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(54) **MICROWAVEABLE POPCORN ARRANGEMENT**

IN DER MIKROWELLE ZUBEREITBARE POPCORNANORDNUNG

EMBALLAGE POUR MAIS SOUFFLE COMPATIBLE MICRO-ONDES

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(56) References cited:
US-A- 5 690 853 **US-A- 5 994 685**
US-A- 6 100 513

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Description

[0001] This application is being filed as a PCT International Patent application on 11 March 2005, in the name of Con Agra Foods, Inc., a U.S. national corporation, applicant for the designation of all countries except the US, and Eric Craig Jackson, Denise Ellen Hanson, James W. Montealegre and Lance Bernard Schilmoeller, all U.S. citizens, applicants for the designation of the US only, and claims priority to U.S. Application Serial Nos.: 60/552,560 filed 12 March 2004 and 60/574,703 filed 25 May 2004.

Field of the Invention

[0002] The present invention relates to microwaveable packaging for food. The disclosure shown particularly concerns arrangements for popping microwaveable popcorn. The principles herein relate to preferred arrangements for a package with an interior, typically configured to preferably internally receive a popcorn charge.

[0003] The principles particularly relate to utilization of preferred paper materials for generation of the microwave popcorn packaging and in packaged microwave popcorn products.

Background of the Invention

[0004] A wide variety of microwaveable food products are presently known. The ones of particular concern herein are those in which the construction is used to pop microwaveable popcorn. In general, the related consumer product is a package which includes a popcorn charge. In use, the package including the unpopped popcorn charge is positioned appropriately in a microwave oven, and is exposed to microwave energy. During the microwave process, the popcorn is popped.

[0005] Particular arrangements to which the present invention relates, are those in which the package is flexible bag or pouch that expands during the popping process. Flexible bag arrangements are described, for example, in U.S. Patent Nos.: 4,548,826; 4,691,374; 5,081,330; 5,044,777; 5,195,829; 5,302,790; and, 5,650,084. The disclosures of the identified seven patents are each incorporated herein by reference.

[0006] Referring to U.S. Patent No. 5,044,777, certain characteristics of conventional microwaveable popcorn packaging are apparent. First, the bags are generally provided in a configuration wherein side gussets are used to separate the internal volume of the bag into first and second "tubes." When the arrangement is filled, generally the popcorn charge is placed in one of the two "tubes" and is substantially retained therein, prior to popping. This is shown, for example, in U.S. Patent No. 5,044,777, Fig. 3.

[0007] Also, in general, the popcorn charge is positioned in a center portion (typically about a center one-third) of the package arrangement. In many arrangements, during storage the packing arrangement is folded into a "tri-fold" configuration. This is apparent from the drawings and descriptions of U.S. Patent Nos. 4,044,777 and 5,195,829; and, it is specifically illustrated in U.S. Patent No. 4,548,826, Fig. 5; U.S. Patent No. 4,691,374, Figs. 3 and 14; and in U.S. Patent No. 5,650,084, Figs. 1 and 4.

[0008] In some instances, it has been found that the positioning of the popcorn charge substantially in one of two tubes, and substantially only in the central portion of that tube, especially in association with a microwave interactive material or susceptor positioned in close proximity, leads to preferred characteristics of popping. This is referenced generally in the U.S. patents identified above, and specifically in connection with U.S. Patent Nos. 4,548,826 and 4,691,374. Herein, when it is said that the popcorn charge is "substantially only" in a location, it is meant that preferably at least 80% (more preferably at least 95%, by weight, most preferably essentially all; i.e., at least 99%) by weight of the charge (popcorn, fat, flavor, etc.), is at the stated location.

[0009] Typically the microwave popcorn packages comprise two-ply paper arrangements, made from materials so as to provide an acceptably low level of passage of grease (i.e., oil/fat), if any, through the packaging, during storage. Often this is accomplished by utilizing fluorocarbon treated papers, for the inner ply, the outer ply or both. A microwaveable popcorn arrangement comprising an inner and an outer ply of kraftpaper is disclosed in document US-A-5 690 853.

[0010] The present invention relates to improvements in microwave popcorn packaging and products.

