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(54) **TRIGGER MECHANISM FOR SELF-HEATING/COOLING PACKAGES OR CONTAINERS UNIVERSALLY APPLIED TO BOTH RIGID AND NON-RIGID PACKAGES AND CONTAINERS**

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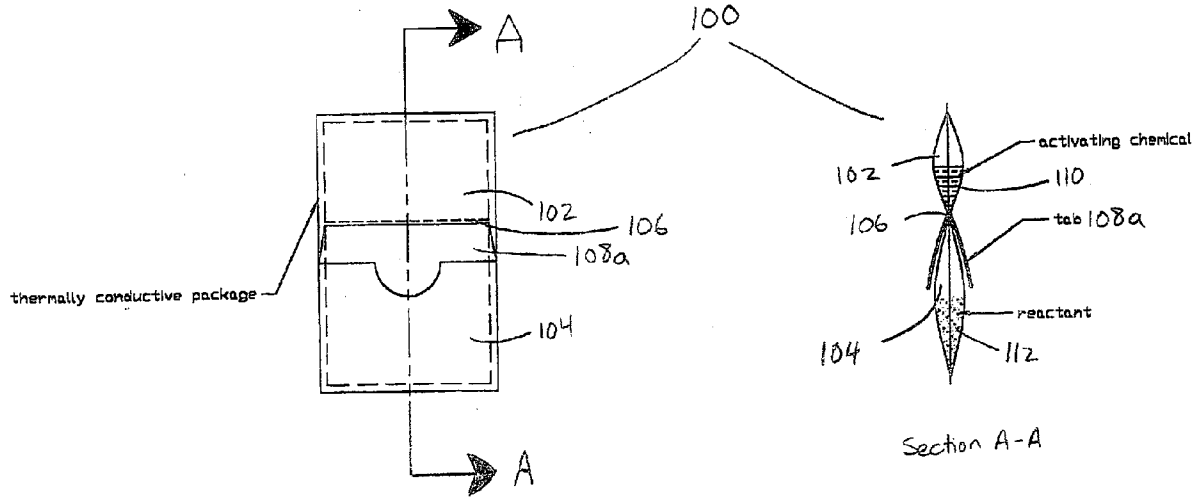
(57) **ABSTRACT**

A package is provided including a first sealable envelope containing a first agent, a second sealable envelope containing a second agent adjacent the first sealable envelope and a frangible seal separating the first sealable envelope from the second sealable envelope and a triggering mechanism located on an exterior of the package, the triggering mechanism having a first portion attached to the package at a first point adjacent the first sealable envelope and a second portion attached to the package at a second point adjacent the second sealable envelope such that, if the first portion and the second portion of the triggering mechanism are pulled, the frangible seal is stressed to rupture, allowing the first agent to communicate with the second agent.



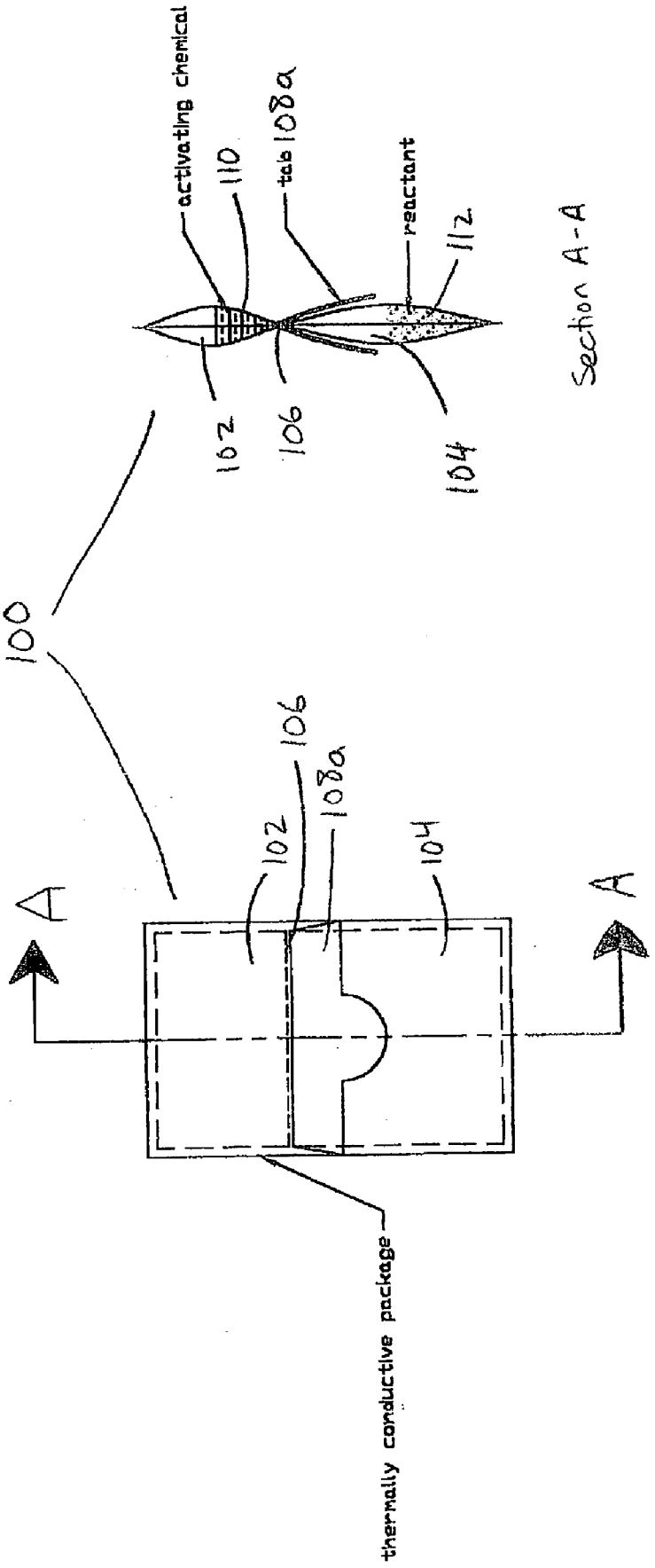

activating chemical
110
tab 108a
reactant
112
Section A-A
102
106
104
100
106
108a
102
104
A
A
thermally conductive package

Figure 1A

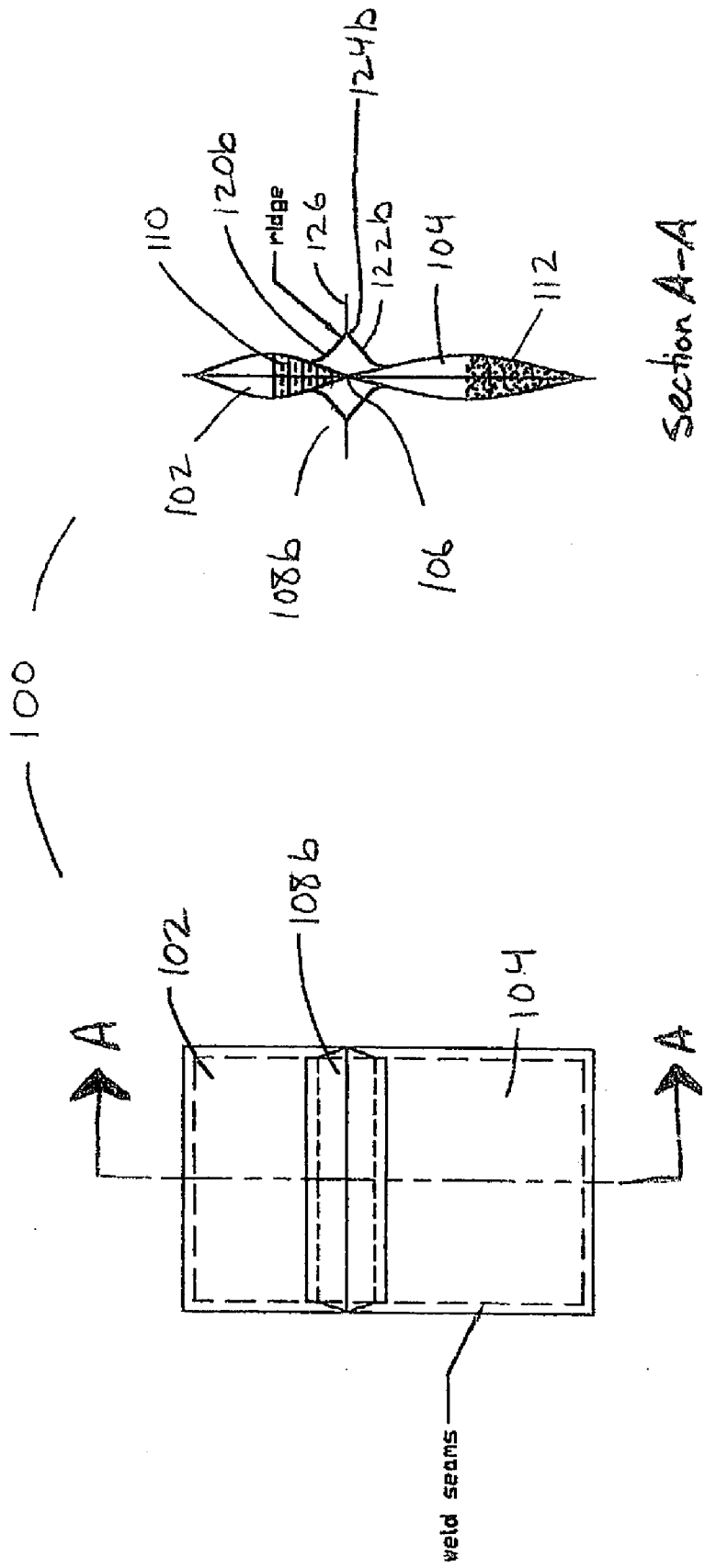

100
102
108b
104
A
A
weld seams
110
120b
ridge
126
122b
124b
104
112
102
108b
106
Section A-A

Figure 1B

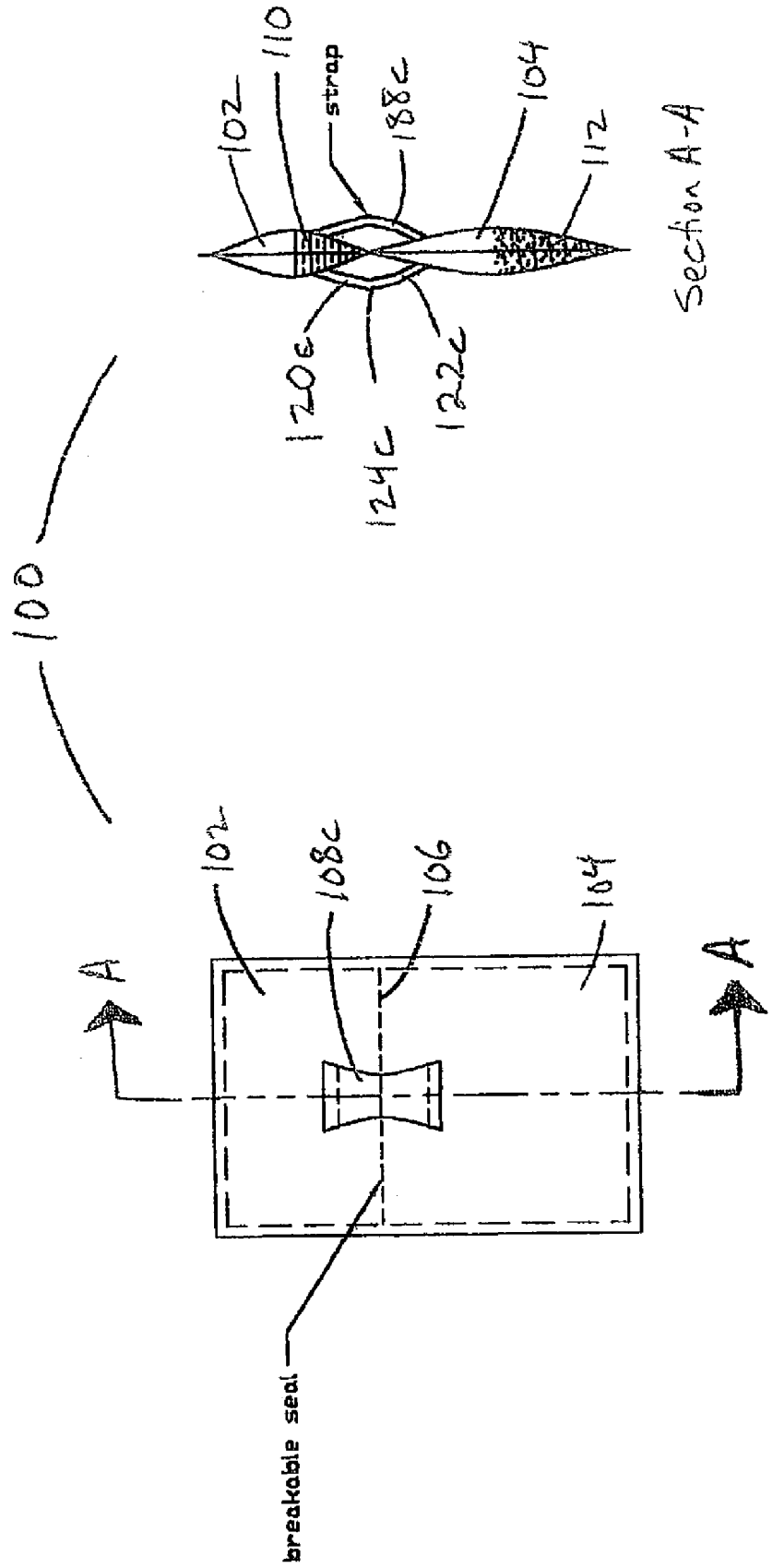

100
102
110
strap
188c
104
112
Section A-A
120c
122c
124c
102
108c
106
104
A
A
breakable seal

