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(54) Title: SYSTEM FOR SMOKING FOOD

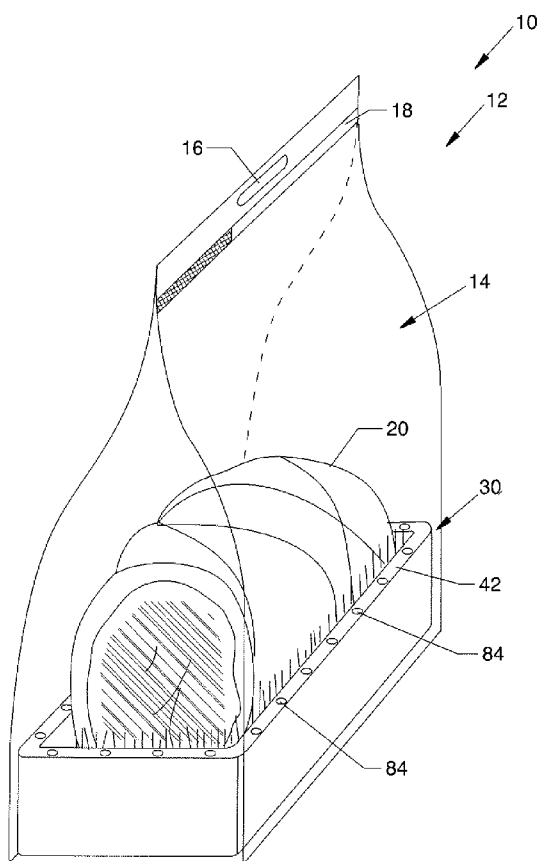


FIG. 1

(57) Abstract: Systems and methods for smoking food are disclosed. In one embodiment, a system for smoking food includes a first container configured for containing an article of food. The system also includes a second container configured for containing a smoking material. The second container is contained within the first container. The second container has a cover and a base, and the cover is selectively removably coupled to the base.



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SYSTEM FOR SMOKING FOOD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of the United States Provisional Patent Application, Serial No. 61/745,127, filed December 21, 2012, SYSTEM FOR SMOKING FOOD, which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates generally to a system and method for smoking food. Aspects of the disclosure are particularly directed to a container for smoking the food, such as protein (*e.g.*, meat).

BACKGROUND

[0003] A method of cooking a frozen bird in a bag is known as shown and described in U.S. Patent Application Publication No. US2010/0247720 published September 30, 2010 and filed as Application No. 12/722,273 by Steven D. Leitch *et al.* and assigned to Jennie-O Turkey Store, LLC.

[0004] A ready-to-cook turkey is known, such as the HONEYSUCKLE WHITE SIMPLY DONE whole young turkey, available from Cargill, Incorporated, Wayzata, Minnesota, USA.

[0005] A bag for curing food is known as shown and described in U.S. Patent No. 5,520,940 titled "Bag for Curing Food" issued May 28, 1996 to Tapani Tirkonen of Kortteinen, Finland.

SUMMARY

[0006] Provided is a system for smoking food, the system comprising a first container configured for containing an article of food, and a second container configured for containing a smoking material, where the second container is contained within the first container; and wherein the second container is selectively removable from the first container. In some embodiments, the second container further comprises a cover and a base, where the cover is selectively removably coupled to the base, and where the cover is selectively positionable between a first (opened) position and a second (closed) position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIGURE 1 is a perspective view of a food smoking system according to an exemplary embodiment.

[0008] FIGURE 2 is perspective view of the food smoking system of FIGURE 1 showing an insert according to an exemplary embodiment.

[0009] FIGURE 3 is an end elevation view of the insert of FIGURE 2.

[0010] FIGURE 4 is a top plan view of the insert of FIGURE 2.

[0011] FIGURE 5 is a cross sectional view showing a locking mechanism of the insert of FIGURE 2 along line 5—5 of FIGURE 2.

[0012] FIGURE 6 is a cross sectional view of an insert having a locking mechanism according to an alternative embodiment.

[0013] FIGURE 7 is an exploded view of an insert of an alternative embodiment.

[0014] FIGURE 8 is a top plan view of the insert of FIGURE 7.

[0015] FIGURE 9 is an exploded cross sectional view of the insert of FIGURE 8 along line 9—9 of FIGURE 8.

[0016] FIGURE 10 is a cross sectional view of the insert of FIGURE 8 along line 9—9 of FIGURE 8 showing smoke traveling from the smoke generation chamber and out of an aperture.

DETAILED DESCRIPTION

[0017] Specific details of several embodiments of the disclosure are described below with reference to a food smoking system.

[0018] One aspect of the present disclosure is directed toward a system for smoking food. The system includes a first container configured for containing an article of food. The system also includes a second container configured for containing a smoking material. The second container is contained within the first container.

[0019] Referring to FIGURE 1, a food smoking system 10 is shown according to an exemplary embodiment. Food smoking system 10 includes a first container (shown as a bag 12) having a space (shown as an interior smoking chamber 14). A second container (shown as an internal container or insert 30) is shown inside of interior smoking chamber 14 of bag

12. Insert 30 includes a lid or top (shown as a cover 32) and a bottom or base 52 (see FIGURE 3). Cover 32 is selectively positionable between a closed position 44 (see FIGURES 2, 5, and 6) and an opened position 46 (see FIGURES 3 and 4) relative to base 52. As shown in FIGURE 3, cover 32 is configured to pivot about a fastener (shown as a living hinge 50) between opened position 46 and closed position 44 (see FIGURES 2, 5, and 6). An article of food (shown as a protein or meat block 20) rests on insert 30 when cover 32 is in closed position 44 (see FIGURES 2, 5, and 6).

[0020] Referring further to FIGURE 1, bag 12 is shown having a handle 16 for transporting meat block 20 (*e.g.*, carrying from the retail display case to the consumer's home). The handle 16 may be integrated into the bag 12 (*e.g.*, cut out) according to one example, and may be attached to the bag 12 (*e.g.*, glued) according to another example. Bag 12 is shown in FIGURE 1 having an interlocking seal 18.

[0021] Referring to FIGURE 3, cover 32 is shown in opened position 46. Cover 32 includes a tray 34 for supporting, retaining or holding meat block 20. Meat block 20 is shown in FIGURE 1 resting on a horizontal surface 36 of tray 34.

[0022] Referring to FIGURE 4, horizontal surface 36 of tray 34 is surrounded by vertical end walls 38a and 38b and vertical side walls 40a and 40b. A flange or lip 42a and 42b (shown as a tab 42 in FIGURE 1) extends horizontally from each of vertical end walls 38a and 38b and vertical side walls 40a and 40b.

[0023] Referring further to FIGURE 4, base 52 of insert 30 includes a cavity (shown as a smoke generation chamber 54). Smoke generation chamber 54 includes a horizontal surface (shown as a floor 56). Rising from floor 56 are vertical end walls 58a and 58b and vertical side walls 60a and 60b. A flange or lip 42b extends horizontally from each of vertical end walls 58a and 58b and vertical side walls 60a and 60b. A cavity (shown as a chamber 62) for retaining a smoking material 66 is formed in a rectangular shape by vertical end walls 68a and 68b and vertical side walls 70a and 70b extending from floor 56. The chamber for retaining the smoking material may be any shape (*e.g.*, rectangular, circular) according to alternative embodiments. In FIGURE 4, chamber 62 is shown positioned in the center of floor 56, and may be positioned in different locations (*e.g.*, corner, corners, end, side) according to alternative embodiments.