Summary of the Invention

[0011] According to the present disclosure, microwaveable popcorn arrangements are provided which include a flexible, expandable, bag configuration. The construction preferably comprises at least one sheet or layer of paper which has not been treated with fluorocarbon treatment agent. Preferably both plies of a two-ply arrangement are made with paper materials that have not been fluorocarbon treated.

[0012] Herein the term "two-ply" when used in this context, is meant to refer to a construction used to form bag side walls, comprising two sheets of paper secured to one another. The term "two-ply" is meant to be applicable in this context,

even if between the two paper plies a microwave interactive construction or susceptor, in a sheet form, is positioned.

[0013] In general terms, in preferred arrangements an outer ply and an inner ply are provided. The inner ply is generally the ply of material which defines the interior of the microwaveable popcorn arrangement or package. The inner ply will preferably comprise a paper (typically highly refined) having a porosity, before inclusion in the bag, of no greater than 300,000 Gurley-sec. Preferably it comprises a material having a porosity of no greater than 600,000 Gurley-sec, and most preferably it is made from a sheet material having a porosity of no greater than 950,000 Gurley-sec. (It is noted that Gurley-sec is a unit of measurement for porosity, according to a test identified below. A higher number in Gurley-sec generally references a lower porosity.)

[0014] The inner ply may include fields of sealant, adhesive or other (preferably non-fluorocarbon) material applied on the inner surface, if desired.

[0015] The term "outer ply" as used herein, is meant to refer to the layer of paper that forms the outer surface of the microwaveable popcorn arrangement or flexible bag. Preferably it comprises a paper (typically highly refined) having a porosity, before use in the bag, of no greater than 30,000 Gurley-sec, more preferably no greater than 35,000 Gurley-sec, most preferably no greater than 40,000 Gurley-sec.

[0016] The preferred inner ply and outer ply materials can be configured, in a variety of shapes and with the variety of seal arrangements, to form microwaveable popcorn arrangements. An example is characterized herein, but alternatives are possible.

[0017] Typical preferred bags will be ones in which the two-ply arrangement is folded to define a bag interior including first and second, opposite, face panels joined by first and second, opposite, inwardly directed side gussets. Each side gusset preferably comprises two panel sections, the first one adjacent the first face panel and the second one adjacent the second face panel. A variety of such arrangements are possible, and a useable one is characterized in detail below.

Brief Description of the Drawings

[0018]

Fig. 1 is a front perspective view of an arrangement according to one embodiment of the present invention; the arrangement of Fig. 1 being depicted in a storage overwrap and oriented standing on an edge.

Fig. 2 is a schematic top plan view of an arrangement according to Fig. 1, depicted unwrapped and unfolded as it would be when positioned in a microwave oven for cooking.

Fig. 3 is an enlarged top plan view of a sheet of flexible sheet material from which the bag arrangement is such that as shown in Figs. 1 and 2 can be folded; the arrangement of Fig. 3 including markings indicating where sealing material is preferably positioned in the construction.

Fig. 4 is an enlarged cross-sectional view taken generally along line 4-4, Fig. 2.

Fig. 5 is a view analogous to Fig. 3, with letters indicating example dimensions found in this text.

Fig. 6 is a top plan view of an alternate package blank to that shown in Fig. 3 useable to form the arrangement of Fig. 2.

Fig. 7 is a view analogous to Fig. 6, but with symbols indicating dimensions found in this text.

[0019] In some of the drawings, in some instances, relative component thicknesses may be shown exaggerated, for clarity.

Detailed Description

I. Issues with Fluorocarbon Treated Papers.

[0020] Although to date there have not been specific government regulations regarding the matter, there is some perception that fluorocarbon treated paper materials may be undesirable, for use in microwave popcorn packaging. The issues generally relate to the work place environment of the package preparation and/or popcorn packaging facilities. There is, however, also at least some concern relating to possible fluorocarbon release during the microwave popcorn popping operation.

[0021] Generally, the fluorocarbon treatment in at least one of the plies of paper, has been considered to be very important with respect to obtaining desirable oil/fat retention characteristics, during storage, shipping and handling of the microwave popcorn products. Indeed many commercial paper microwave popcorn products, utilize fluorocarbon treated paper, to obtain desirable, reduced, wicking characteristics with respect to contained oil/fat within the unpopped popcorn charge contained therein.