Figure 1C

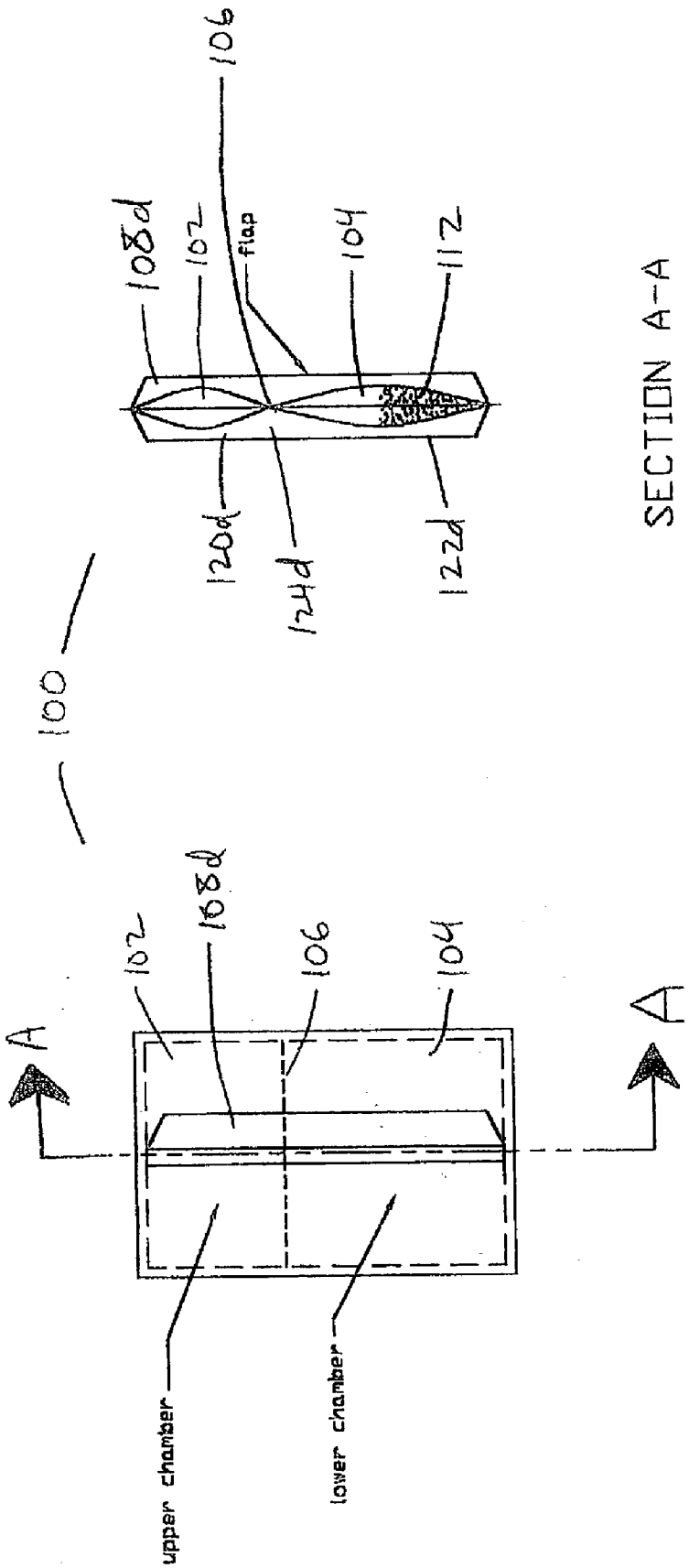

106
108d
102
flap
104
112
120d
124d
122d
SECTION A-A
100
102
108d
106
104
A
A
upper chamber
lower chamber

FIGURE 1D

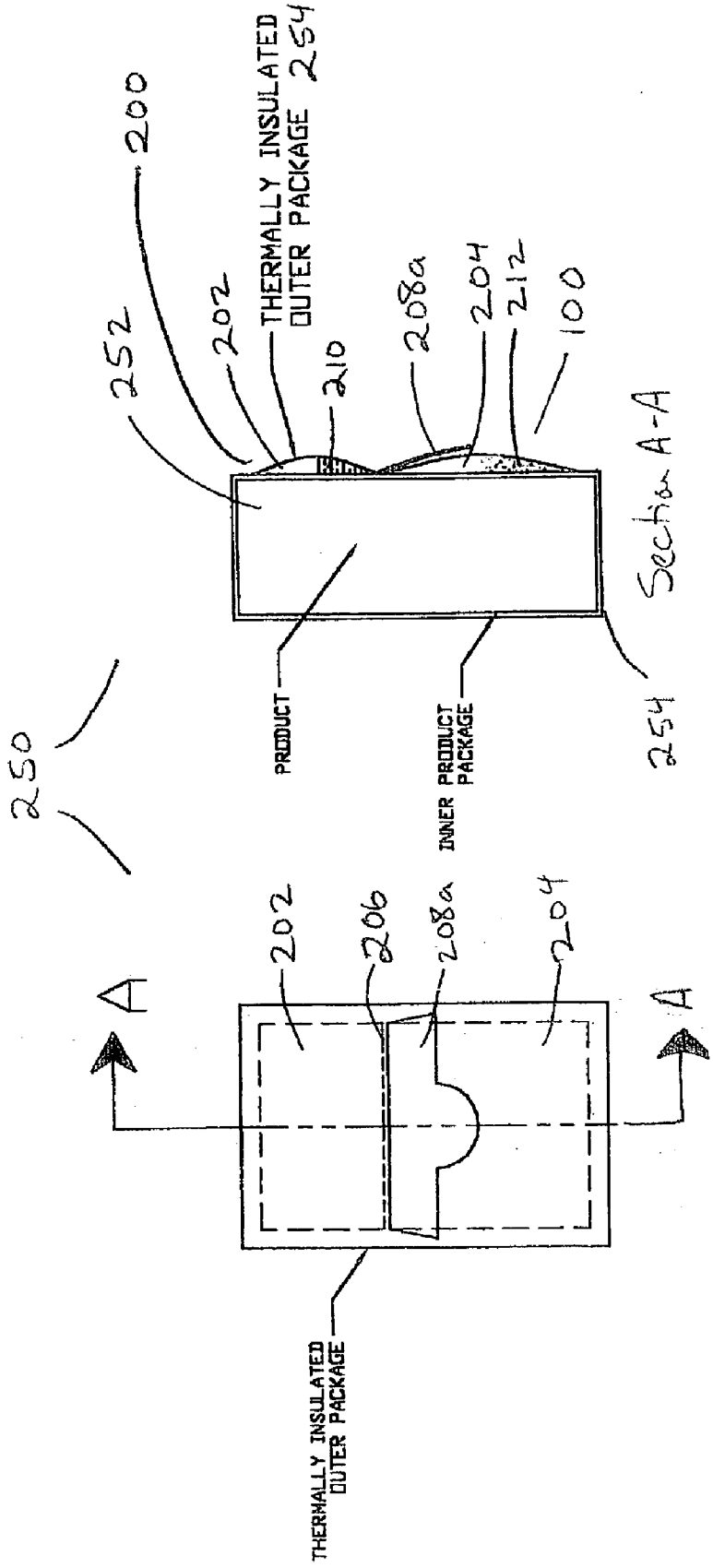

250
200
252
202
THERMALLY INSULATED OUTER PACKAGE 254
210
208a
204
212
100
PRODUCT
INNER PRODUCT PACKAGE
254
Section A-A
A
A
202
206
208a
204
THERMALLY INSULATED OUTER PACKAGE

Figure 2A

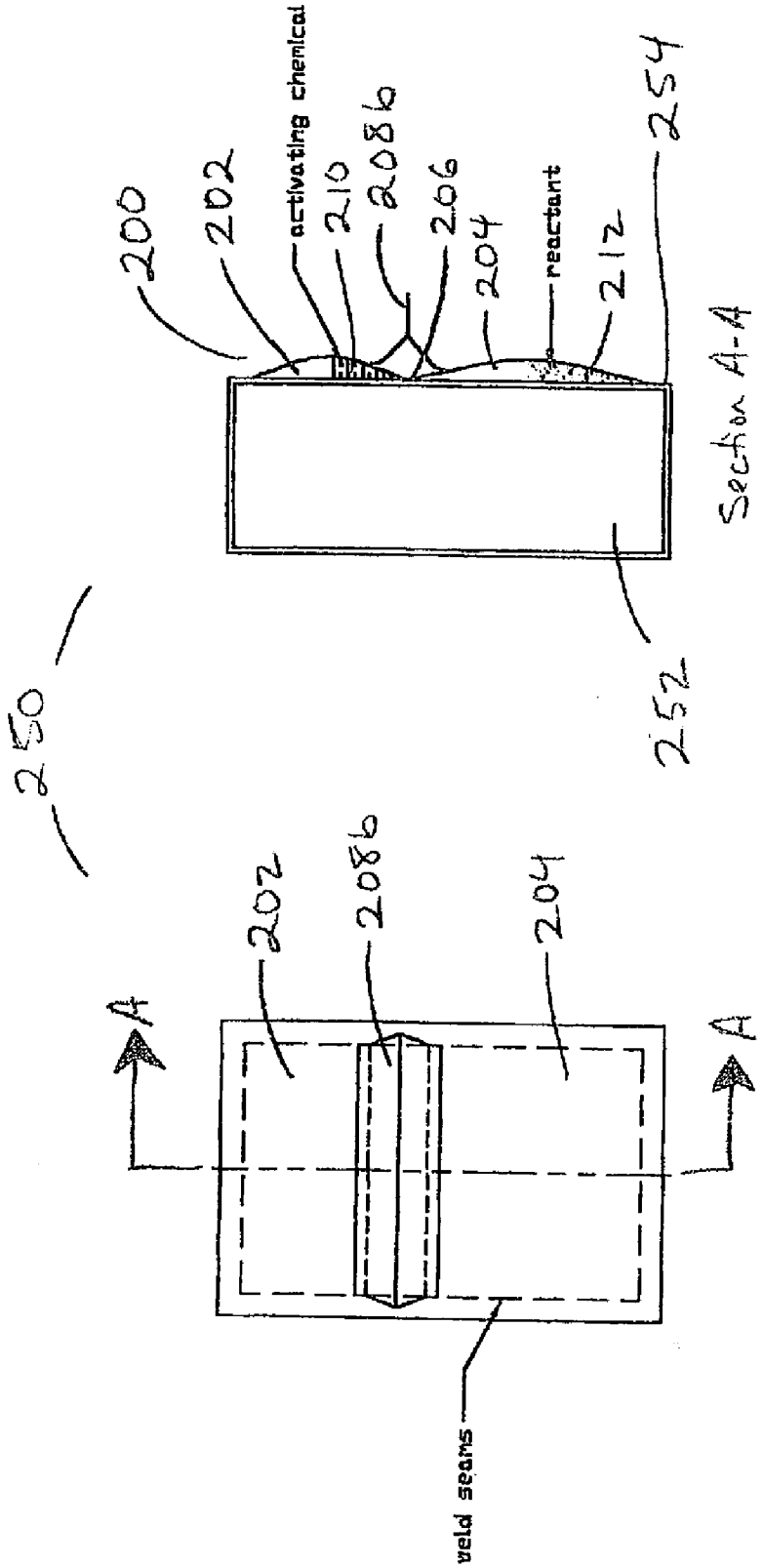

200
202
activating chemical
210
208b
206
204
reactant
212
254
Section A-A
252
250
202
208b
204
A
A
weld seams