[0024] Referring to FIGURE 5, cover 32 of insert 30 is attached to base 52 of insert 30 by a locking mechanism 80 when cover 32 is in closed position 44 (*i.e.*, the insert is in the

closed configuration). As shown in FIGURE 5, locking mechanism 80 has a tongue and groove configuration. Tab 42a of cover 32 has a rail or tongue 72, and tab 42b of base has a channel or groove 74. Locking mechanism 80 is closed or engaged when tab 42a of cover 32 interlocks via a friction fit with tab 42b of base 52. According to one example, the friction fit is strong enough so that it is not broken or overcome by the weight of the meat block resting on the tray. Referring further to FIGURE 5, when cover 32 is in closed position 44, horizontal surface 36 of tray 34 rests on vertical end walls 68a and 68b and vertical side walls 70a and 70b of chamber 62, thus enclosing chamber 62 and smoking material 66.

[0025] According to an alternative embodiment as shown in FIGURE 6, there may be a small space 82 (*e.g.*, for gas or smoke circulation) between the cover 32 and the chamber 62 for retaining the smoking material 66. According to one example, the small space may be 1 mm. According to another example, the small space may be 1 mm - 2 mm. According to another example, the small space may be 1 mm - 3 mm. According to another example, the small space may be 1 mm - 4 mm. According to another example, the small space may be 1 mm - 5 mm. Smoke 86 generated from smoking material 66 may be conveyed (*e.g.*, in gas or air) from cavity 62 to smoke generation chamber 54 through space 82 (see FIGURE 6), and from smoke generation chamber 54 to smoking chamber 14 of bag 12 through apertures 84 of insert 30 (see FIGURE 2). As shown in FIGURE 1, vent ports shown as apertures 84 are circular in shape. According to other examples, the holes may have any shape (*e.g.*, lines, slits, rectangular, square, oval, irregular).

[0026] Referring to FIGURE 6, an insert 130 is shown having a locking mechanism 180 according to an alternative embodiment. Like insert 30 of FIGURE 2, insert 130 includes a cover 132 nested at least partially within and a base 152. Cover 132 includes a horizontal tab 142a and base 152 includes a horizontal tab 142b. When insert 130 is in closed position 44, tab 142a aligns over tab 142b. A fastener (shown as a hollow elongate member or pin 182) attaches horizontal tab 142a of cover 132 to horizontal tab 142b of base 152. Pin 182 may include an aperture (shown as a vent 184) for conveyance of smoke 86 from smoke generation chamber 54 to smoking chamber 14 of bag 12. A variety of other locking mechanisms (*e.g.*, press fit, snap fit, friction fit, fasteners) are examples according to other alternative embodiments.

[0027] In another embodiment as shown in FIGURE 7, an insert 230 comprises a cover 232 and a base 252. Cover 232 includes a tray 234 for supporting, retaining, or holding meat block 20. Horizontal surface 236 of tray 234 is surrounded by vertical end walls 238a and

238b and vertical side walls 240a and 240b. A flange or lip 242a extends horizontally from each of vertical end walls 238a and 238b and vertical side walls 240a and 240b. Channels 224 on each of vertical end walls 238a and 238b and vertical side walls 240a and 240b extend vertically from horizontal surface 236 to apertures 284. Pegs 222 extend downward from horizontal surface 236 (see FIGURE 9). In some examples, the pegs 222 may be hollow.

[0028] Referring further to FIGURE 7, base 252 includes a cavity (shown as smoke generation chamber 254). Smoke generation chamber 254 includes a horizontal surface (shown as a floor 256). Rising from floor 256 are vertical end walls 258a and 258b and vertical side walls 260a and 260b. A flange or lip 242b extends horizontally from each of vertical end walls 258a and 258b and vertical side walls 260a and 260b. A smoking material 66 is shown positioned in the center of floor 256, and may be positioned in different locations (*e.g.*, corner, corners, end, side) according to alternative embodiments.

[0029] Referring to FIGURE 8, pegs 222 are shown with a circular base shape. According to other embodiments, the pegs 222 may have a base of another suitable shape (*e.g.*, oval, triangular, square). Horizontal surface 236 is shown including forty-nine pegs 222 positioned as shown. According to alternative embodiments, pegs 222 may be positioned in different configurations. In other examples, horizontal surface 236 includes at least five, at least ten, at least fifteen, at least twenty, at least twenty-five, at least thirty, at least thirty-five, at least forty, or at least forty-five pegs 222. Further referring to FIGURE 8, two channels 224 are shown for each aperture 284. In some embodiments, some other number of channels 224 (*e.g.*, one or three) may exist for each aperture 284.

[0030] Referring to FIGURE 9, pegs 222 are shown having a frustoconical profile. According to other embodiments, the pegs 222 may have a profile of another suitable shape (*e.g.*, conical, square, rectangular).

[0031] Referring to FIGURE 10, pegs 222 may not contact floor 256. In other examples, pegs 222 may contact floor 256. In some embodiments, pegs 222 may contact a smoking material 66 and/or floor 256 when a meat block 20 is positioned on horizontal surface 236 of tray 234 (see FIGURE 7).

[0032] Referring further to FIGURE 10, smoke 86 generated from smoking material 66 may be conveyed (*e.g.*, in gas or air) from smoke generation chamber 254 through channel 224 to smoking chamber 14 of bag 12 through apertures 284 of insert 230. Vent ports shown

as apertures 284 in FIGURES 7, 8, and 10 are circular in shape. According to other examples, the holes may be, for example, lines, slits, rectangular, square, oval, or irregular.

[0033] According to one example, the bag is a foil bag. According to another example, the bag is a heat resistant bag made of a biaxially oriented polyethylene terephthalate material such as a MYLAR polyester film MYLAR 887 commercially available from Dupont Teijin Films U.S. Limited Partnership. In another example, the bag may be made of an oven-ready film, available, for example, from M&Q Packaging Corporation, Schuylkill Haven, Pennsylvania, USA. According to another example, the bag is vacuum packed, hermetically sealed, leak resistant, heavy duty (*e.g.*, 2 mils, 2.5 mils, 3 mils.), suitable for cooking temperatures (*e.g.*, up to 375°F (190 °C) for up to 4 hours), and oxygen impermeable. In some embodiments, the bag is a modified atmosphere packaging (“MAP”) bag. In some embodiments, the MAP bag may comprise a protective atmosphere inside the MAP bag such as, for example, nitrogen gas, carbon dioxide gas, or a mixture thereof. In some embodiments, the ratio of nitrogen gas to carbon dioxide gas in the protective atmosphere is about 70:30 to about 80:20. According to another example, the bag is a CRYOVAC OVEN EASE Bag model numbers HC2X40, HC2X40 Heavy, HC2X70, or HC2X70 commercially available from Sealed Air Corporation of Elmwood Park, New Jersey, USA. According to one example the bag has a rectangular base and triangular shaped end walls (*e.g.*, a gusset which can expand during the heating process). In some embodiments, the bag may comprise a rectangular base film and a rectangular upper film, where the base film is mated to the upper film using, for example, a horizontal form fill-seal machine available from MULTIVAC Sepp Haggenmüller GmbH & Co. KG, Wolfertschwenden, Germany, to form a bag. In some embodiments, the base film may have a cavity formed therein to receive an insert. According to another example, the bag is printable or printed with merchandising or advertising indicia or other graphics. In some embodiments, the bag may not include a handle.

[0034] According to one example, the seal allows one-way removal of air from the bag (*e.g.*, vacuum seal such as by removal of air using a pump). According to another example, the seal provides for self venting when heating, such as the seal used in BEMIS MAGIC STEAM Microwavable Pouches commercially available from the Bemix Company, Inc. of Neenah, Wisconsin, USA.

[0035] According to one example, the insert is made of PET/Crystalline Polyethylene Terephthalate (“CPET”) material. According to one example, the insert is in the shape of at

least one of a square, a rectangle and a parallelogram. According to one example, the insert is a rectangle having a length of about 12 inches (30.48 cm) a width of about 8 inches (20.32 cm) and a height of about 3.5 inches (8.89 cm). According to an alternative embodiment, the insert is not placed within the bag; rather the bag is attached to the insert. According to an alternative embodiment, the insert is selectively reconfigurable between the opened position and the closed position. Such reconfiguration may be useful, for example, in loading, unloading and reloading of the smoking material.