[0022] Herein, there are reported preferred materials and constructions for microwave popcorn products, which provide for desirable levels of operation in a variety of microwave popcorn charges therein, with respect to wicking characteristics of contained oil/fat, without the use of fluorocarbon treated papers.

II. Preferred Fluorocarbon Treated Materials for Use in Preparing Multi-Ply Microwave Popcorn Packaging - Highly Refined Papers.

A. General Characteristics of Preferred Papers.

[0023] In general, the proper selection of raw fibers, as well as highly refining the raw fibers in the process of manufacturing paper, result in the fibers themselves providing the resulting paper with the resistance to grease staining and paper grease proof properties. This grease resistance or grease proofness is the result of tight packing of the highly refined fibers of the sheet, physically preventing the migration of grease into and through the sheet. Highly refined fibers also absorb a high amount of water on the surface. This generates about a layer of water, providing for an hydrophilic characteristic to the paper surface, making the fibers and thus the paper intrinsically oil repellent.

[0024] In addition, highly refined fibers are more flexible. This can be important to microwave popcorn packaging, since with such packaging microfractures that occur during creasing and folding facilitate making the oil leakage. More flexible fibers will be less likely to be undesirably damaged, during folding or creasing processes.

[0025] To facilitate grease proofness and highly refined papers, film former is typically applied to the surface of the paper sheet. Examples of such film formers are copolymers of EVA (ethylene vinyl acetate) and PVOH (poly vinyl alcohol) or acrylics. An example is Johnson Polymer F41.

[0026] The general characteristics of preferred non-fluorocarbon (non-FCT) treated, highly refined, grease proof papers for use in microwave popcorn packaging are provided herein below. Some commercially available types of paper which meet these general characteristics are obtainable from Rhinelander Paper Company, Inc., Rhinelander, Wisconsin, 54501. Rhinelander is a Wausau-Mosinee Company. The products are those designated by product code number 238-9577 and product code 238-9696. As will be apparent from the following, product number 238-9577 is particularly well configured for use as the inner sheet of a microwave popcorn bag, and product number 238-9696 is particularly useful as the outer ply of a microwave popcorn bag construction. Wausau 238-9696 is preferred for the outer sheet typically due to its higher opacity or greater whiteness. (It is noted that Wausau 238-9646 is also useable for the outer ply. It is similar to 238-9696, but has a higher basis weight.)

[0027] The term "highly refined" as used herein, sometimes abbreviated HR, is meant to have its ordinary definition from the paper making industry, in which in general oil and grease resistance is obtained in paper by reduction of porosity typically by refining an easily hydrated pulp to extremely low freeness, resulting in a closed sheet with a minimum or reduced space. Historically, valley beaters were used to accomplish this level of refinement. Modern paper mills generally use refiners to accomplish this.

[0028] In general it is preferred that the flexible paper material utilized for the inner sheet, i.e., the sheet which defines the interior surface of the bag construction, have a porosity (Gurley-sec) of no more than 300,000, preferably no more than 600,000 and more preferably 950,000 or less. Wausau grade 238-9577 meets this qualification, as a non-fluorocarbon treated material, but Wausau grade 238-9696 does not. (When measured in Gurley-sec, higher numbers are lower porosity. Thus the statement "or less" actually refers to higher numbers. The statement could alternately be "having a porosity value in Gurley-sec of at least 300,000, preferably at least 600,000 and more preferably at least 950,000.")

[0029] In general, for the outer ply, i.e., the layer which form the outer surface of a flexible microwave popcorn bag, it is preferred that highly refined paper material have a porosity (Gurley-sec) of no more than 30,000, preferably no more than 35,000 and typically and most preferably 40,000 or less. Both Wausau grade 238-9696 and Wausau grade 238-9577 meet this characteristic. (Also Wausau grade 238-9646, 25# paper is useable for this.)