Figure 2B

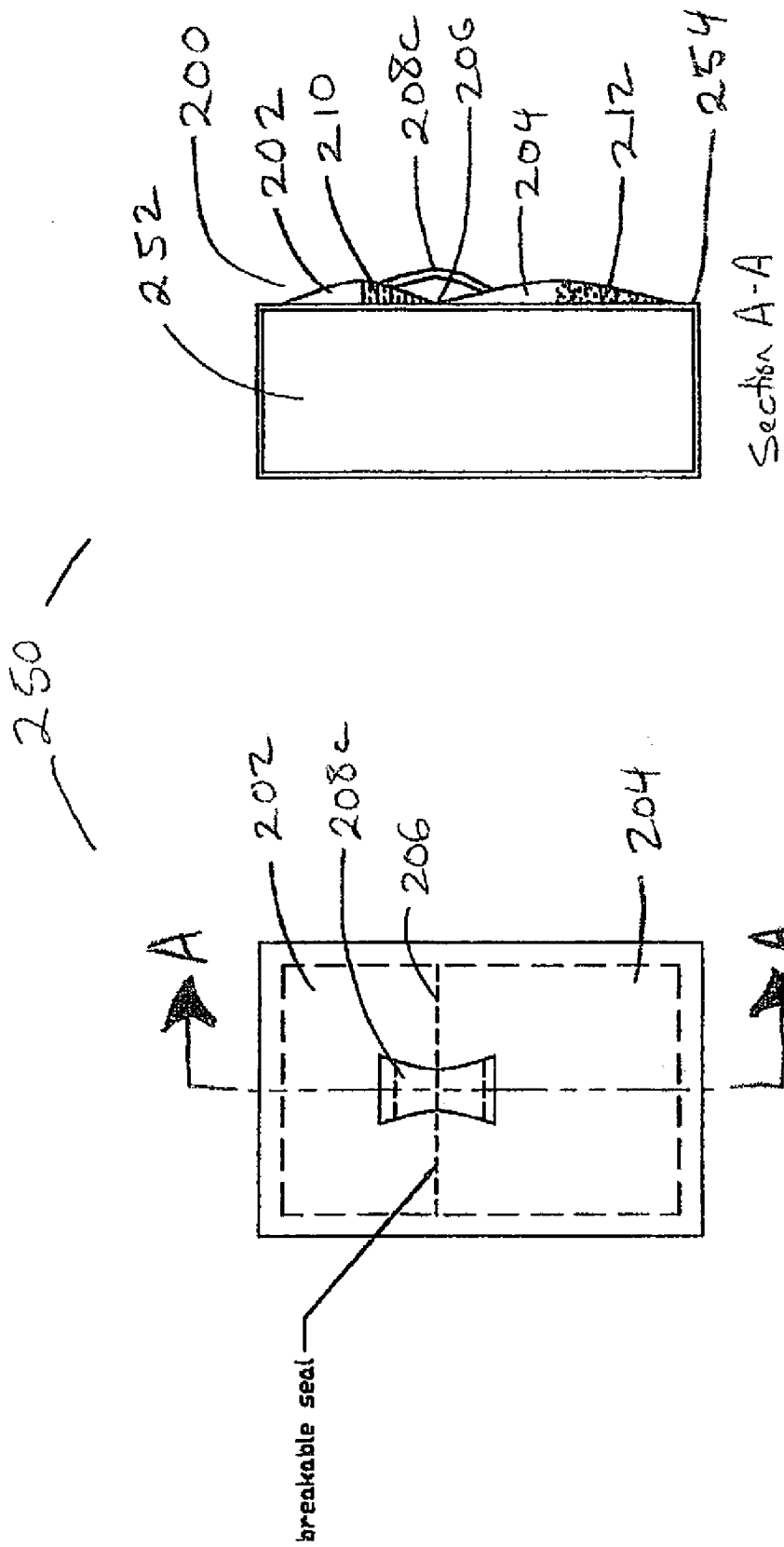

252
200
202
210
208c
206
204
212
254
Section A-A
250
202
208c
206
204
A
A
breakable seal

Figure 2C

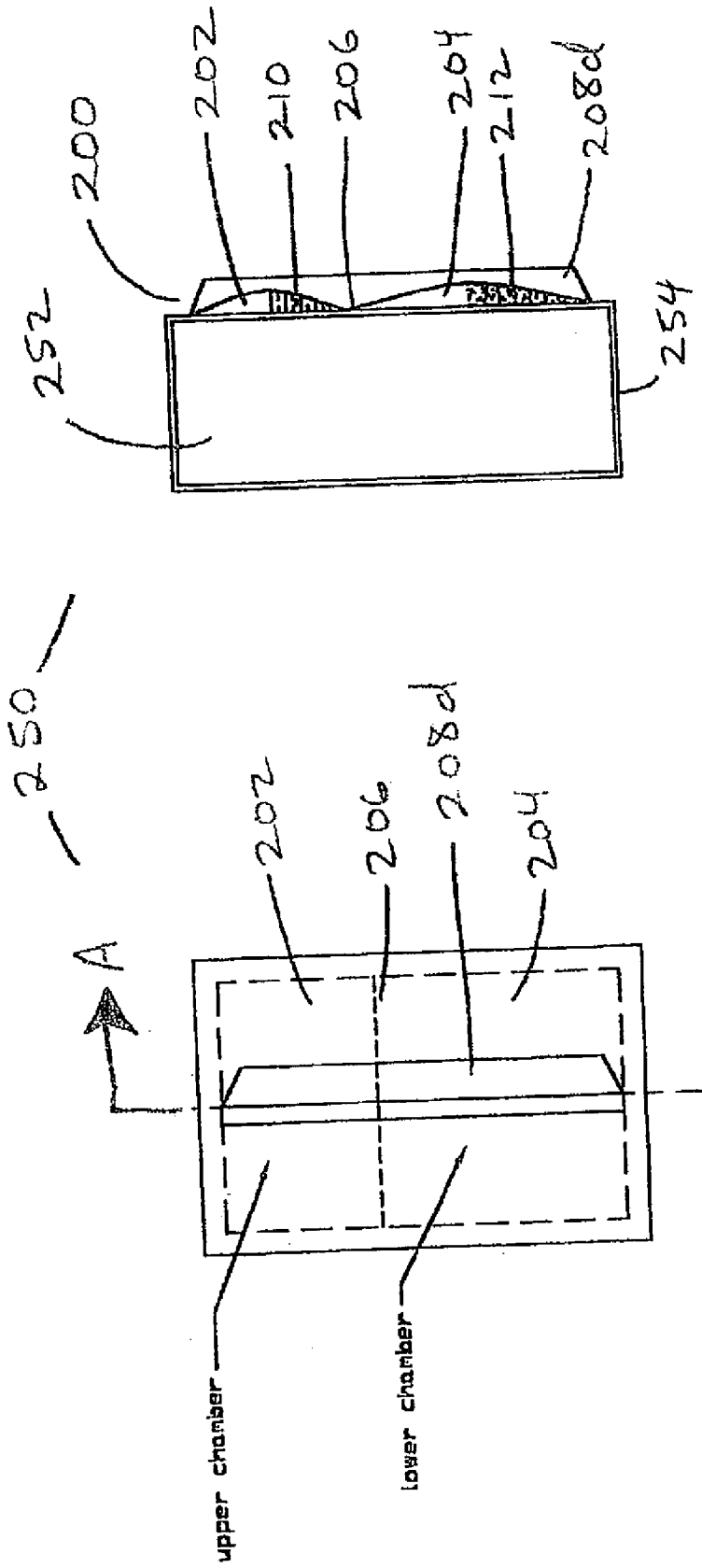

200
202
210
206
204
212
208d
252
254
SECTION A-A
250
202
206
208d
204
A
A
upper chamber
lower chamber

FIGURE 2D

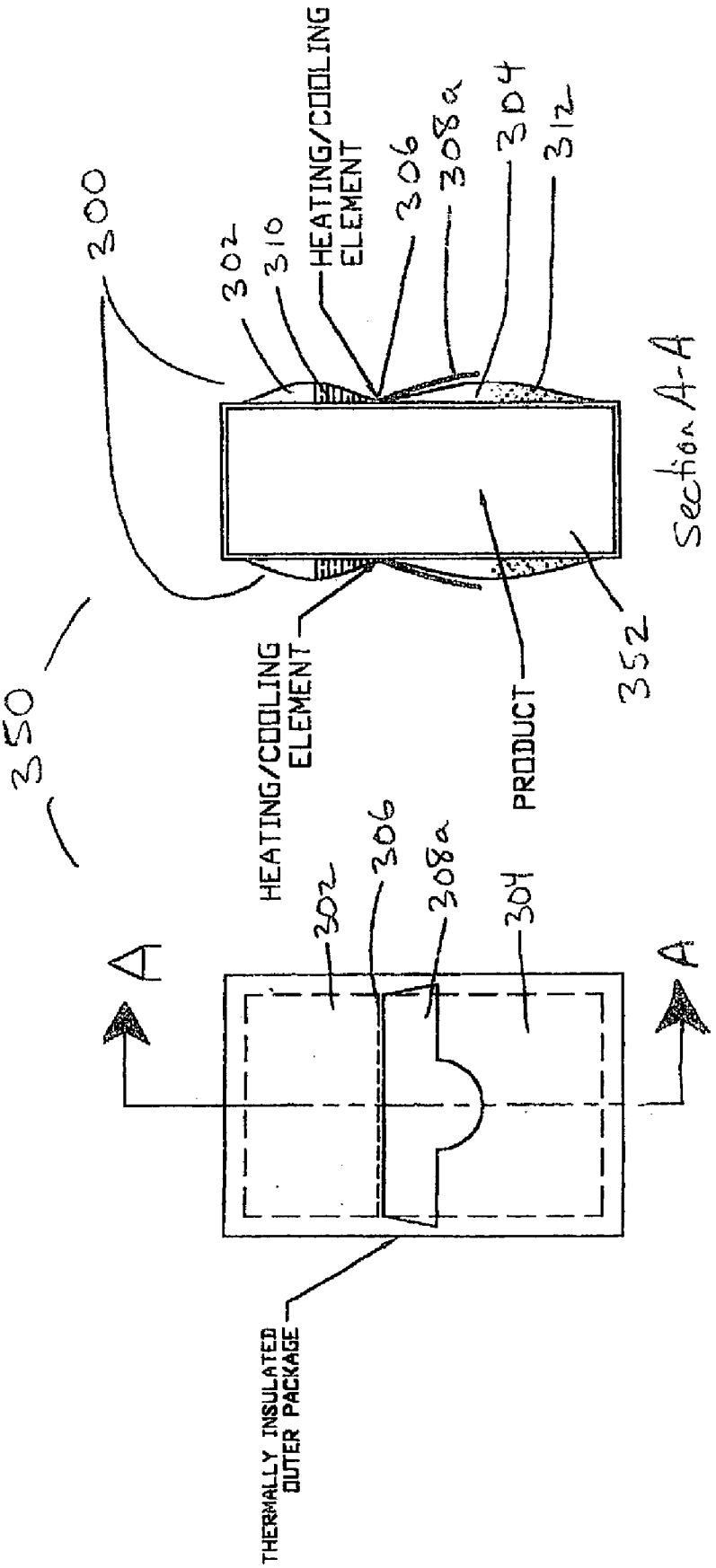

200
302
310
HEATING/COOLING ELEMENT
306
308a
304
312
Section A-A
350
HEATING/COOLING ELEMENT
PRODUCT
352
302
306
308a
304
A
A
THERMALLY INSULATED OUTER PACKAGE

Figure 3A

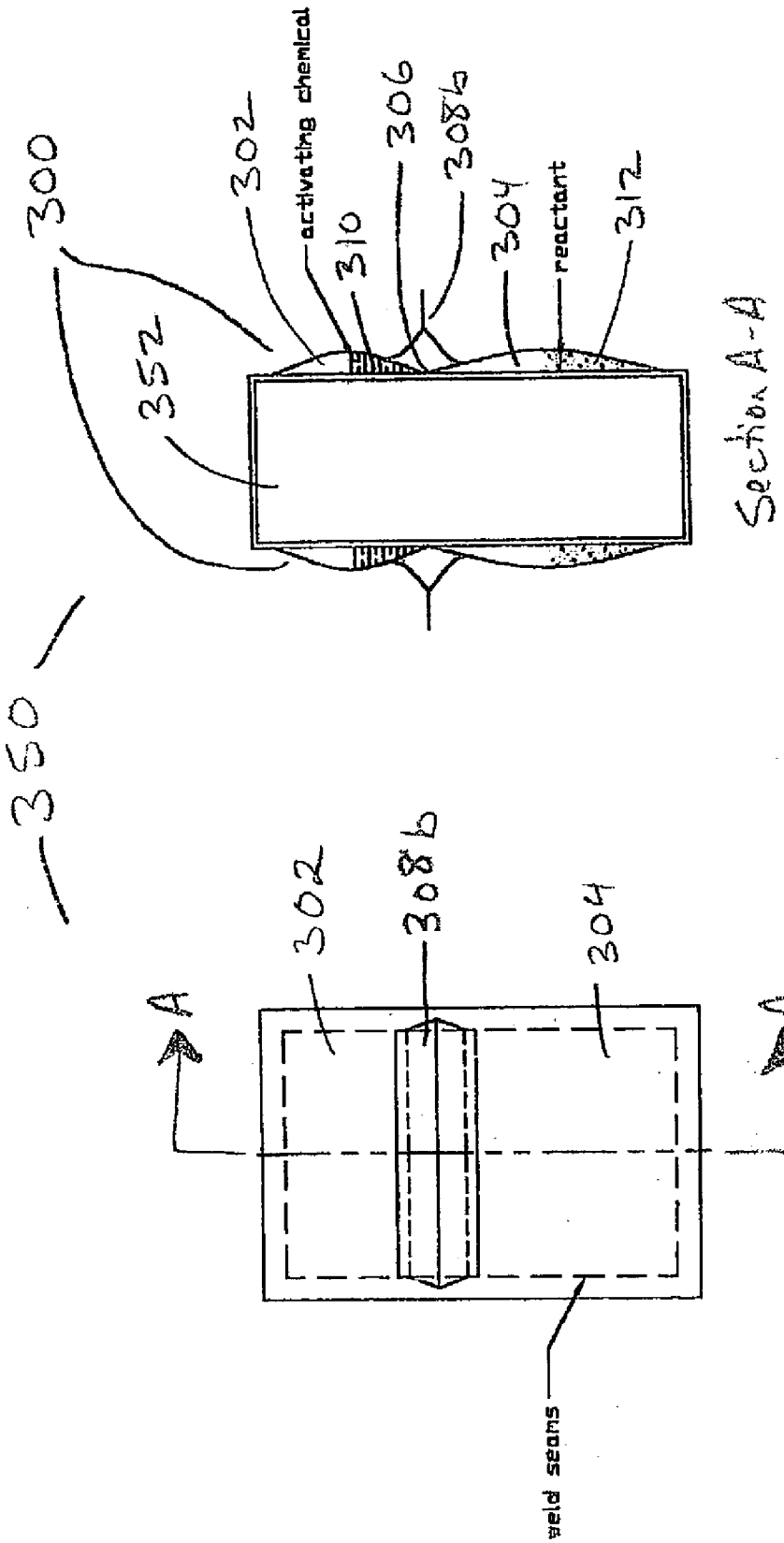

350
300
352
302
activating chemical
310
306
308a
304
reactant
312
Section A-A
302
308b
304
A
A
weld seams