[0036] The smoking material may be any material used to create smoke, *e.g.*, from burning or smoldering plant materials such as wood. Suitable wood materials include alder, apple, cedar, cherry, grape, hickory, maple, mesquite, oak, peach, pecan, wine barrel chips, *etc.* Suitable plant materials include seaweed, lemon peel, orange peel, *etc.* Suitable herb materials include bay leaves, cinnamon, nutmeg, peppermint, rosemary, tea, *etc.* Other fuels besides wood, plant and herbs can also be employed, *e.g.*, with the addition of flavoring ingredients. Exemplary flavors include hickory wood, apple wood, campfire, smoked peppercorn and lemon peppercorn (Mediterranean). Smoking material may be in the form of smoking paste, smoking pellets, smoking granules, smoking tablets or pucks, smoking powder, smoking liquid, *etc.* In one embodiment, the smoking material is in the form of a paste.

[0037] The food product may be any type of food. One example is protein. Another example is animal protein or meat. The meat block may be obtained from any animal protein source such as bovine, porcine, equine, caprine, ovine, avian animals, seafood animals, or any animal commonly harvested for food production. Bovine animals include, but are not limited to buffalo, bison, and all cattle, including steers, heifers, cows, and bulls. Porcine animals include, but are not limited to feeder pigs and breeding pigs, including sows, gilts, barrows, and boars. Ovine animals include, but are not limited to, sheep, including ewes, rams, wethers, and lambs, caprine animals include, but are not limited to, goats, including does, bucks, wethers, and kids. Avian animals include, but are not limited to, birds, including chickens, turkeys, and ostriches (and also include domesticated birds also referred to as poultry). Seafood animals (including from salt water and freshwater sources) include, but are not limited to, fish and shellfish (such as clams, scallops, shrimp, crabs and lobster). According to an alternative example, the meat block may include a pop-up timer to indicate when cooking is complete.

[0038] A method of making and using the food smoking system is provided. The method of making the food smoking system includes obtaining the insert and pivoting or providing the insert to the opened configuration. The smoking material is filled in the cavity of the base of the insert. The cover is then pivoted or provided to the closed position, whereby the tray of the cover is touching (or in an alternative embodiment very close to) the smoking material of the cavity so that the smoking material is substantially retained in the cavity. In one embodiment, a bag is then opened, and the insert is then placed inside the bag. The meat block is placed on the insert in the bag. (According to an alternative embodiment, the meat block could be placed on the insert and then the insert and the meat block are simultaneously placed in the bag.) The bag is then sealed. In another embodiment, the insert is placed in the formed cavity of a base film. The meat block is placed on the insert in the base film cavity. (According to an alternative embodiment, the meat block could be placed on the insert and then the insert and the meat block are simultaneously placed in the base film cavity.) The base film is mated to an upper film (*e.g.*, by a heated seal plate) to form a bag.

[0039] The bag and meat block may be refrigerated or frozen. In some embodiments, the bag and meat block may be placed inside a carton. In some embodiments the carton may be sealed (*e.g.*, glued, stapled). The carton may facilitate transportation to and/or storage of the bag and meat block in a retail environment. In some embodiments, the carton may comprise a paper material, a plastic material, a cardboard material, or a combination thereof. In some embodiments, the carton may include a handle. In some embodiments, the carton is printable or printed with merchandising or advertising indicia or other graphics.

[0040] The bag is provided to the retail environment (*e.g.*, meat display case). A consumer may lift the bag, using the bag handle in some embodiments or the carton or carton handle in other embodiments, and transport the bag to the place where the meat block will be cooked. The bag with the meat block (in the frozen or fresh state) is placed in or on the cooking apparatus (*e.g.*, oven, microwave, grill, open fire). (According to an alternative embodiment, the meat block is thawed before cooking or placing the bag in the oven.) If the bag is provided in a carton, the bag is removed from the carton before cooking. The bag (with the meat block) are heated in an environment having a temperature of from about 300 °F (about 149 °C) to about 400 °F (about 204 °C) for from about fifteen minutes to about four hours (*e.g.*, up to about 375°F (190° Celsius) for up to about 4 hours). During heating, the smoking material begins to create smoke (*e.g.*, small solid particles or liquid droplets) in the cavity. The smoke is provided from the cavity to the smoke generation chamber. The

smoke is then further provided through the vents of the insert to the smoking chamber in the interior of the bag. The smoke physically interacts with the meat block in the smoking chamber of the bag (*i.e.*, smoking the meat block so the meat block absorbs the smoke rather than the bag absorbing the smoke -- and thereby infusing the meat block with a smoky or smoke flavor). During the heating process, pressure builds inside the bag until it vents through the seal to the atmosphere.

[0041] After the heating (*e.g.*, cooking and smoking) process is completed, the bag is opened. A cooked meat block that is tender and juicy (and the insert) is removed from the bag. Any juices from the meat block resulting from the heating process may be retained by the tray of the insert (*e.g.*, used for basting or marinating the meat block, used for gravy, au jus, discarded). (According to an alternative embodiment, the meat block may be removed from the bag and the insert retained in the bag.) The bag and the insert may then be discarded. (According to an alternative embodiment, the bag and/or the insert may be recycled for future reloading with smoking material and meat block and reused.) According to other alternative embodiments, any of these steps may be eliminated, repeated, or conducted in other sequences.

[0042] One advantage of the food smoking system is the meat block (*e.g.*, ½ bone-in-breast turkey) could be prepared with overall shortened preparation time (*e.g.*, cook from frozen) without the need for braising or adding smoke flavorings – which is convenient, quick, easy to prepare and clean up, and which results in an end product that is tasty and moist.

* * * *

[0043] Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in a sense of "including, but not limited to." Words using the singular or plural number also include the plural or singular number respectively. When the claims use the word "or" in reference to a list of two or more items, that word covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list.

[0044] The above detailed descriptions of embodiments of the invention are not intended to be exhaustive or to limit the invention to the precise form disclosed above. Although specific embodiments of, and examples for, the invention are described above for

illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. For example, while steps are presented in a given order, alternative embodiments may perform steps in a different order. The various embodiments described herein can also be combined to provide further embodiments.

[0045] In general, the terms used in the following claims should not be construed to limit the invention to the specific embodiments disclosed in the specification, unless the above detailed description explicitly defines such terms. While certain aspects of the invention are presented below in certain claim forms, the inventors contemplate the various aspects of the invention in any number of claim forms. Accordingly, the inventors reserve the right to add additional claims after filing the application to pursue such additional claim forms for other aspects of the invention.

CLAIMS

I/We claim:

1. A system for smoking food, comprising:
 - a first container configured for containing an article of food; and
 - a second container configured for containing a smoking material,wherein the second container is contained within the first container and wherein the second container is selectively removable from the first container.
2. The system of claim 1, wherein the second container further comprises:
 - a cover; and
 - a base,wherein the cover is selectively removably coupled to the base and wherein the cover is selectively positionable between a first (opened) position and a second (closed) position.
3. The system of claim 2, wherein:
 - the cover further comprises a first horizontal surface configured for supporting the article of food; and
 - the base further comprises a second horizontal surface configured for supporting the smoking material.
4. The system of claim 2 or claim 3, wherein the second container further comprises a chamber between the cover and the base when the cover is in the closed position.
5. The system of claim 4, wherein the second container further comprises a first vent in the cover and wherein the vent is configured for gas communication of smoke from the chamber to the first container.
6. The system of claim 5, wherein the second container further comprises a second vent configured for gas communication from the second container to the atmosphere.