[0030] Preferably for each paper (ply), a material having basis wt. of 20-30 lb/ream (3000 sq. feet) is used. More preferably the basis wt. is not greater than 25 lbs/ream. Typically each sheet has a thickness (caliper) of 1.75 - 2.0 mils, typically no more than 1.9 mils, for example 1.8 - 1.9 mils.

B. Further Regarding Preferred Outer Ply Materials for Microwave Packaging.

[0031] In the following table (Table 1), comparative characteristics of two materials, usable as outer plies in preferred microwave popcorn packaging, are provided. The material designated "X" is a material commercially used for the outer ply in at least the following commercial products: Act II Butter (in 2003); Orville Reddenbacher Movie Theater Butter (2003); Act II Extreme Butter (2003). These products are manufactured and sold by ConAgra Foods, Inc., the assignee of the present invention.

[0032] The comparative is with the non-fluorocarbon treated, highly refined paper, Wausau Grade 238-9696 mentioned above. In Table 1, the caliper dimension is in mils (thousandths of an inch).

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Table 1

	X	Wausau Grade 238-9696 Non-FCT Outer	Test Method
5	Fluorochemically Treated Basis Weight	Yes 20.4 lbs/3000 sq.ft.	No 21 lbs/3000 sq.ft. TAPPI T 410 om-98
	Caliper Porosity	1.74 mils 136 Gurley-sec	1.81 mils 42,000 Gurley-sec TAPPI T 411 om-97 TAPPI T 536 om-96**
10	Seffield Smoothness	71 Sheffield	135 Sheffield TAPPI T 538 om-96
	Tear MD Tear CD	18 grams force 10.2 grams force	18 grams force 11.5 grams force TAPPI T 414 om-98
15	Opacity	52%	58% TAPPI T 425
	3M Kit Wire 3M Kit Felt	9 9	NA NA TAPPI 559 pm-96
20	Color L Color a Color b	94.6 -0.08 3.8	93.2 -0.02 1.6 Datacolor instrument (CIELAB/D50)
	Brightness	84.8	85% TAPPI T 452 om-98
25	Turpentine RP-2 Crease*	2 minutes 100%	10 seconds 14% TAPPI T 454 om-94 RP -2 (Ralston Purina)
* % grid stained after 140F for 24 hours (grid 10 cm x 10 cm) ** seconds/ 100 cc of oil			

C. Further Regarding Preferred Materials for Use as the Inner Ply, in Microwave Popcorn Packaging.

[0033] In the following Table 2, a comparative presentation is made of a fluorocarbon treated paper and a non-fluorocarbon treated paper, each of which is acceptable for use in preferred microwave popcorn packaging. The paper designated "Y" is a fluorocarbon treated paper currently used as the inner ply of the microwave popcorn packaging of at least the above mentioned ConAgra commercial products. The product designated Wausau Grade 238-9577, is a highly refined, non-fluorocarbon treated paper.

Table 2

	Y	Wausau Grade 238-9577 Non-FCT Inner	Test Method
40	Fluorochemically Treated Basis Weight	Yes 22.5 lbs/3000 sq. ft.	No 23 lbs/3000 sq. ft. TAPPI T 410 om-98
45	Caliper Porosity	2.0 8000 Gurley-sec	1.85 999,999+ Gurley-sec TAPPI T 411 om-97 TAPPI T 536 om-96**
	Seffield Smoothness	150 Sheffield	151 Sheffield TAPPI T 538 om-96
	Tear MD Tear CD	17 grams force 18 grams force	16 grams force 8 grams force TAPPI T 414 om-98
50	Opacity	42%	38% TAPPI T 425
	3M Kit Wire 3M Kit Felt	10 12	NA NA TAPPI 559 pm-96
55	Color L Color a Color b	94.0 -2.0 6.0	92.6 -1.5 5 Datacolor instrument (CIELAB/D50)
	Brightness	81 %	80% TAPPI T 452 om-98

(continued)

	Y	Wausau Grade 238-9577 Non-FACT Inner	Test Method
Turpentine RP-2 Crease*	180 minutes* 0.20%	3 minutes 1.90%	TAPPI T 454 om-94 RP -2 (Ralston Purina)
* % grid stained after 140F for 24 hours (grid 10 cm x 10 cm) ** seconds/100 cc of oil			

