object once formed around it. Alternatively, two metallic members **246,248** may already have a curvature, causing the temperature-changing package to roll up on itself. The user will then simply unroll it and place it around the object to be heated or cooled, and it will remain around the object.

[0045] Another embodiment of the temperature-changing package is illustrated in **FIGS. 17 and 18**. The temperature-changing package **250** has the same construction as the embodiments in **FIGS. 9-16**, but is larger in size and has more attachment members **252**. The temperature-changing package **250** also has a cover **254** for access to the composition compartment. The attachment members **252** are preferably adhesive members as with adhesive tab **222** in the embodiment above. The attachment members **252** can be used to attach the temperature-changing package **250** to a larger object **256**, such as a dish, plate, bowl, etc., to either heat or cool the contents of the object **256**. While there are four attachment members **252**, there could be as many as would be needed for the object to which the temperature-changing package **250** would be attached. The temperature-changing package **250** could also be of any shape, even though it is illustrated in a square configuration in **FIG. 17**.

[0046] The shapes and sizes of the temperature-changing package according to the present invention could be of any shape and any size, so that the temperature-changing package is suited to heat or cool the object. For example, the temperature-changing package **40** may be large enough to hold and heat **6** ounces of distilled water in the product compartment **42** so that a parent could mix the heated, distilled water with formula to feed a baby on the run. The parent no longer needs to find a cup of hot water to heat premixed formula or worry about how long the formula has been mixed prior to use. The parent only needs to have a relatively small amount of water to initiate the reaction to heat the distilled water, which can be obtained at a water fountain, restroom faucet, or a glass of water or even tea at a restaurant.

[0047] The packages may also have advertising printed on the first and second sides. While the covers have been

illustrated as being transparent, they need not be. For example, if the temperature-changing package **10** has shaving cream, a hotel or resort operator could print their logos or other information on either or both sides and include them in the usual toiletries provided in the room. Similarly, businesses could print information on the packages and hand them out as promotional items.

[0048] It will be apparent to those skilled in the art that various modifications and variations can be made in the multi-fiber ferrule of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

We claim:

1. A temperature-changing package for changing the temperature of a product comprising:

a first product compartment containing the product;

a first composition compartment to hold a first temperature-changing composition, the first composition compartment being in thermal contact with the first compartment and having at least one opening to allow entry of an external component to induce a temperature changing reaction; and

a cover to cover the at least one opening.

2. The temperature-changing package of claim 1, further comprising a porous material, the porous material disposed within the first composition compartment and mounted adjacent the at least one opening to prevent the first temperature-changing composition from exiting the first composition compartment and allowing the external component to enter the first composition compartment.

3. The temperature-changing package of claim 1, wherein the external component includes water.

4. The temperature-changing package of claim 1, wherein the external component includes glycerol.

5. The temperature-changing package of claim 1, wherein the temperature changing component is a mixture of iron, magnesium, and salt.

6. The temperature-changing package of claim 1, wherein the package is flexible.

7. The temperature-changing package of claim 1, wherein the product compartment has a removable product cover.

8. The temperature-changing package of claim 1, wherein the first product compartment has a tear notch.

9. The temperature-changing package of claim 1, wherein the first product compartment has a perforation for opening the first product compartment.

10. The temperature-changing package of claim 1, wherein the cover is removably attached to the package.

11. The temperature-changing package of claim 1, wherein the temperature-changing package has a temperature and the temperature-changing component reduces the temperature of temperature-changing package.

12. The temperature-changing package of claim 11, wherein the temperature is reduced to about 40° F.

13. The temperature-changing package of claim 1, wherein the temperature-changing package has a temperature and the temperature-changing component increases the temperature of temperature-changing package.

14. The temperature-changing package of claim 13, wherein the temperature is increased by about 50-75° F.

15. The temperature-changing package of claim 14, wherein the temperature is increased to about 155° F.

16. The temperature-changing package of claim 14, wherein the temperature is increased to between about 140° F. and 165° F.

17. The temperature-changing package of claim 1, wherein the temperature changing component is ammonium nitrate.

18. The temperature-changing package of claim 1, wherein the at least one opening in the first composition compartment comprises at least two openings.

19. The temperature-changing package of claim 1, further comprising a second composition compartment to hold a second temperature-changing composition, the second composition compartment being in thermal contact with the first product compartment and having at least one opening to allow entry of an external component to induce a temperature changing reaction.

20. The temperature-changing package of claim 1, further comprising

a second product compartment containing a second product;

a second composition compartment to hold a second temperature-changing composition, the second composition compartment being in thermal contact with the second product compartment and having at least one opening to allow entry of an external component to induce a temperature changing reaction; and

a second cover to cover the at least one opening in the second composition compartment.

21. The temperature-changing package of claim 20, wherein the first and second products are the same.

22. The temperature-changing package of claim 20, wherein the temperature-changing package has a temperature and the temperature-changing component reduces the temperature of temperature-changing package.

23. The temperature-changing package of claim 20, wherein the temperature-changing package has a temperature and the temperature-changing component increases the temperature of temperature-changing package.

24. The temperature-changing package of claim 20, wherein the first and second product compartments are attached to one another.

25. A method for changing a temperature of a product, the product disposed in a temperature-changing package, the method comprising the steps of:

providing a temperature-changing package comprising:

a first product compartment containing the product;

a first composition compartment to hold a first temperature-changing composition, the first composition compartment being in thermal contact with the first

product compartment and having at least one opening to allow entry of an external component to induce a temperature changing reaction; and

a cover to cover the at least one opening;

removing the cover to expose the at least one opening; and

introducing the external component into the at least one opening to initiate the temperature changing reaction.

26. The method of claim 25, further comprising the step of waiting a predetermined amount of time to allow the product to reach a predetermined temperature.

27. The method of claim 25, wherein the temperature-changing package further comprises a tear notch to allow a user to access the product in the first product compartment, and further comprising the step of tearing the first product compartment at the tear notch and removing the product at a predetermined temperature.

28. A temperature-changing package for changing the temperature of a product comprising:

a first composition compartment to hold a first temperature-changing composition, the first composition compartment having a first side and a second side, the first side having at least one opening to allow entry of an external component to induce a temperature changing reaction, and the second side configured for being in thermal contact with a product container;

a cover to cover the at least one opening in the first side; and

attachment means to attach the temperature-changing package to the product container.

29. The temperature-changing package of claim 28, wherein the attachment means is selected from the group consisting of hook and loop fasteners, adhesive tabs, elastic member joining two end portions of the temperature-changing package, and a tab and slot.

30. A temperature-changing package for changing the temperature of a product comprising:

a first composition compartment to hold a first temperature-changing composition, the first composition compartment having a first side and a second side, the first side having at least one opening to allow entry of an external component to induce a temperature changing reaction, and the second side configured for being in thermal contact with a product container;

a cover to cover the at least one opening in the first side; and

an attachment member for attaching the temperature-changing package to the product container.

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