7. The system of any of claims 1 to 6, wherein the second container further comprises a rectangle.
8. The system of any of claims 2 to 7, wherein the second container further comprises a living hinge for selectively pivoting the cover between the first (opened) position and the second (closed) position and further for attaching the cover to the base when the cover is in the closed position.
9. The system of any of claims 2 to 8, wherein the cover nests at least partially within the base when the cover is in the closed position.
10. The system of any of claims 2 to 9, wherein the cover friction fits to the base when the cover is in the closed position.
11. The system of any of claims 2 to 10, wherein the cover further comprises a peg.
12. The system of claim 11, wherein the peg is hollow.
13. The system of any of claims 4 to 12, wherein the cover further comprises a channel configured for gas communication of smoke from the chamber to the first container.
14. The system of claim 13, wherein the cover further comprises a second channel configured for gas communication of smoke from the chamber to the first container.
15. The system of any of claims 4 to 14, wherein the second container further comprises the smoking material in the chamber.
16. The system of any of claims 3 to 15, further comprising the article of food in the first container and supported on the first horizontal surface.
17. The system of any of claims 1 to 16, wherein the article of food further comprises protein.

18. The system of any of claims 1 to 17, wherein the first container comprises a biaxially-oriented polyethylene terephthalate material.
19. The system of any of claims 1 to 18, wherein the second container comprises a Crystalline Polyethylene Terephthalate (CPET) material.