III. Preferred Packaging Configurations.

A. Issues with Microwave Packaging Generally.

[0034] Utilization of preferred highly refined paper materials in accord with the present disclosure will lead to improved grease proofness or grease retention characteristics of microwave popcorn packaging, relative to what would be the case if such materials as the papers used in conventional microwave popcorn arrangements were not fluorocarbon treated. However, the specific manner in which the microwave popcorn package is configured, does have a bearing on the overall grease proofness or grease retention characteristics of the package. A useable configuration for some applications was described in the U.S. provisional application having serial no. 60/544,573, filed February 13, 2004 and entitled "Microwave Bag Construction with Seal Arrangement for Containing Oil/Fat; Microwave Popcorn Product; and, Methods", which has been filed as a U.S. utility application and a PCT application, the complete disclosures of which are incorporated herein by reference. Utilization of preferred non-fluorocarbon treated materials of the type characterized herein, in such packages, does lead to a useable microwave popcorn product. Therefore, herein, in connection with the figures of the following description, such a construction is described.

[0035] Microwave popcorn arrangements generally involve a collapsed package, having a microwave interactive sheet or susceptor operably positioned therein, and with a microwaveable popcorn charge positioned in a covering relation or thermoconductive relation to the microwave interactive construction. For many conventional arrangements, the package is generally folded into a tri-fold configuration during storage and prior to use. The tri-fold is typically positioned in a moisture barrier overwrap to enhance shelf life for the contents.

[0036] The microwave popcorn charge generally comprises at least 50 grams of unpopped popcorn kernels and at least 20 grams of oil/fat, typically having a melting point of under 130° F (54.4°C); often the popcorn charge contains at least 60 grams of unpopped popcorn kernels and at least 25 grams of oil/fat, having a melting point of under 130° F (54.4°C).

[0037] Such arrangements as those depicted in the references cited above, generally involve folded paper constructions in which creases or folds are used along the paper, at opposite side edges, where side gussets are attached to (or are integral with) two opposite face panels. One pair of opposite edge folds is generally located on opposite sides of a first face panel in one tube of the bag, with a second pair of opposite edge folds at opposite sides of a second face panel in an opposite, second, tube. During initial loading of a popcorn charge into the bag, the popcorn charge is generally placed in one of the two tubes, against a portion of a panel between the creased or folded side edges.

[0038] Creasing of a paper sometimes results in microfracture of the paper integrity, along the edge of creasing. If the popcorn charge is allowed to come into direct contact with a creased location, several problems can occur. First during storage, depending on the content of the microwave popcorn charge, undesirable levels of leakage or wicking of oil/fat material through the paper material in the location of the creased edges can occur. Secondly, during microwave popping, undesirable levels of leakage or wicking of oil/fat can occur along this same creased location. Even with the improved highly refined papers characterized herein, such creasing can be expected to lead to some disadvantage.

[0039] In microwave popcorn packaging, leakage or wicking adjacent selected creases or folds in the microwave popcorn construction, can be better managed, if desired, than with conventional arrangements. In some arrangements, this can be managed by providing specific seal patterns or arrangements within the packaging. In some instances it can be managed by applying material at selected regions on an interior of the package, to affect surface tension between oil and the internal ply of paper. For this latter, the same type of material (adhesive) as used for the seals, can be used.

B. The Arrangement of Figs. 1-5.

[0040] The reference numeral 1, Fig. 1, depicts a microwaveable popcorn package according to the present disclosure. In Fig. 1, the popcorn package 1 is depicted in a conventional "tri-fold" configuration 2, for storage. In Fig. 1, the tri-fold 2 is sealed within a storage overwrap 3. A useable storage overwrap 3 would comprise a 110-140 gauge, biaxially oriented, polypropylene, although other materials can be used. The overwrap 3 is discarded, when the popcorn package

1 is removed from storage, for use.

[0041] In Fig. 1, package 1 is shown stood up on an edge, as it would typically be when stored. Package 1 has two opposite sides 5, 6, each side 5, 6, as discussed in detail below, comprising two side gusset outside edges, along which creases are located.