Figure 3B

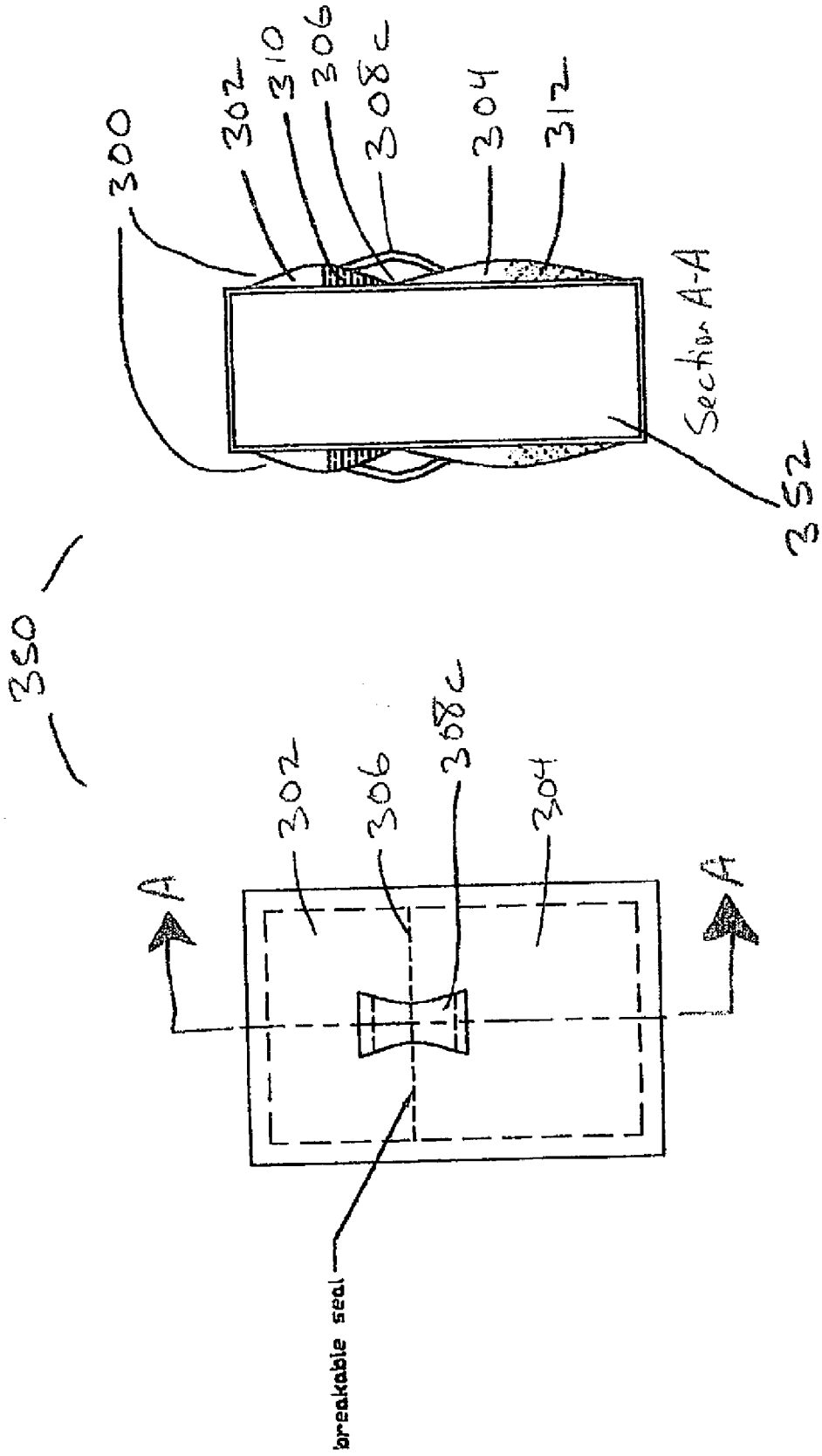

300
302
310
306
308c
304
312
Section A-A
352
350
302
306
308c
304
A
A
breakable seal

Figure 3C

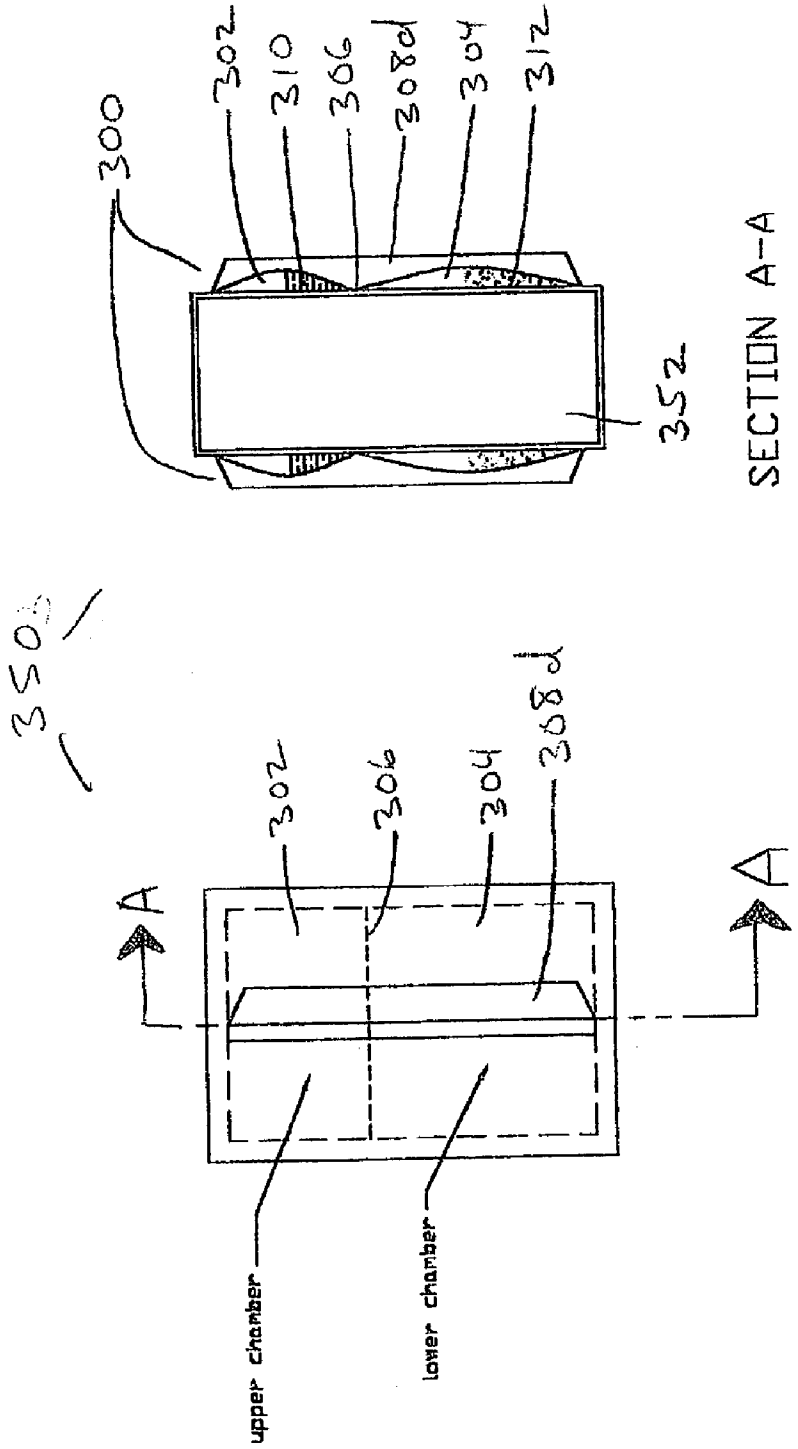

300
302
310
306
308d
304
312
352
SECTION A-A
350
302
306
304
308d
A
A
upper chamber
lower chamber

FIGURE 3D

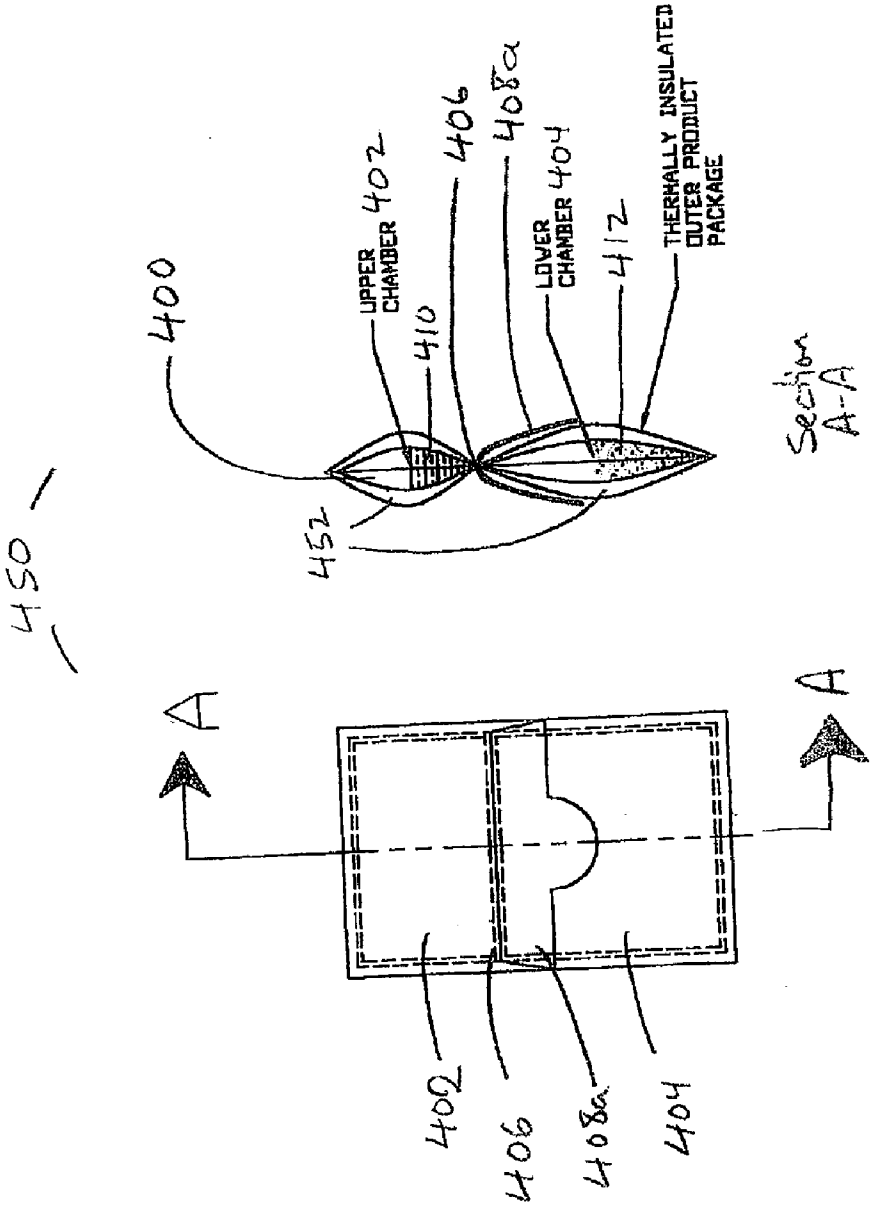

450
400
UPPER CHAMBER 402
410
406
408a
LOWER CHAMBER 404
412
THERMALLY INSULATED OUTER PRODUCT PACKAGE
452
Section A-A
A
A
402
406
408a
404