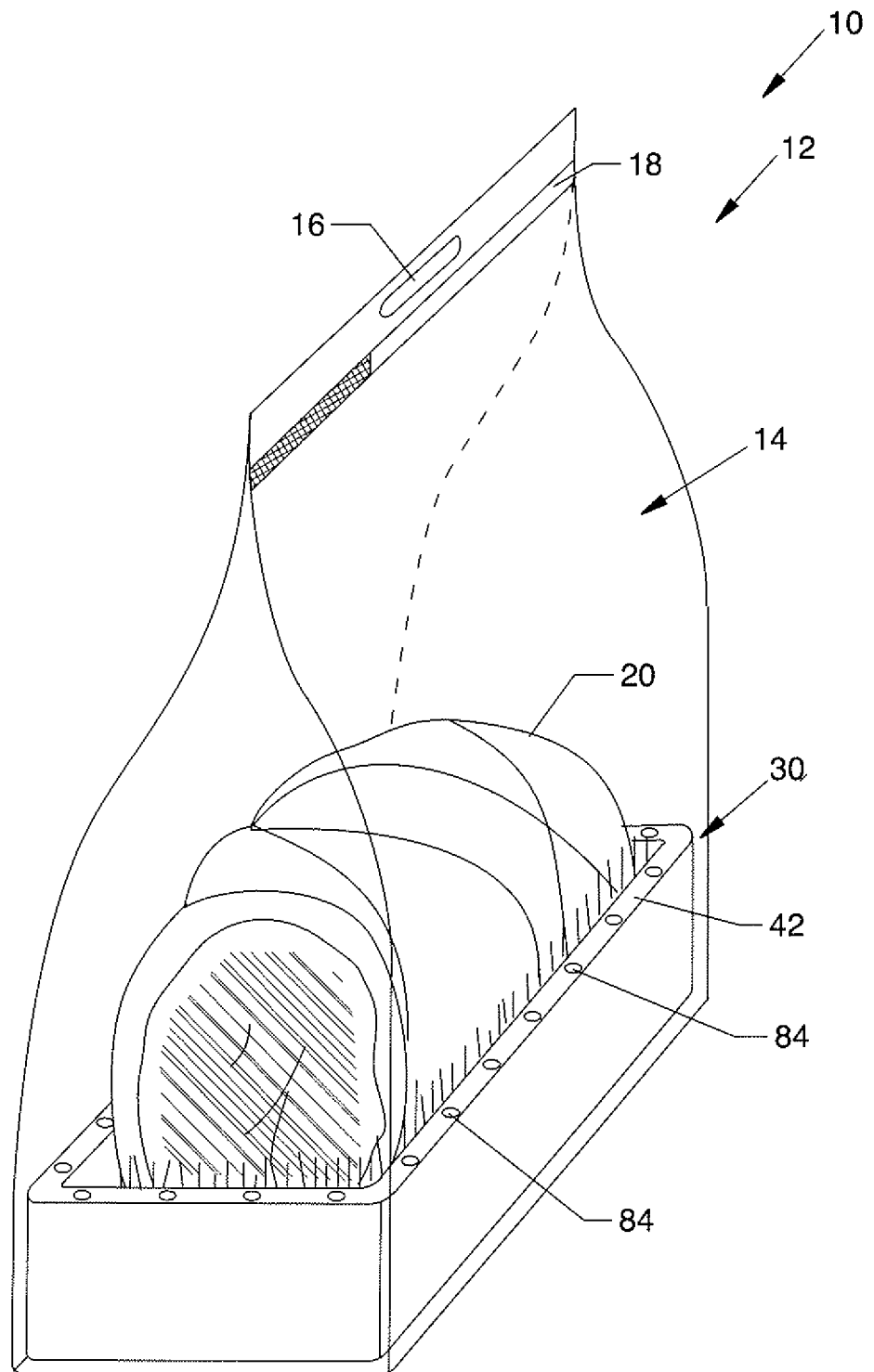


FIG. 1

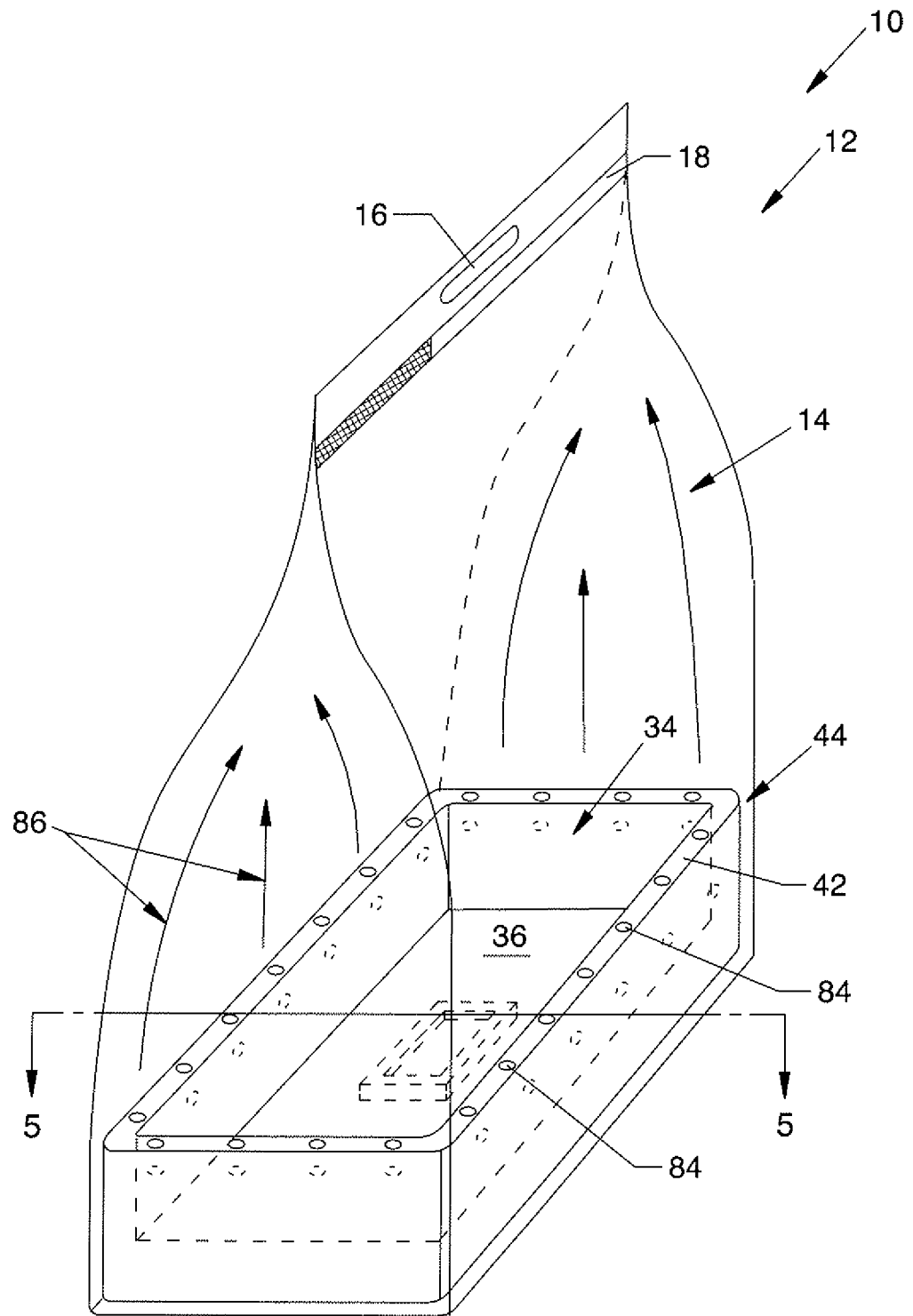


FIG. 2

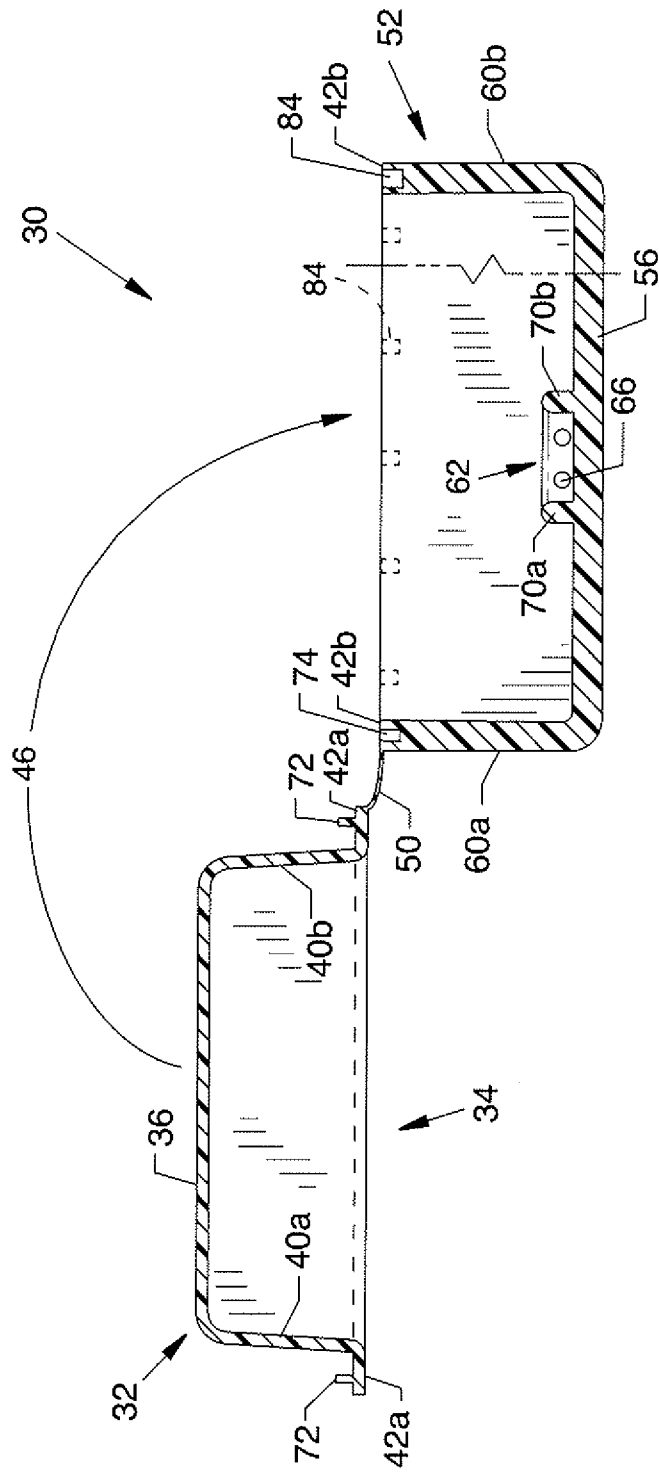


FIG. 3

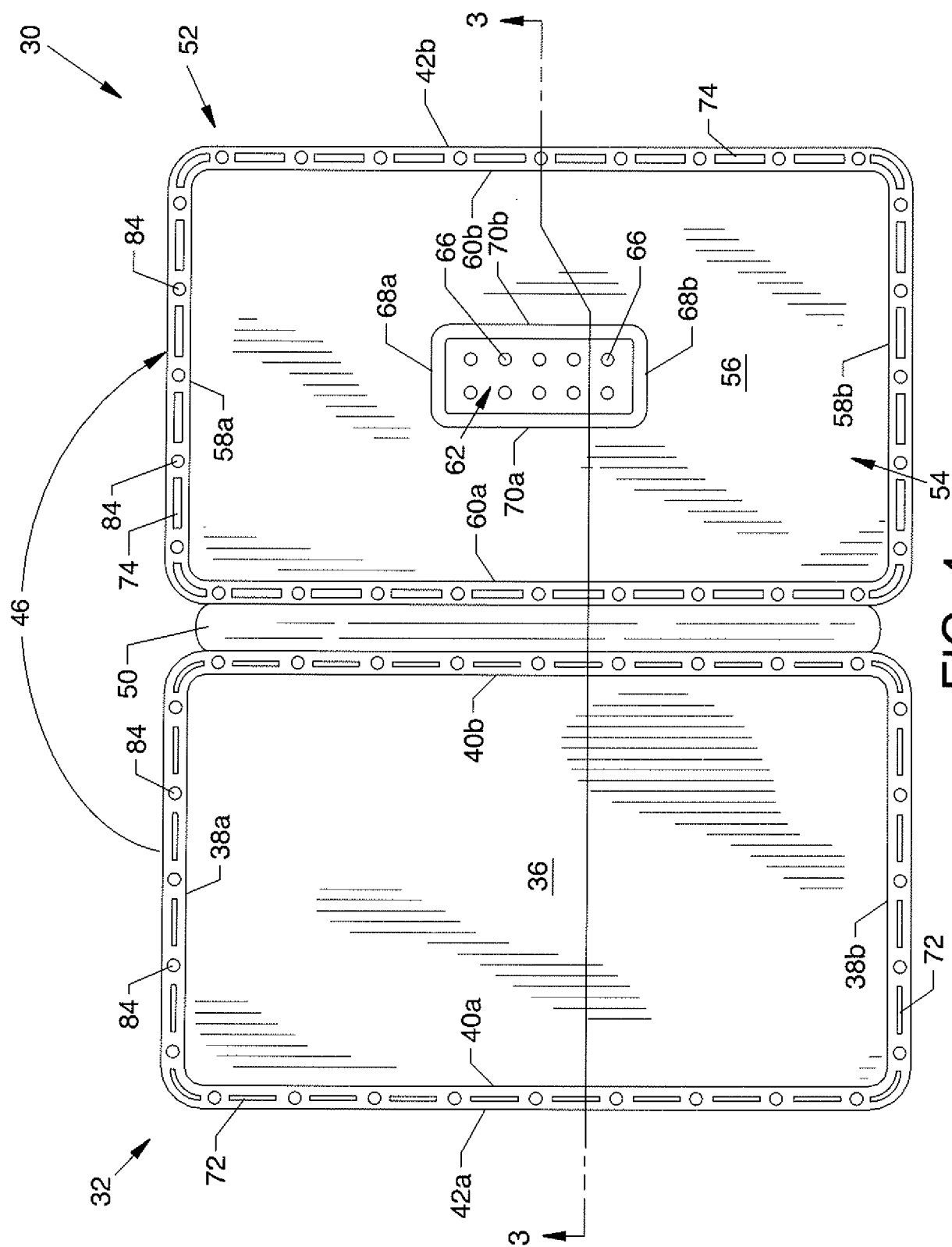


FIG. 4

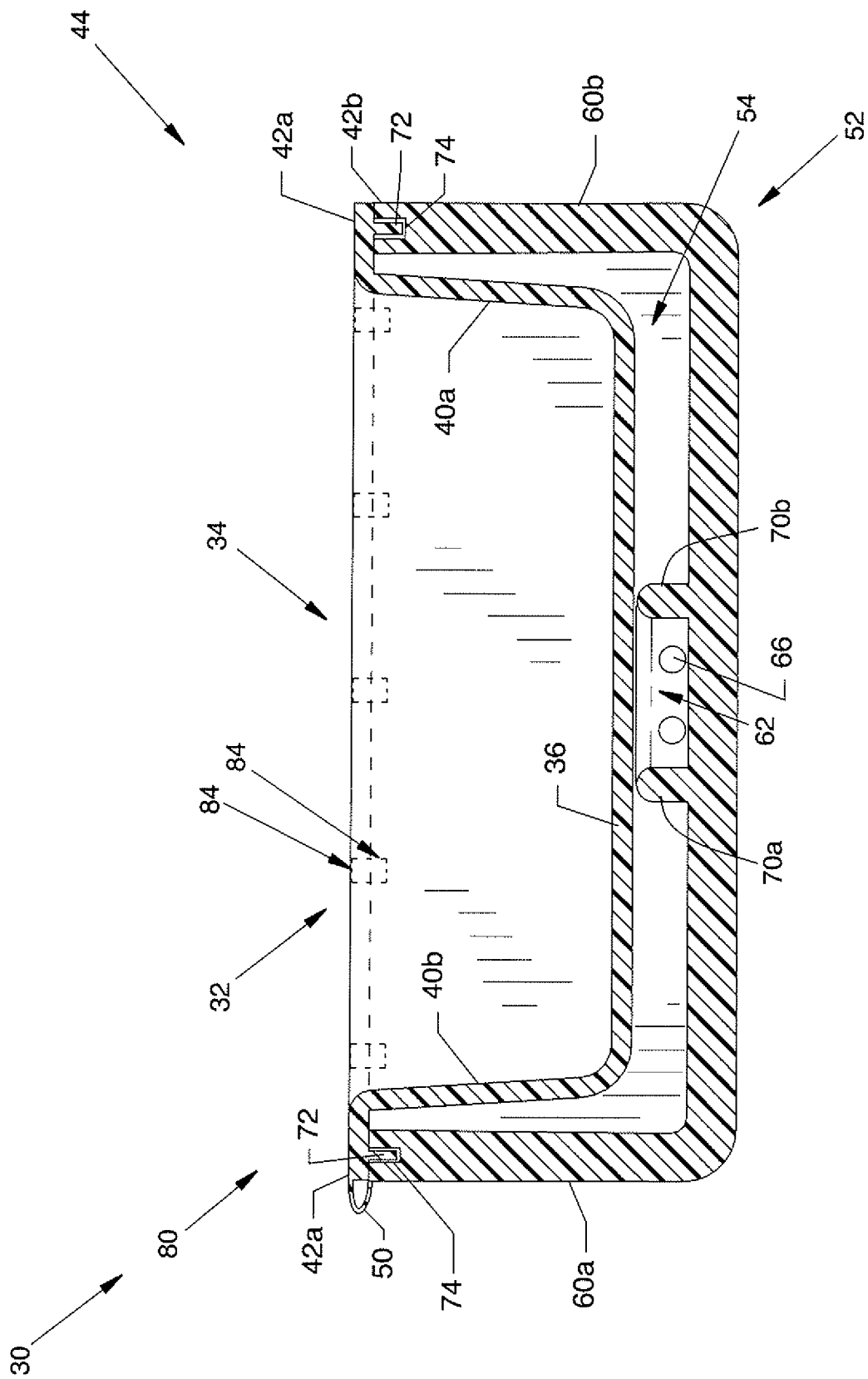


FIG. 5

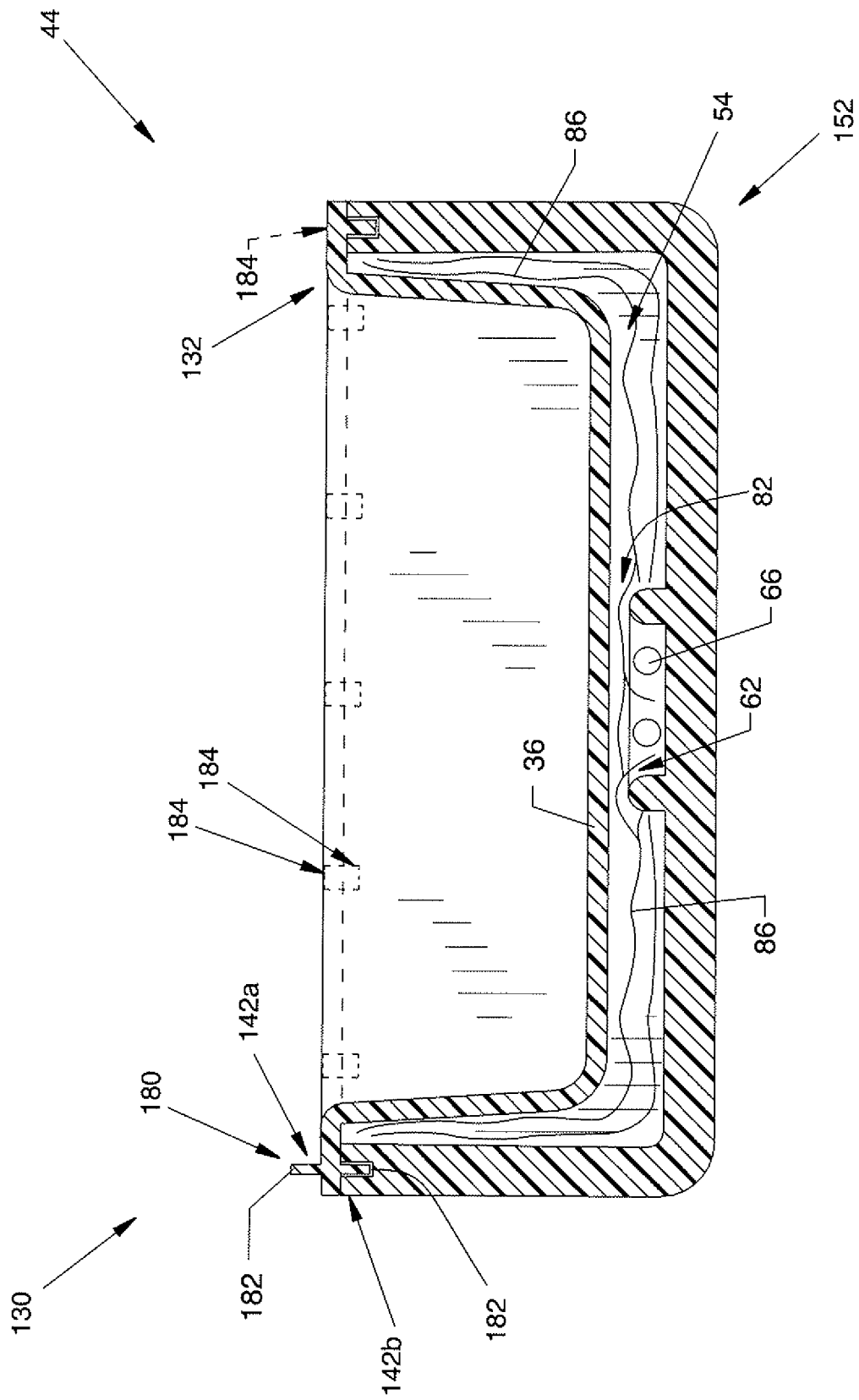


FIG. 6

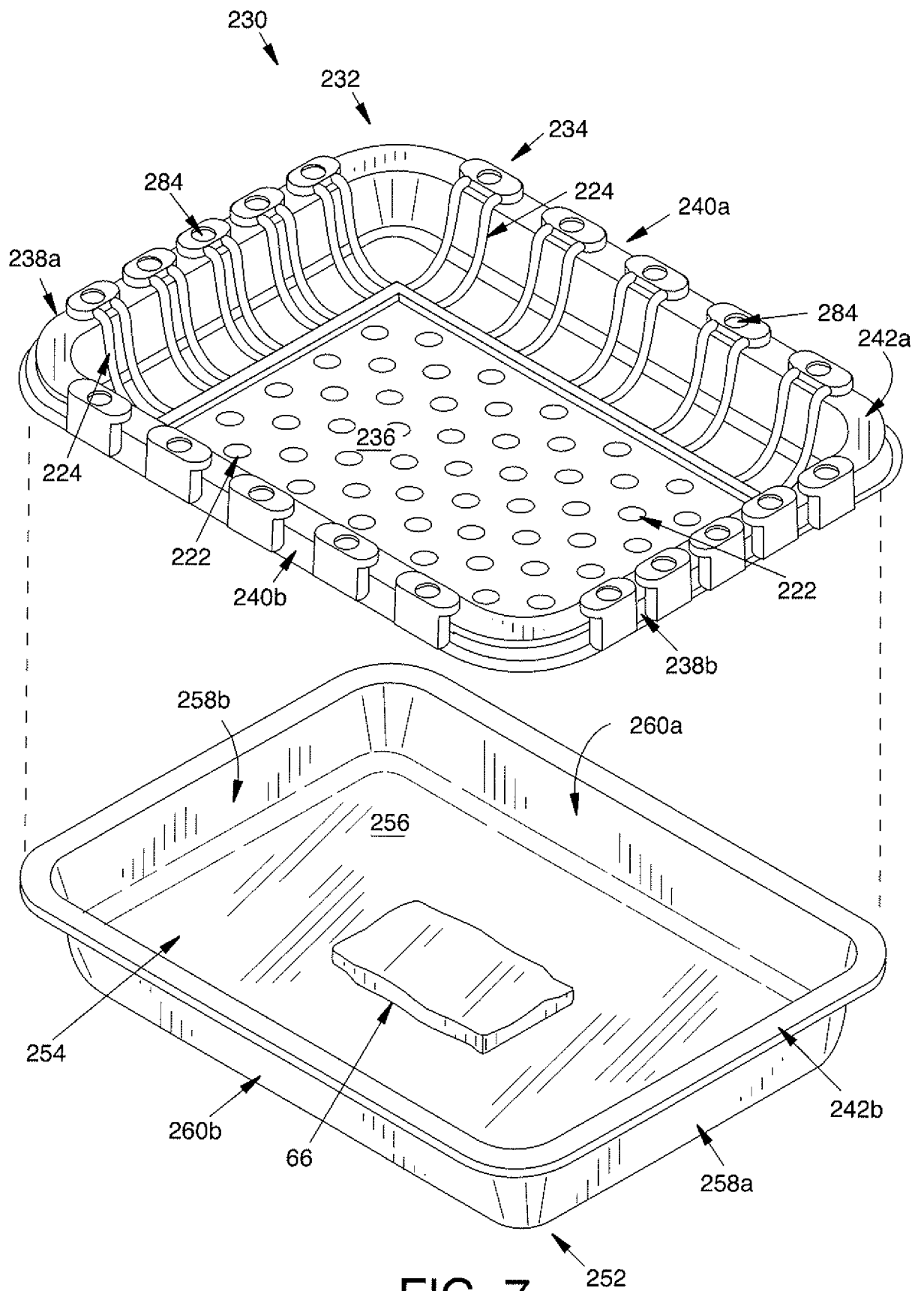


FIG. 7

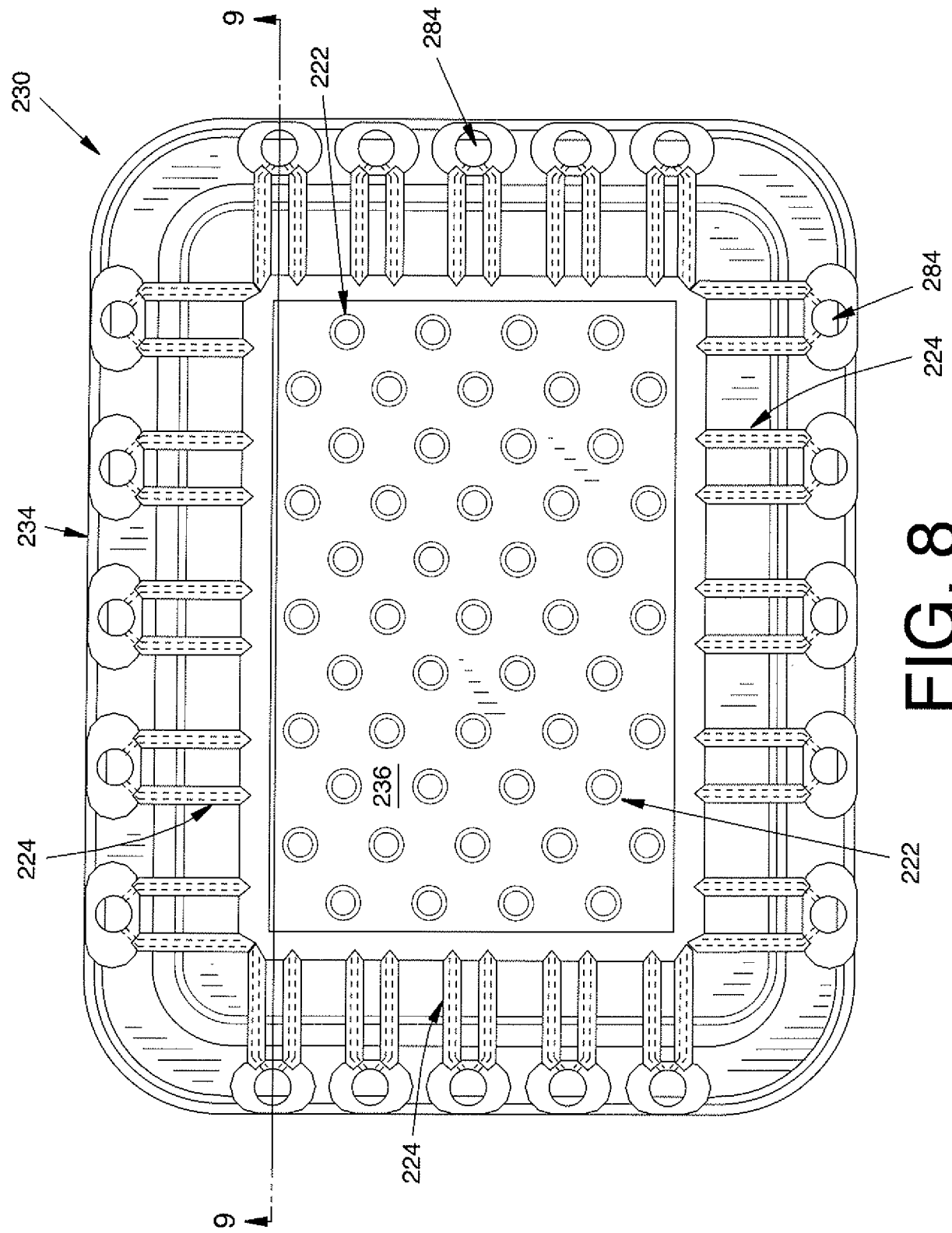


FIG. 8

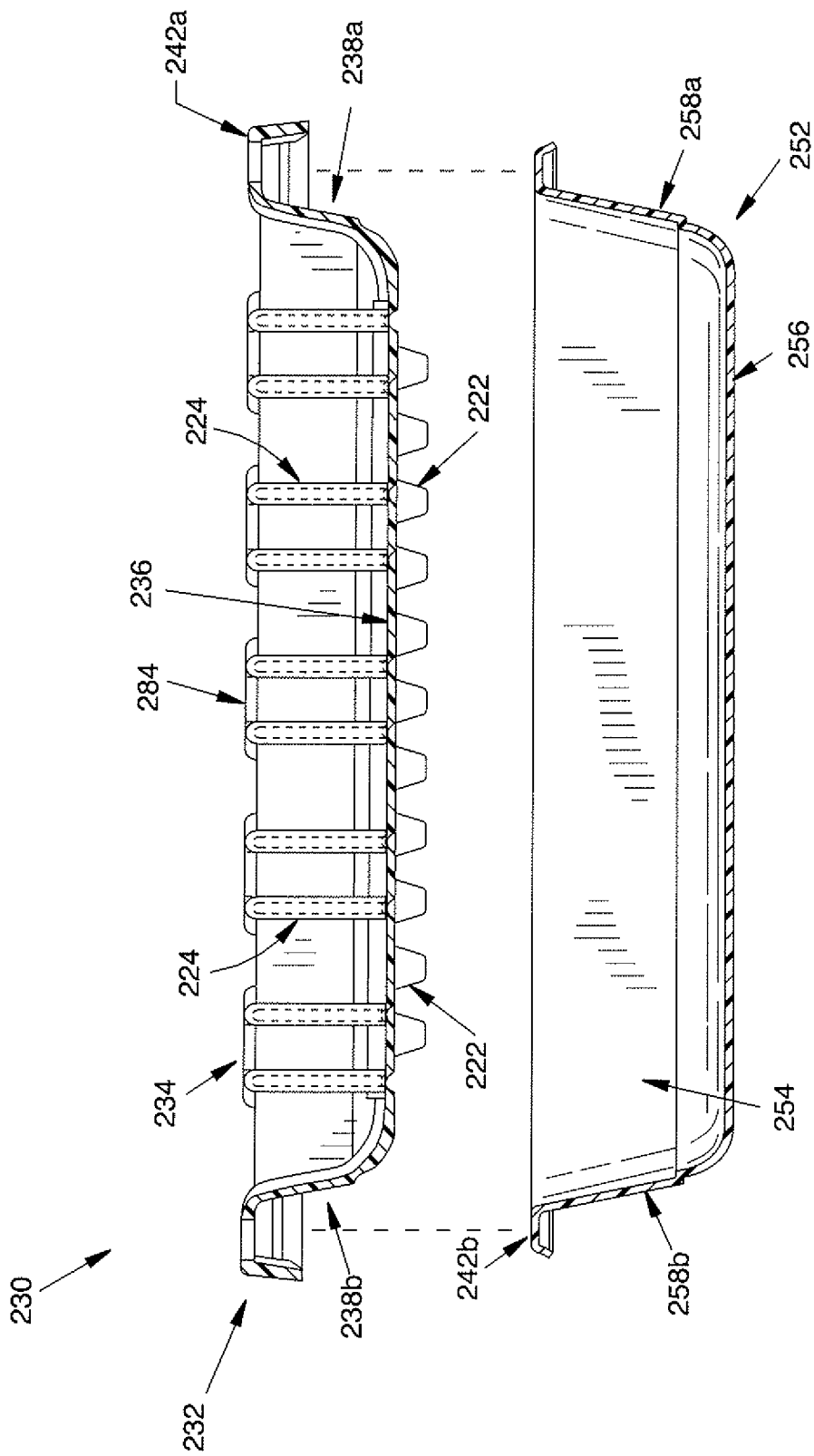


FIG. 9