[0042] As indicated, the arrangement depicted in Fig. 1 is a "tri-fold." The invention is described and depicted in connection with an arrangement folded, or intended to be folded, as a tri-fold. It will be apparent, however, that the techniques according to the present disclosure can be utilized in other folded arrangements, i.e., even when the arrangements are not folded as "tri-folds," for storage.

[0043] In Fig. 2, a top plan view, package 1 is schematically shown in an unfolded configuration oriented much as it would be when positioned in a microwave oven for popping of an internally received popcorn charge, but before expansion. In Fig. 2, lines 11 and 12 indicate fold lines which define central region 13 in the arrangement and which formed the folds to make the trifold, Fig. 1. In central region 13, the unpopped popcorn charge will generally be positioned in an orientation against, and when oriented as shown in Fig. 2 above, a portion of the package 1 in which a microwave interactive construction is preferably positioned. Herein, in this context, the term "microwave interactive" is meant to refer to a material which absorbs energy and becomes hot, upon exposure to microwave energy in a microwave oven.

[0044] During the popping operation, moisture inside the popcorn kernels absorbs microwave energy, generating sufficient steam and heat for popping and expansion of package 1. In addition, the microwave interactive material absorbs microwave energy and dissipates heat to the popcorn charge. In preferred constructions, the microwave interactive material occupies at least central region 13 (internally) and is in greater thermoconductive contact with a portion of that region than any other portions of an interior of popcorn package 1. That is, most of the microwave interactive material (by area or weight) is positioned in thermoconductive contact with a region of the bag interior whereat the microwave interactive will be covered by the popping charge, when the package 1 is positioned in a microwave oven for material use. This is preferred, since it leads to a preferred and efficient utilization of microwave interactive material and also due to preferred heat transfer or heat retention characteristics in connection with the popcorn popping process. This technique is also used in conventional arrangements, such as those of the incorporated references.

[0045] Attention is now directed to Fig. 4, a cross-section taken generally along line 4-4, Fig. 2. From a review of Fig. 4, it will be understood that the popcorn package generally comprises a construction defining first and second opposite face panels 20, 21 joined by first and second, opposite, inwardly directed side gussets 22, 23. By "inwardly directed" in this context it is meant that, in the cross-section of Fig. 4, gussets 22, 23 point or extend toward one another.

[0046] The gussets 22 and 23 generally separate popcorn package 1 into first and second expandable tubes 28 and 29. A popcorn charge 30 is substantially positioned and substantially retained within one of the tubes, in this instance tube 29. The other tube, tube 28, prior to popping, is generally collapsed. Indeed, in preferred arrangements, tube 28 is sealed closed by temporary heat seals, prior to the popping operation.

[0047] Still referring to Fig. 4, side gusset 22 generally comprises: outwardly directed edge creases or folds 33 and 34, fold 34 being adjacent face panel 21 and fold 33 being adjacent face panel 20; and, inwardly directed, central, fold 35. Similarly, gusset 23 comprises: outwardly directed edge creases or folds 38 and 39; and, inwardly directed central fold 40; fold 39 being adjacent face panel 21 and fold 38 being adjacent face panel 20. Package 1, for the arrangement shown in Fig. 4, is folded from a two ply sheet of material, and panel 20 includes central longitudinal seam 42 therein. Such folds as folds 33, 34, 35, 38, 39 and 40 are known for flexible microwave packaging, for example as shown in U.S. Patent Nos. 5,044,777; 5,195,829; and, 5,650,084.

[0048] Underneath popcorn charge 30, arrangement or package 1 includes microwave interactive construction or susceptor 45. The microwave interactive construction or susceptor 45 may be of a conventional design. In certain arrangements, such as the one shown in Fig. 4, the susceptor 45 is positioned between layers or plies 46, 47 from which the flexible package 1 is folded. A typical microwave interactive construction comprises a flexible, metallized polyester sheet. Even with the susceptor 45 positioned between sheets 46, 47, the package 1 is referenced as two-ply. For the example shown, the susceptor 45 only occupies a portion of the area between the plies 46, 47.