Figure 4A

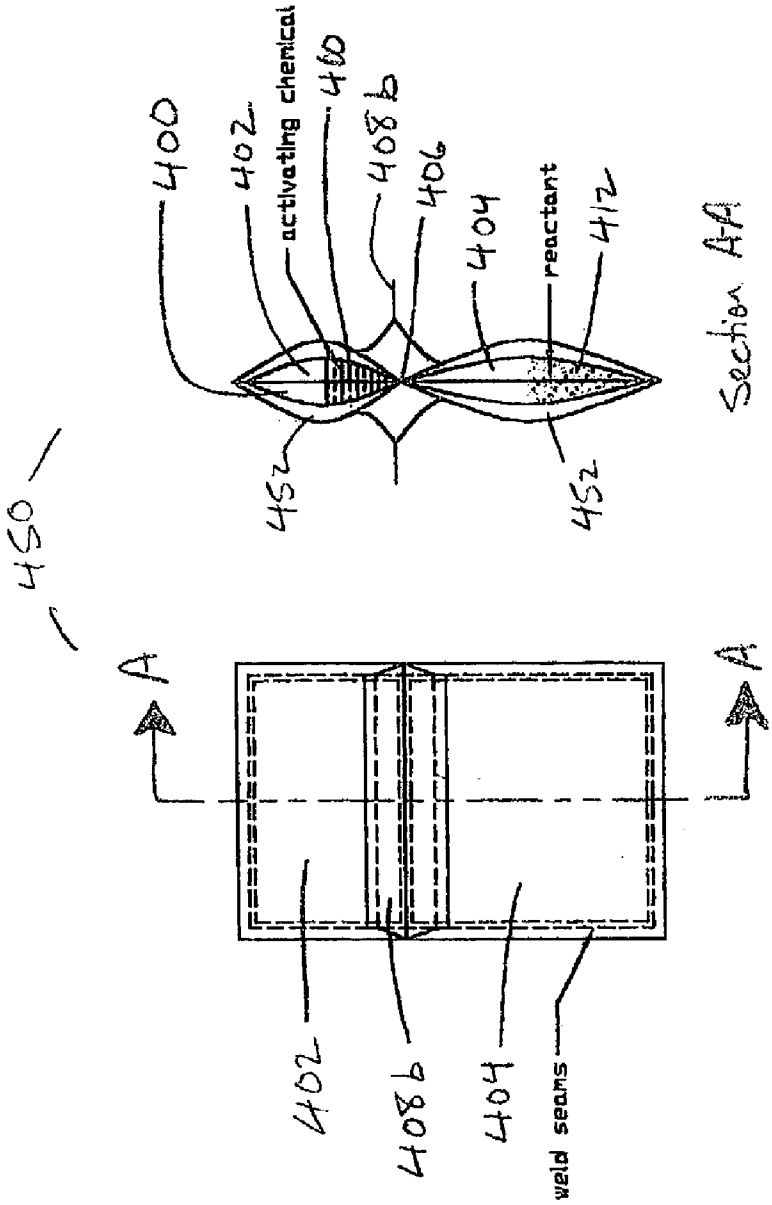

450
400
402
activating chemical
410
408b
406
404
reactant
412
Section A-A
452
452
A
A
402
408b
404
weld seams

Figure 4B

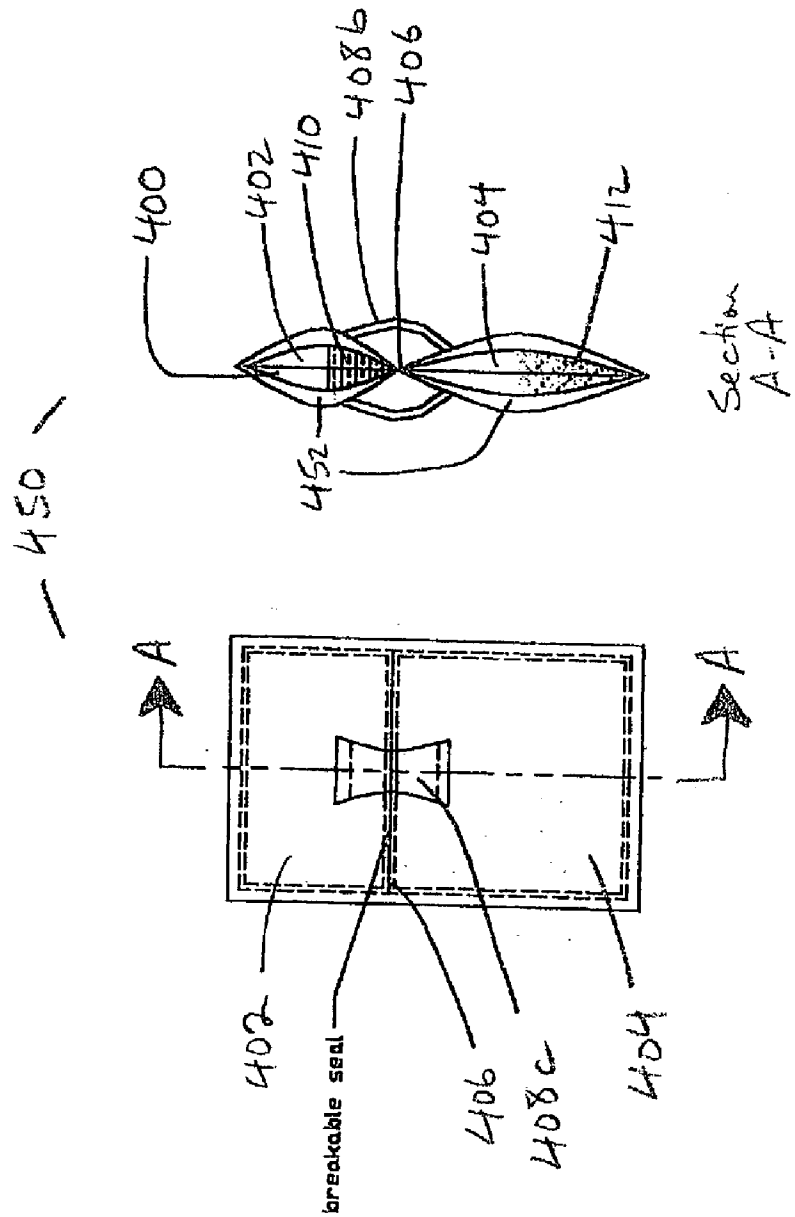

450
400
402
410
408b
406
404
412
452
Section A-A
A
A
402
breakable seal
406
408c
404

Figure 4C

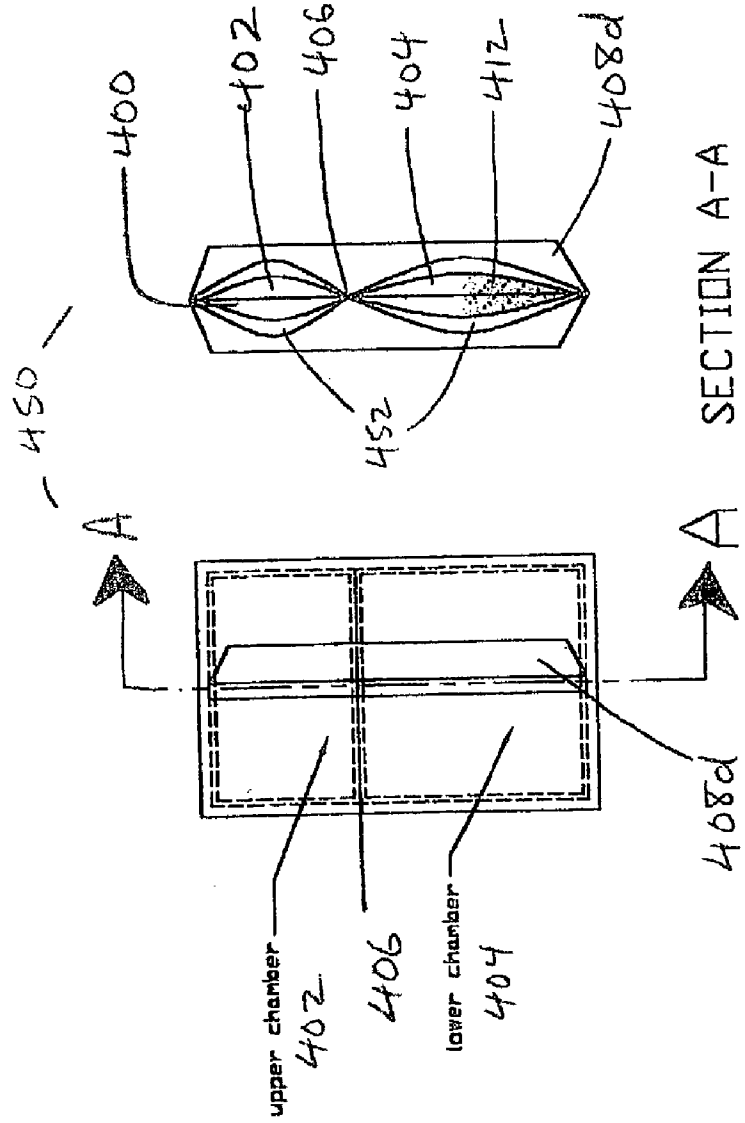

400
402
406
404
412
408d
450
452
A
A
SECTION A-A
408d
upper chamber
402
406
lower chamber
404