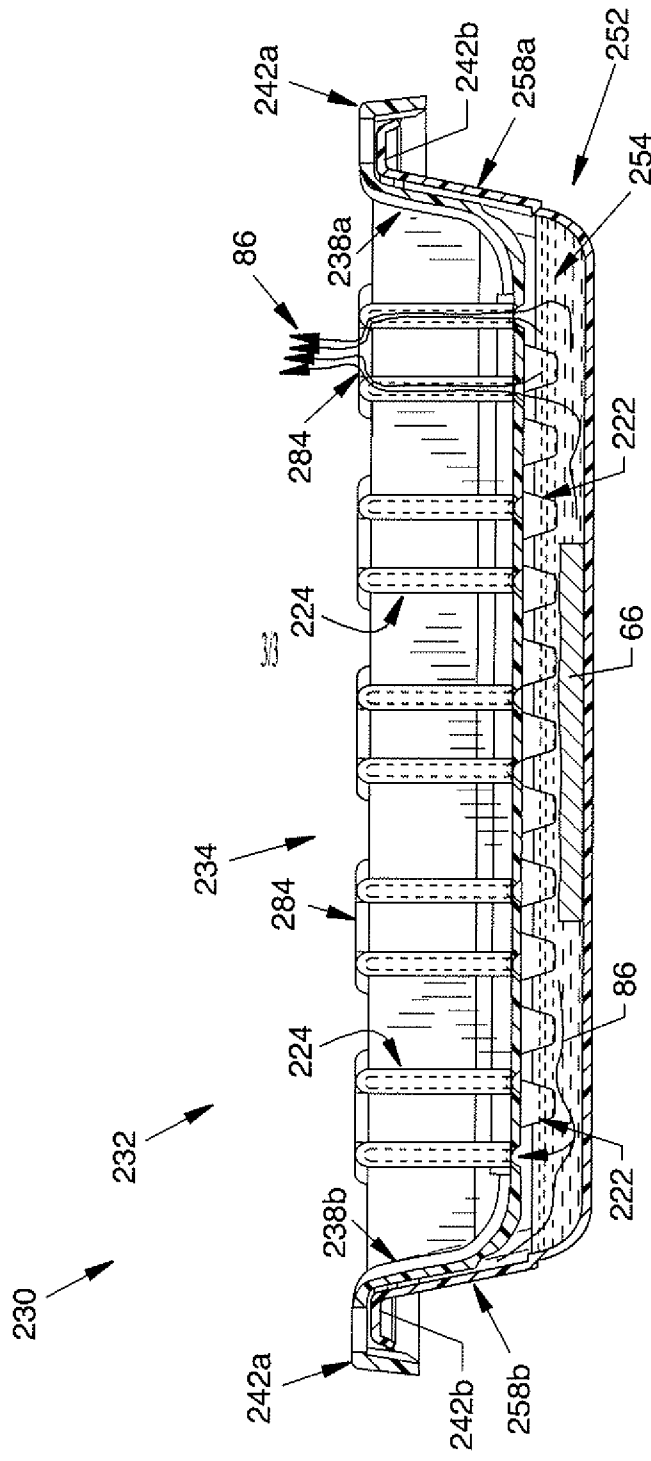


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/076897

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A23B 4/044 (2014.01) USPC - 99/482 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A23B 4/044, 4/048; A47J 37/07 (2014.01) USPC - 99/449, 482; 126/38, 275R; 312/264; 426/113, 132, 314, 316, 325 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched CPC - A23B 4/044, 4/048; A47J 37/07 (2014.02) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatBase, Google Patents, Google, YouTube		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/0218691 A1 (ADAMS et al) 02 September 2010 (02.09.2010) entire document	1, 2, 4-6
Y		3
Y	US 2006/0260475 A1 (BJORK et al) 23 November 2006 (23.11.2006) entire document	3
A	US 5,520,940 A (TIRKKONEN) 28 May 1996 (28.05.1996) entire document	1-6
A	US 2,967,023 A (HUCKABEE) 03 January 1961 (03.01.1961) entire document	1-6
☐ Further documents are listed in the continuation of Box C. ☐		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents; such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 14 April 2014		Date of mailing of the international search report 06 MAY 2014
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver. PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/076897

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 7-19
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.