[0049] Still referring to Fig. 4, in region 21 a an inside surface of panel 21 is shown. Region 21 a defines an unpopped popcorn charge retention surface. This is because the unpopped popcorn charge 30 is generally positioned in contact with surface 21a, and generally sitting on surface 21a, when the package 1 is positioned in a microwave oven, for popping. Referring to Fig. 4, the gusset 23 includes a panel section 49 adjacent to, and integral with, face panel 21; and, gusset 22 includes panel section 48 adjacent to, and integral with, face panel 21.

[0050] Attention is now directed to Fig. 3. In Fig. 3, a top plan view of a bag blank, panel or sheet 60 from which an arrangement according to Figs. 1 and 2 can be folded, is shown. Many of the features illustrated in Fig. 3 are generally analogous to features shown and described in U.S. Patent Nos. 5,195,829; 5,044,777; and 5,650,084. As will be discussed in detail below, a variety of sealant arrangements are utilized to provide for desirable features in the package 1. Any or all of these can be implemented, as well as variations, as desired. The sealant fields indicated are meant to provide an example of a useable system.

[0051] The view in Fig. 3 is of what is sometimes referred to as the "backside" of sheet 60; i.e., the side 65 of sheet

60 which forms the interior surface of the assembled package 1, Fig. 1. The side opposite the side viewable in Fig. 3, is sometimes referred to as the "front side," and will form the exterior surface of the package 1. Of course a mirror image arrangement is also possible.

[0052] Still referring to Fig. 3, line segment 62 defines a region 63 within which, for preferred embodiments, most of the microwave interactive material, such as a microwave interactive material and construction, or susceptor 45, would be associated. The microwave interactive construction, for example susceptor 45, Fig. 4, may be positioned on an interior of the arrangement, an exterior, or between plies 46, 47. In general, for preferred embodiments, susceptor 45 is positioned between plies 46, 47 of the sheet 60.

[0053] Still referring to Fig. 3, again the surface 65 viewed is the surface which, when package 1 has been folded, forms the interior surface of the package 1. The popcorn charge 30, Fig. 4, then, will eventually be positioned over central region 63.

[0054] In Fig. 3, line 66 generally indicates where fold 34, Fig. 4, will be formed; and, line 67 generally indicates where fold 39, Fig. 4, will be formed. Folds or creases 34, 39 are generally outwardly directed folds or creases in opposite side gussets 22, 23 adjacent one face 21. Surface 21a, for positioning of a popcorn charge thereon, in use, extends between the folds 34, 39. Line 68 corresponds with fold 35 (Fig. 4); line 69 with fold 40 (Fig. 4); line 70 with fold 33 (Fig. 4); and, line 71 with fold 38 (Fig. 4). Thus, region 75, between fold lines 68 and 66, will generally define gusset panel section 48, Fig. 4; and, region 77 between fold lines 67 and 69 will generally define gusset panel section 49, Fig. 4.

[0055] In general, the tri-fold, Fig. 1, is eventually formed by folding the overall package 1 such that it folds along lines 80 and 81, respectively. It will be understood that this latter folding would generally be after the bag construction, Fig. 2, has been otherwise assembled. Line 81, will form the bottom edge, Fig. 1. Referring to Figs. 3 and 2, line 80 will form fold 11 and line 81 will form fold 12.

[0056] Referring to Fig. 3, sealant field 84, along edge 84a positioned an opposite side of sheet 60 from side 65, is used to engage field 85 (positioned along edge 85a), during folding (with applied heat and pressure), to form the longitudinal seam or seal 42, Fig. 4. It will also be apparent that, during folding, various portions of field 89 along edge 89a on side 65 will line up with one another to form various portions of end seal 90, Fig. 2 (with application of heat and pressure); and, various portions of field 92, along edge 92a on side 65, Fig. 3, will line with one another to form end seal 93, Fig. 2, with application of heat and pressure. In general, field 92 will form a top edge of the completed bag, through which popped popcorn is removed, after popping. Sealant fields 95 and 96, on the opposite side of the sheet 60, Fig. 3, will align with one another, when folding around fold line 68 is conducted, and heat and pressure are applied, to help secure sheet 60 in a preferred configuration, along end 90, Fig. 2, after folding. This is analogous to what was done in the arrangement of U.S. Patent No. 5,195,829, Fig. 1a. Similarly, sealant fields 98 and 99, on underside of sheet 60, Fig. 3, are aligned with one another when the panel is folded around fold line 69, also to provide a secure end and preferred end configuration to end 90, Fig. 2, when heat and pressure are applied.