FIGURE 4D

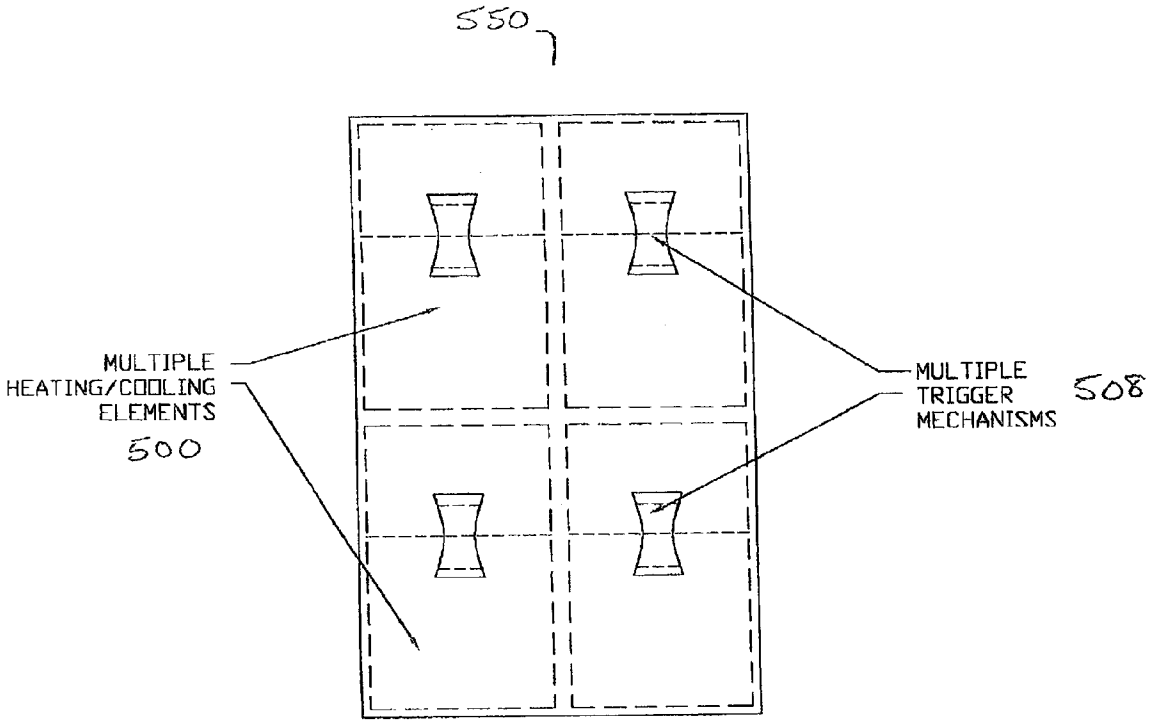

550
MULTIPLE
HEATING/COOLING
ELEMENTS
500
MULTIPLE
TRIGGER
MECHANISMS
508

FIGURE 5

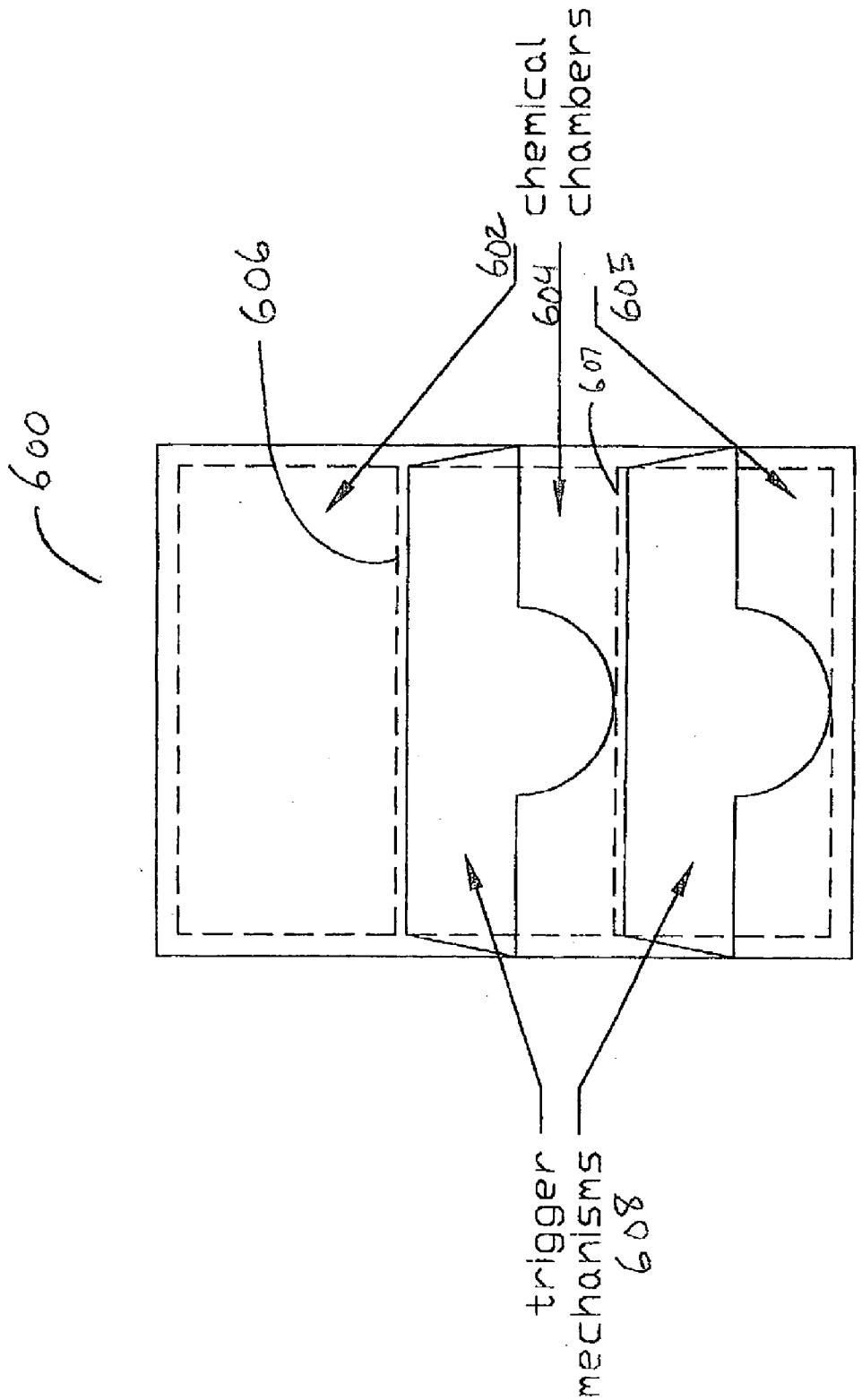

600
606
602
chemical chambers
604
605
607
trigger mechanisms
608

FIGURE 6

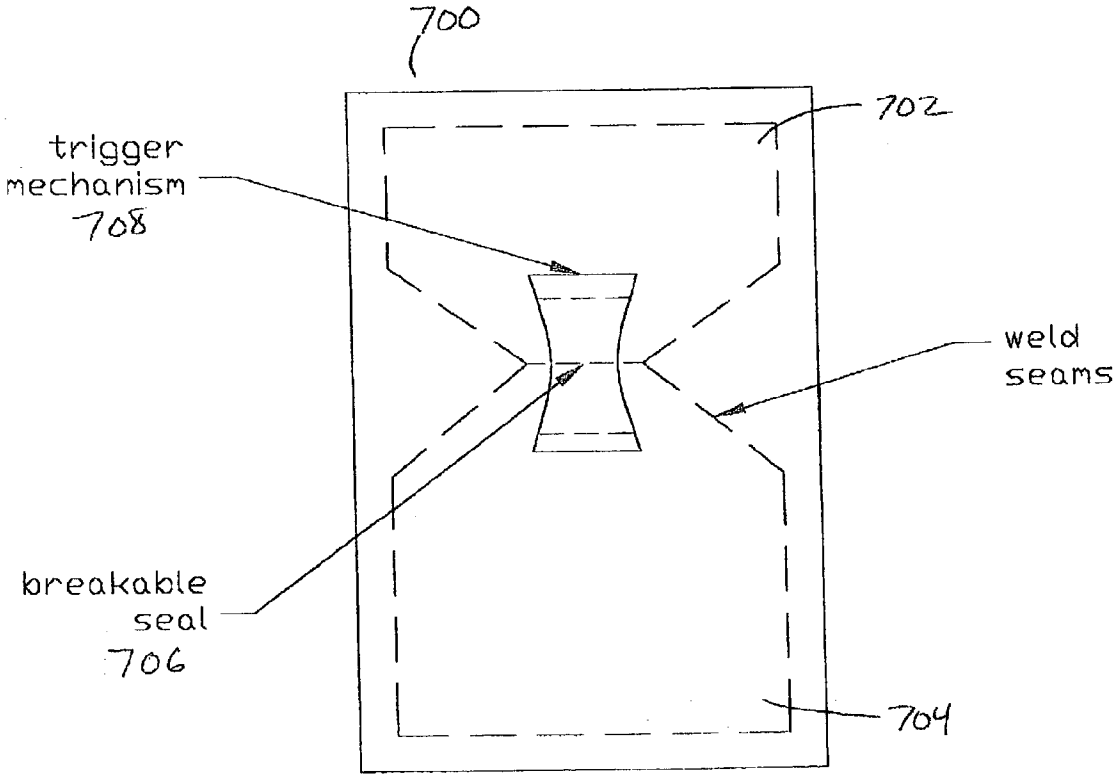

700
702
trigger mechanism 708
weld seams
breakable seal 706
704

FIGURE 7

TRIGGER MECHANISM FOR SELF-HEATING/COOLING PACKAGES OR CONTAINERS UNIVERSALLY APPLIED TO BOTH RIGID AND NON-RIGID PACKAGES AND CONTAINERS

FIELD OF THE INVENTION

[0001] The invention relates to self-heating/cooling packages or containers and especially a trigger mechanism therefor.

BACKGROUND OF THE INVENTION

[0002] Examples of flexible, chemical thermal bags are well known. Examples include U.S. Pat. No. 4,856,651/U.S. Pat. No. 4,995,217/CA Pat. No. 1,278,478 which describe a thermal pack including an outer pouch having a pair of opposed faces arranged generally parallel to each other and defined by a single sheet of plastic film folded along a predetermined fold line. A second sheet of plastic film is disposed between the pair of opposed faces. A continuous weld line circumscribes the periphery of the faces, with the weld line bonding together the periphery of the faces and the periphery of the second sheet to define first and second volumes within the outer pouch. The second sheet provides a common wall between the first and second volumes. A heat transfer material is disposed in the first volume and an insulating layer is disposed in the second volume, substantially covering the second sheet.

[0003] U.S. Pat. No. 4,268,272 describes an invention that is an exothermic composition prepared by mixing an iron powder with a mixed fibrous and carbonaceous powder and impregnated with a solution prepared by dissolving a proper amount of a neutral salt in an aqueous solution of an alkali or alkaline weak acid salt so as to mature when left sealed and a warming bag wherein said exothermic composition is contained in a ventilative inner bag provided in a part with a group of ventilating holes and a nonventilative label covering it and this inner bag is contained in a nonventilative outer bag.

[0004] U.S. Pat. No. 6,036,004/U.S. Pat. No. 5,545,197 relate to a multi-compartment bag which provides for the separation of two substances until their desired intermixing. A specific application of this multi-compartment bag is for hot or cold chemical packs. The substances in the multi-compartment bag are separated by two breakable walls and a third compartment which together act as a barrier to migration of one substance into the second substance, which would reduce the shelf life and efficiency of the hot or cold chemical pack. The present invention's use of two breakable walls and a compartment, empty or containing an inert substance, separating two reactive substances, provides a longer shelf life, a high efficiency, more reliability and improved ease of operation.

[0005] U.S. Pat. No. 4,462,224/CA Pat. No. 1,234,731 describes a three-compartment, instant hot or cold, reusable cold pack for transferring heat to or from an object. A first compartment contains a predetermined amount of a solvent comprised primarily of water. A second compartment contains a predetermined amount of a solute capable of essentially completely dissolving in the solvent. A third compartment contains a gelling agent capable of gelling with the solvent and solute solution and producing a gel that is relatively soft and moldable when frozen.

[0006] U.S. Pat. No. 5,792,213 describes a hot or cold chemical therapy pack that has two compartments. One compartment has a natural weak point or seam and is contained inside the other compartment. Each compartment contains a chemical reactant. In one embodiment, the outer compartment, which is made of a flexible, vinyl or plastic material, is arranged in a semi-collapsed configuration. Each end of the inner compartment is fixedly attached to a respective end of the outer compartment.

[0007] U.S. Pat. No. 6,289,889 refers to an improved heater and self-heating package that function without application of external energy. Heat is generated by contact of a heat-producing composition, such as calcium oxide, and an activating solution which is typically water. The heater contains multi-compartments containing heat-producing composition and activating solution. The heater is activated by application of hand pressure to rupture a frangible seal which allows the heater components to mix. The heater compartments are at least in part formed from flexible walls.

[0008] U.S. Pat. No. 3,874,504 refers to a chemical thermal pack that has a sealed intermediate envelope filled with a powder that produces or absorbs heat when dissolved in water and a quantity of water separated from the powder by a membrane that may be ruptured readily.

[0009] Examples of Acid-Base fuel mixtures to produce an exothermic reaction include CA Pat. No. 2,200,586/U.S. Pat. No. 5,542,418.

[0010] Examples of heated packages include U.S. Pat. No. 4,559,921 which refers to a self-heating receptacle comprising a vessel for food to be heated, and below the vessel a sealed container containing two chemicals, e.g. quick lime and water. A pouch within the container holds one of the chemicals sealed from the other. A tearing filament secured to the pouch simultaneously opens the pouch and the container thereby to trigger the exothermic reaction to heat said food vessel.

[0011] U.S. Pat. No. 6,116,231 describes a self-heating, disposable liquid heating pack utilizing an exothermic chemical reaction. Moderation of the reaction is provided by the use of a gelling agent, which also gives structural rigidity to the heating pack.

[0012] U.S. Pat. No. 5,984,953 describes a self-heating, disposable heating pack utilizing an exothermic chemical reaction. Self-moderation of the heat pack is provided through the use of a preformed reversibly stiffenable gel that alters the rate of exothermic chemical reactions.

[0013] U.S. Pat. No. 6,099,555 describes a cold pack which utilizes the negative heat of solution of a material dissolving in a liquid. The cold pack further includes a gelling agent, which is activatable to form a gel.

[0014] U.S. Pat. No. 4,953,550/CA Pat. No. 1,336,757 refers to a hot or cold thermal pack that has an outer pouch provided with capillaries to allow drainage of the pack and optionally to provide a temperature moderating effect.

[0015] U.S. Pat. No. 5,220,909 describes a self-heating individual meal module that includes a tub for holding a quantity of food to be heated. Below the tub is a tray

containing an electrolytic-solution-activated exothermic-chemical pad and a pouch containing an electrolytic solution. The tub is welded to the tray and in contact with the pad. A pull-tab is attached to the pouch for opening the pouch so that the electrolytic solution inside the pouch can flow out to trigger the exothermic reaction in the pad so as to heat the tub containing the food.

[0016] CA Pat. No. 2,116,007 describes a single use or re-usage exothermic and/or endothermic recipient with vapour condensation means such as dish plate or similar free from vapours and odours and meal trays incorporating one or more such recipients.

[0017] U.S. Pat. No. 4,823,769/CA Pat. No. 1,322,349 describes a self-heating food system comprised of a retort packaged food container disposed above a hermetically sealed reaction chamber and a relatively small rigid rod placed therebetween. Said reaction chamber has therein a water containing ampule and quantity of calcium oxide, both reagents in an exothermic reaction, said food container, rod and reaction chamber being situated within a resilient housing, said housing being disposed within an insulating envelope having a cover. Means are provided for causing said rod to come into crushing contact with said water ampule so that the water within said ampule will be distributed in vigorously reactive contact among said calcium oxide for heating the food in said food container.

[0018] U.S. Pat. No. 4,819,612/CA Pat. No. 2,017,502 refers to a container capable of heating its content when ignited has a container containing Japanese sake, coffee, soup or the like and an exothermic material storage chamber projected into the container. A self-combustible exothermic material consisting of a mixture of oxidant such as potassium permanganate and a combustible material such as iron powder, ferrosilicon powder or the like is charged into an innermost portion of the storage chamber. A heat insulating layer made of inorganic porous material is disposed adjacent to the exothermic material and ignition means for igniting the exothermic material is extended from the exterior of the container to the exothermic material.

[0019] U.S. Pat. No. 4,528,218/CA Pat. No. 1,234,786 describes a disposable device for utilizing an exothermic or endothermic reaction for heating or cooling drinks and foodstuffs, substantially comprising a single piece metal container, having two chambers and being enveloped within a protective insulating plastic covering, the reactants being contained in separated sectors and closed by diaphragms, which are heat-sealed and impermeable to external agents, the covering being provided with a locking system for locking therein the metal container and with a device, so-called outer breaker, which is manually controlled for starting the exothermic or endothermic reaction by mixing a solid reactant with a liquid one.

[0020] U.S. Pat. No. 4,809,673 describes a device which has a disposable tray with an upper compartment which contains a food product and a lower compartment which has two reagents which are separated from each other by one or more watertight partitions and also having one axis with radial blades to tear said watertight partitions and a control knob visible outside of the tray and, moreover, having at least one screen equipped with orifices which are crosswise to said axis.

[0021] U.S. Pat. No. 5,465,707/CA Pat. No. 2,169,259 describes a self heating individual meal package includes a quantity of foodstuff to be heated. The package consists of a thermal insulated outer pouch. Within the package is an electrolytic-solvent activated exothermic-chemical pad or powder enclosed in an absorbent envelope, a bag containing electrolytic solvent and a pouch for foodstuff. The solvent bag is affixed to a board material which provides a rigid structure for the functioning of a tear filament pull-tab mechanism or the rupturing of the solvent bag. The pull-tab is affixed to the solvent bag so that when pulled the bag will open and the electrolytic solvent within can flow out to trigger the exotherinic reaction.

SUMMARY OF INVENTION

[0022] In a first aspect, a package is provided including a first sealable envelope containing a first agent, a second sealable envelope containing a second agent adjacent the first sealable envelope, a frangible seal separating the first sealable envelope from the second sealable envelope, a rigid member located about the frangible seal, and a triggering mechanism located on an exterior of the package adjacent the frangible seal on a side of the package opposite the rigid member such that, if the triggering mechanism is pulled in a direction away from the rigid member, the frangible seal is stressed to rupture, allowing the first agent to communicate with the second agent.

[0023] The triggering mechanism may be a tab.

[0024] The first agent and the second agent may communicate to generate a reaction.

[0025] The reaction may heat at least a portion of the package.

[0026] The reaction may cool at least a portion of the package.

[0027] The package may further include a third envelope adjacent the first sealable envelope and the second sealable envelope for containing a product.

[0028] The rigid member may form part of the third envelope.

[0029] In a second aspect, a package is provided including a first sealable envelope containing a first agent, a second sealable envelope containing a second agent adjacent the first sealable envelope, a frangible seal separating the first sealable envelope from the second sealable envelope and a triggering mechanism located on an exterior of the package, the triggering mechanism having a first portion attached to the package at a first point adjacent the first sealable envelope and a second portion attached to the package at a second point adjacent the second sealable envelope such that, if the first portion and the second portion of the triggering mechanism are pulled, the frangible seal is stressed to rupture, allowing the first agent to communicate with the second agent.

[0030] In a third aspect, a package is provided including a first sealable envelope containing a first agent, a second sealable envelope containing a second agent adjacent the first sealable envelope, a third sealable envelope containing a third agent adjacent the second sealable envelope, a first frangible seal separating the first sealable envelope from the second sealable envelope, a second frangible seal separating the second sealable envelope from the third sealable envelope, a first triggering mechanism located on an exterior of

the package adjacent the first frangible seal such that, if the first triggering mechanism is pulled, the first frangible seal is stressed to rupture, allowing the first agent to communicate with the second agent and a second triggering mechanism located on an exterior of the package adjacent the second frangible seal such that, if the second triggering mechanism is pulled, the second frangible seal is stressed to rupture, allowing the second agent to communicate with the third agent.

[0031] In other aspects of the invention, various combinations and subset of the above aspects are provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] The foregoing and other aspects of the invention will become more apparent from the following description of specific embodiments thereof and the accompanying drawings which illustrate, by way of example only, the principles of the invention. In the drawings, where like elements feature like reference numerals (and wherein individual elements bear unique alphabetical suffixes):

[0033] **FIG. 1A** is a schematic diagram and cross-sectional view of a basic heating/cooling element with a first embodiment of a triggering mechanism;

[0034] **FIG. 1B** is a schematic diagram and cross-sectional view of the basic heating/cooling element with a second embodiment of the triggering mechanism;

[0035] **FIG. 1C** is a schematic diagram and cross-sectional view of the basic heating/cooling element with a third embodiment of the triggering mechanism;

[0036] **FIG. 1D** is a schematic diagram and cross-sectional view of the basic heating/cooling element with a fourth embodiment of the triggering mechanism;

[0037] **FIG. 2A** is a schematic diagram and cross-sectional view of a heating/cooling element with the first embodiment of the triggering mechanism, the element incorporated as part of a package, container or pouch containing products to be heated/cooled;

[0038] **FIG. 2B** is a schematic diagram and cross-sectional view of the heating/cooling element with the second embodiment of the triggering mechanism, the element incorporated as part of the package, container or pouch containing products to be heated/cooled;

[0039] **FIG. 2C** is a schematic diagram and cross-sectional view of the heating/cooling element with the third embodiment of the triggering mechanism, the element incorporated as part of the package, container or pouch containing products to be heated/cooled;

[0040] **FIG. 2D** is a schematic diagram and cross-sectional view of the heating/cooling element with the fourth embodiment of the triggering mechanism, the element incorporated as part of the package, container or pouch containing products to be heated/cooled;

[0041] **FIG. 3A** is a schematic diagram and cross-sectional view of a package including a pouch where a product to be heated/cooled is positioned between heating/cooling elements, the heating/cooling elements including the first embodiment of the triggering mechanism;

[0042] **FIG. 3B** is a schematic diagram and cross-sectional view of the package including the pouch where the product to be heated/cooled is positioned between heating/cooling elements, the heating/cooling elements including the second embodiment of the triggering mechanism;

[0043] **FIG. 3C** is a schematic diagram and cross-sectional view of the package including the pouch where the product to be heated/cooled is positioned between heating/cooling elements, the heating/cooling elements including the third embodiment of the triggering mechanism;

[0044] **FIG. 3D** is a schematic diagram and cross-sectional view of the package including the pouch where the product to be heated/cooled is positioned between heating/cooling elements, the heating/cooling elements including the fourth embodiment of the triggering mechanism;

[0045] **FIG. 4A** is a schematic diagram and cross-sectional view of a package including a heating/cooling element that is positioned between pouches for containing a product to be heated/cooled, the heating/cooling element including the first embodiment of the triggering mechanism;

[0046] **FIG. 4B** is a schematic diagram and cross-sectional view of the package including the heating/cooling element that is positioned between pouches for containing the product to be heated/cooled, the heating/cooling element including the second embodiment of the triggering mechanism;

[0047] **FIG. 4C** is a schematic diagram and cross-sectional view of the package including the heating/cooling element that is positioned between pouches for containing the product to be heated/cooled, the heating/cooling element including the third embodiment of the triggering mechanism;

[0048] **FIG. 4D** is a schematic diagram and cross-sectional view of the package including the heating/cooling element that is positioned between pouches for containing the product to be heated/cooled, the heating/cooling element including the fourth embodiment of the triggering mechanism;

[0049] **FIG. 5** is a schematic diagram of a package including multiple heating/cooling elements;

[0050] **FIG. 6** is a schematic diagram of another embodiment of a heating/cooling element having multiple chambers; and

[0051] **FIG. 7** is a schematic diagram of another embodiment of a heating/cooling element with shortened breakable seal.

DESCRIPTION OF THE EMBODIMENTS

[0052] The description which follows, and the embodiments described therein, are provided by way of illustration of an example, or examples, of particular embodiments of the principles of the present invention. These examples are provided for the purposes of explanation, and not limitation, of those principles and of the invention. In the description which follows, like parts are marked throughout the specification and the drawings with the same respective reference numerals.

[0053] Briefly, the heating/cooling element of the embodiment includes a triggering mechanism attached adjacent a

frangible seal between sealable envelopes containing agents or attached to each envelope containing agents. The triggering mechanism may provide complete, uniform breakage of the frangible seal as opposed to the rupturable or squeezable counterpart of the prior art which usually breaks at a point. This enables quicker and more complete mixing of chemicals in the embodiment and may increase the size of the heating/cooling region and a provide more uniform and quicker heating/cooling upon activation as chemicals can float freely between chambers. The heating/cooling element of the embodiment may also reduce the chance of accidental triggering as opposed to a rupturable or squeezable counterpart of the prior art. This may increase ease and decrease cost of transportation as a rigid outer container may not be necessary. It also may reduce production costs as there is less time and effort required to form chambers and seals. This also increases convenience for the consumer by providing a cheaper, fully portable device without worry of accidental triggering. The embodiment may also reduce the risk of chemical chambers breaking in undesired regions causing possible leakage. The embodiment may also be more effective for use with longer, flexible product containers (e.g. heating of food product in flexible package) than rupturable or squeezable containers of the prior art as squeezing of said device will compress the product as well which may be undesirable. Also, a soft, flexible product may "cushion" the rupturable chamber containing the solvent upon compression thus increasing the effort required for triggering devices of the prior art. The embodiment may also be more effective for use with certain chemical ingredients which are nonliquid and contain no gases (i.e both ingredients are in powder form) as the seal may not be rupturable by squeezing.

[0054] Referring to FIGS. 1A-D, an embodiment of heating/cooling element **100** is shown. In a basic design, heating/cooling element **100** includes two chambers, first sealable envelope **102** and second sealable envelope **104**, which are adjacent one another and separated by a breakable seal **106**. The heating/cooling element **100** also has at least one triggering mechanism **108**. Ideally, heating/cooling element **100** is at least partially flexible, non-porous and thermally conductive. Heating/cooling element **100** may be opaque or transparent, made of a laminated or a non-laminated material. It may also be made of a composite material or multiple layer material. Heating/cooling element **100** may be formed by folding the multiple layer material, with the folded edge becoming the bottom of the heating/cooling element **100** package. The sides are held together preferably with weld seams to form the complete element or unit. A chemical **110** may be placed in the formed pouch or envelope **104**. A breakable seal **106** is then formed across the general middle area of the package completely enclosing chemical **110**. Another chemical **112** is added adjacent to the seal **106** and the total package is sealed at the top to form envelope **102**. The triggering mechanism(s) **108** is added at any point during the manufacturing of said package. **FIGS. 1A through 1D** depict different triggering mechanisms **108** used. Any individual skilled in the art can adapt said triggering mechanisms **108** in an infinite multitude of ways without deviating from the general idea of said invention.

[0055] The heating/cooling element **100** can be held down by one hand (or any other means) while the other hand pulls the triggering mechanism **108**. In FIGS. 1A-D, two (2) triggering mechanism(s) **108** are applied and heating/cooling element **100** is activated by pulling triggering mechanisms **108** in opposite directions for each heating/cooling element **100**.

[0056] The triggering mechanism **108** may be in the form of an appendage, tab, string, tape, strap or ridge, or any similar form as long as it is attached to or integrated as part of the outside of the exterior packaging and enable the user to grasp on so as to provide pulling resistance. The triggering mechanism **108** may be rigid or flexible. The triggering mechanism **108** may be incorporated into and attached to any portion(s) of the exterior packaging, but preferably close to or traversing the breakable seal **106** in order to apply maximum stress to the breakable seal vicinity.

[0057] **FIG. 1A** shows triggering mechanism **108***a* attached to an outside of heating/cooling element **100***a* adjacent breakable seal **106**. Triggering mechanism **108***a* shown is a tab.

[0058] **FIG. 1B** shows triggering mechanism **108***b* attached to an outside of heating/cooling element **10***b*. A first portion **120***b* of triggering mechanism **108***b* is attached adjacent envelope **102** and a second portion **122***b* is attached adjacent envelope **104**. The first and second portions **120***b* and **122***b* join together at a point **124***b* of triggering mechanism **108***b* removed from the sealable envelopes **102** and **104**. Triggering mechanism **108***b* further includes a tab or ridge **126** joined to the attached portions **120***b* and **122***b* to enable a user to grasp triggering mechanism **108***b*.

[0059] **FIG. 1C** shows triggering mechanism **108***c* attached to an outside of heating/cooling element **100***c*. A first portion **120***c* of triggering mechanism **108***c* is attached adjacent envelope **102** and a second portion **122***c* is attached adjacent envelope **104**. The first and second portions **120***c* and **122***c* join together at a point **124***c* of triggering mechanism **108***c* removed from the sealable envelopes **102** and **104**. A user pulls the attached portions **120***c* and **122***c* to rupture breakable seal **106** and trigger the reaction.

[0060] **FIG. 1D** shows triggering mechanism **108***d* attached to an outside of heating/cooling element **100***d*. A first portion **120***d* of triggering mechanism **108***d* is attached adjacent envelope **102** and a second portion **122***d* is attached adjacent envelope **104**. The first and second portions **120***d* and **122***d* join together at a point **124***d* adjacent envelopes **102** and **104** to form a flap. A user pulls the flap to rupture breakable seal **106** and trigger the reaction.

[0061] Referring to FIGS. 2A-D, a package **250** includes heating/cooling element **200** and may include one or more product package(s) **252**. The product package **252** may be rigid, flexible, or partially rigid and may be porous or non-porous. The surface or part of the surface of heating/cooling element **100** may form at least a portion of the product container **252**. The package **250** has an outer package **254** which is preferably thermally insulated. The outer package **254** may be partially or fully flexible.

[0062] In one specific embodiment, a rigid box-like container **252** (containing the substance to be heated/cooled) may be wrapped in an outer, preferably thermally insulated sheet-like material. On at least one of the sides of the box-like container **252**, bonds or seals (such as weld seams) are formed along the perimeter of the plane. This creates an envelope space between the inner box-like container **252** and the outer package **254** on at least that one-side of the

container **252**. A weaker, breakable seal **206** is formed across the side of the box-like container **252** dividing the envelope space into two envelopes **202** and **204**. One envelope **202** contains the solvent/activating solution **210** and the other envelope **204** contains the corresponding reagent **212**. At least one appendage, tab, string, tape, strap or ridge, attached to or forming part of the outer packaging (referred to as triggering mechanism **208**) is incorporated so that when pulled by hand (while the other hand holds the container) the stress breaks the weaker seal **206** pulling the outer package **254** away from the inner, box-like container **252** causing the chemicals **210** and **212** to mix initiating the reaction.

[**0063**] In this specific embodiment, the heating/cooling element **200** is attached to the inside of the outer package **254** (e.g. weld seams), at least partially, such that pulling a triggering mechanism **208** on the outside of the outer package **254** will break the frangible seal **206** of the heating/cooling element **200** inside. Triggering mechanisms **208***a*-**208***d* are the same as triggering mechanisms **108***a-d* described in relation to heating/cooling element **100** of FIGS. **1**A-D.

[**0064**] Several embodiments can be considered by anyone skilled in the art. In another similar embodiment to **FIG. 2**, the heating/cooling element **200** may be a separate unit added or inserted into a product package **252**.

[**0065**] Another embodiment contains all of the elements described above with the exception that instead of an inner box-like product container **252**, there is a flexible pouch-like product container/package. This embodiment has at least two triggering mechanisms. One triggering mechanism is located on the same side as the heating/cooling element **200**, the other triggering mechanism is located on the opposing side of the container **250**, such that when both triggering mechanisms are pulled, the entire package **250** flexes to its maximum, at which point the stress breaks the seal dividing the envelopes of heating/cooling element **200** thus triggering the reaction.

[**0066**] FIGS. **3**A-D depict another embodiment of a package **350** having one or more products/product containers/product pouches **352** with one or more heating/cooling elements **300**. The product containers/packages **352** may be rigid or flexible. Heating/cooling element **300** includes a first sealable envelope **302** and a second sealable envelope **304** separated by a frangible seal **306**. First sealable envelope **302** contains a first agent **310** and second sealable envelope **304** contains a second agent **312**. Each heating/cooling element **100** has its own triggering mechanism **308**. Triggering mechanisms **308***a*-**308***d* are the same as triggering mechanisms **108***a-d* described in relation to heating/cooling element **100** of FIGS. **1**A-D.

[**0067**] Heating/cooling element **300** may be formed at least in part from a flexible or rigid packaging material. Each heating/cooling element **300** may be independent or at least in part be formed from the product packaging/container **350** which in turn may be at least in part from either or both flexible or rigid material.

[**0068**] FIGS. **4**A-D depict embodiments where a heating/cooling element **400** is positioned in the middle of a package **450** between product pouches **452**. Heating/cooling element **400** includes a first sealable envelope **402** and a second sealable envelope **404** separated by a frangible seal **406**. First sealable envelope **402** contains a first agent **410** and second sealable envelope **404** contains a second agent **412**. Product pouches **452** are shown gathered about the frangible seal **406**. Each triggering mechanism **408***a-d* is attached on an exterior of product pouch **452**. Product pouch **452** cooperates with triggering mechanism **408** for heating/cooling element **400** to operate similarly to heating/cooling element **100**.

[**0069**] **FIG. 5** shows another embodiment of package **550** having multiple heating/cooling elements **500** on one side of package **550**. Each heating/cooling element **500** shown is provided with a triggering mechanism **508** and are capable of being independently activated allowing for control of the intensity or duration of the temperature change.

[**0070**] **FIG. 6** illustrates another embodiment of a heating/cooling element **600** containing three adjacent chambers **602**, **604**, **605** where each chamber is separated by the next chamber and by a breakable seal **606**, **607**. Each seal **606** and **607** has its own triggering mechanism **608**. This embodiment may be expanded to include N chambers and N-1 breakable seals separating each adjacent chamber each seal having a separate triggering mechanism.

[**0071**] **FIG. 7** illustrates another embodiment of heating/cooling element **700**. Heating/cooling element **700** includes a first sealable envelope **702** and a second sealable envelope **704** separated by a frangible seal **706**. First sealable envelope **702** contains a first agent and second sealable envelope **704** contains a second agent. Heating/cooling element **700** also includes a triggering mechanism **708**. Frangible seal **706** does not extend along a fall width of package **700** as depicted in FIGS. **1**-**6**. This may improve flow of chemicals from chamber **702** to chamber **704** when seal **706** is broken.

[**0072**] An infinite number of variations of placement of heating/cooling elements, product packages and triggering mechanisms are possible to anyone skilled in the art without departing from the main idea of the invention.

[**0073**] This type of packaging and triggering mechanism will prove highly useful when one is transporting volatile, hazardous, unstable, reactive or explosive compounds of chemicals, or chemicals with a pre-determined life or length of use. Said chemicals or compounds can be separated into the two chambers in non-reactive, non-volatile, non-hazardous, non-explosive states. When the chemical is needed, the chemicals can be mixed by triggering the triggering mechanism and causing the chemicals to mix, react and produce the final product chemical needed for the particular application.

[**0074**] For rigid packages an adhesive tape can be wound around said flexible outer package thereby pinching part of said outer package against said inner rigid packaging creating two envelope spaces between said outer flexible package and said inner rigid package to form another type of triggering mechanism. One envelope above, the other below the adhesive tape such that when tape is unwound, the two envelopes join allowing chemicals to mix, thereby initiating the reaction.

[**0075**] The seals that form the edges of the container may be of variable type including soldering, heat sealing, ultrasonic welding, solvent welding, fold sealing, adhesives (such as glue) or adhesive tape etc. The breakable seal portion of the container may be of similar type to those

mentioned above only weaker to allow for breakage. The breakable seal may also be formed mechanically through plastic ridges and valleys where the "ridge" or male portion imbeds into the "valley" or female portion.

[0076] There exists a large variety of chemical reagents available to anyone skilled in the art for said invention. Typical exothermic ingredients found in thermal packs or food/beverage heaters include an aqueous solution of water or electrolytes as the solvent. The reagents may include magnesium sulfate, calcium chloride, magnesium oxide, calcium oxide, magnesium chloride, sodium sulfate etc. It is ideal that the reagent used does not form a gaseous product so as to avoid complications with venting. In addition, the said reagents may be in the form of powder/granules (which dissolve readily) or pellets, pad, or gel (which distribute themselves more readily). Said reagents may be free floating or contained in an absorbing envelope.

[0077] One ideal reagent consists of a mixture of acidic anhydride (phosphorous pentoxide) or acidic salt (aluminum chloride, magnesium chloride) with a basic anhydride (calcium oxide) or basic salt (calcium hydroxide) all of which are commercially available, non-toxic and form no gaseous byproduct. It should be noted that the type or form of chemicals used may not depart from said invention which is an improved triggering mechanism/container for said chemicals. Within the ingredients or said package one skilled in the art may include certain inert chemicals which facilitate the operation of said device such as stabilizers/controllers (e.g. phase change materials), gelling agent (e.g. starch) or ingredients to either catalyze the reaction or increase shelf-life.

[0078] For endothermic reactions, the same rules and conditions stated above for exothermic reactions apply. Examples of typical solvents which may be used can include some of or all of the following; an aqueous solution of water, hydroxylic/polyhydroxylic, alcohols, glycerols, ethylene glycol, propylene glycol, etc. Some common reagents found in industry may include ammonium nitrate, urea (organic compound), ammonium bromide, ammonium iodide, potassium chloride, tin chloride dihydrate, diamnine cobalt, dichlorocobalt hexahydrate, nickel nitrate hexahydrate. Many other chemical reactions are available including a solution of barium hydroxide and ammonium thiocyanate.

We claim:

1. A package comprising:

a first sealable envelope containing a first agent;

a second sealable envelope containing a second agent adjacent said first sealable envelope;

a frangible seal separating said first sealable envelope from said second sealable envelope;

a rigid member located about said frangible seal; and

a triggering mechanism located on an exterior of said package adjacent said frangible seal on a side of said package opposite said rigid member such that, if said triggering mechanism is pulled in a direction away from said rigid member, said frangible seal is stressed to rupture, allowing said first agent to communicate with said second agent.

2. The package as claimed in claim 1, wherein said triggering mechanism is a tab.

3. The package as claimed in claim 2, wherein said first agent and said second agent communicate to generate a reaction.

4. The package as claimed in claim 3, wherein said reaction heats at least a portion of said package.

5. The package as claimed in claim 3, wherein said reaction cools at least a portion of said package.

6. The package as claimed in claim 1, said package further comprising a third envelope adjacent said first sealable envelope and said second sealable envelope for containing a product.

7. The package as claimed in claim 6, wherein said rigid member forms part of said third envelope.

8. A package comprising:

a first sealable envelope containing a first agent;

a second sealable envelope containing a second agent adjacent said first sealable envelope;

a frangible seal separating said first sealable envelope from said second sealable envelope; and

a triggering mechanism located on an exterior of said package, said triggering mechanism having a first portion attached to said package at a first point adjacent said first sealable envelope and a second portion attached to said package at a second point adjacent said second sealable envelope such that, if said first portion and said second portion of said triggering mechanism are pulled, said frangible seal is stressed to rupture, allowing said first agent to communicate with said second agent.

9. The package as claimed in claim 8, wherein said first agent and said second agent communicate to generate a reaction.

10. The package as claimed in claim 9, wherein said reaction heats at least a portion of said package.

11. The package as claimed in claim 9, wherein said reaction cools at least a portion of said package.

12. The package as claimed in claim 8, wherein said first portion of said triggering mechanism is connected to said second portion of said triggering mechanism at a point removed from said first sealable envelope and said second sealable envelope and wherein, if said triggering mechanism is pulled, said first portion and said second portion of said triggering mechanism are pulled.

13. The package as claimed in claim 12, wherein said triggering mechanism includes a tab attached to said triggering mechanism for pulling said triggering mechanism.

14. The package as claimed in claim 8, wherein said triggering mechanism is a flap such that said first portion of said triggering mechanism is connected to said second portion of said triggering mechanism at a point adjacent to said first sealable envelope and said second sealable envelope and wherein, if said triggering mechanism is pulled, said first portion and said second portion of said triggering mechanism are pulled.

15. The package as claimed in claim 8, said package further comprising a member located on a side of said package opposite said triggering mechanism such that, if said triggering mechanism is pulled away from said member, said frangible seal is stressed to rupture, allowing said first agent to communicate with said second agent.

16. The package as claimed in claim 15, wherein said member is located on an exterior of said package.

17. The package as claimed in claim 16, wherein said triggering mechanism is a first triggering mechanism and said member is a second triggering mechanism.

18. The package as claimed in claim 8, said package further comprising a third envelope adjacent said first sealable envelope and said second sealable envelope for containing a product.

19. A package comprising:

a first sealable envelope containing a first agent;

a second sealable envelope containing a second agent adjacent said first sealable envelope;

a third sealable envelope containing a third agent adjacent said second sealable envelope;

a first frangible seal separating said first sealable envelope from said second sealable envelope;

a second frangible seal separating said second sealable envelope from said third sealable envelope;

a first triggering mechanism located on an exterior of said package adjacent said first frangible seal such that, if said first triggering mechanism is pulled, said first frangible seal is stressed to rupture, allowing said first agent to communicate with said second agent; and

a second triggering mechanism located on an exterior of said package adjacent said second frangible seal such that, if said second triggering mechanism is pulled, said second frangible seal is stressed to rupture, allowing said second agent to communicate with said third agent.

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