[0057] Attention is now directed toward sealant fields 103, 104, 105, 106, 107, 108, 109 and 110. Analogous fields were shown in U.S. patent number 5,195,829, Fig. 1. During folding, portions of fields 103-110 align with one another to retain selected portions of the panel adhered to one another (after application of pressure and heat) to provide for preferred configuration during expansion. In particular, field 103 engages field 104; field 105 engages field 106; field 108 engages field 107; and, field 110 engages field 109, during folding and after pressure and heat application. Engagement between fields 105 and 106, and also between fields 108 and 107, tend to retain selected portions of panels 48 and 49 against panel 21, Fig. 4, in regions where the popcorn charge is not located in the collapsed fold or tri-fold 2 (Fig. 1). Sealant field 103 folded and sealed against field 104, and field 110 folded against field 109, help retain panels 115 and 116 seal against panel 20, Fig. 4, in the collapsed tri-fold. This helps ensure that the popcorn charge 30, Fig. 4, is retained where desired in the arrangement. Advantages from this are described, in part, in U.S. patent number 5,195,829.

[0058] Referring again to Fig. 3, attention is now directed to sealant fields 120, 121, 122, 123. When the arrangement is folded about fold line 66, sealant field 120 aligns with (and with pressure and heat is sealed to) sealant field 121; and, when the arrangement is folded about fold line 67, sealant field 123 aligns with (and with pressure and heat is sealed to) sealant field 122. The engagement between fields 120, 121 (with heat and pressure) further ensures that the panel 48 will be sealed against the panel 21 (Fig. 4); and, the engagement between fields 123 and 122 (with heat and pressure) will further ensure that panel 49 is sealed against panel 21, at regions whereat the popcorn charge 30 is not positioned. This is similar to the utilization of fields in Fig. 1, of U.S. patent 5,195,829. The shape and direction of fields 105, 106, 107, 108, 120, 121, 122 and 123 help ensure that central section 63 will remain relatively flat, as the package 1 expands in use under the steam from popping popcorn.

[0059] Attention is now directed to sealant fields 129, 130, 133 and 134. In the preferred embodiment shown, these are also used to ensure that panels 115 and 116 are sealed against panel 20, Fig. 4, so that the popcorn charge 30 is substantially retained in tube 29 (Fig. 4), and does not expand or spread substantially into tube 28 until desired during heating. In particular, fields 129 and 130 are oriented to engage one another, when the arrangement is folded about fold line 70 (with application of heat and pressure); and, fields 133 and 134 are oriented to engage one another, when the arrangement is folded about fold line 71 (with application of heat and pressure).

[0060] Seals of the type associated with fields 129, 130, 133, 134 have been used in previous constructions. For example, see U.S. patent number 5,044,777, Fig. 1.

[0061] In general, sealing results from application of heat and pressure, after folding, to the region where the sealant is located. It is noted that for the various seals discussed, sealant is positioned on both adjoining paper surfaces. This is convenient. However if sealant is only positioned on one side, and the two sides are folded together with follow-up application of appropriate heat and pressure, a seal can be formed.

[0062] It is noted that the sealant fields discussed are configured to form seals with application of heat and pressure. Alternate types of seals, for example cold seals, could be implemented in arrangements according to the present disclosure.

[0063] There can be provided a seal arrangement that helps keep the popcorn charge, prior to popping, separated from undesirable levels of direct contact with creases at fold lines 66, 67, Fig. 3; i.e., folds 34, 39, Fig. 4. This technique can be applied with the preferred paper materials described herein, but in some instances it may not be preferred.

[0064] With respect to fold line 66, attention is directed to sealant fields 150, 151; and, with respect to fold line 67, attention is directed to sealant fields 153, 154. It is noted that for the preferred arrangement shown, fields 150, 151 are integral with one another, and meet at fold line 60, and that similarly fields 153, 154 are integral with one another and meet at fold line 67, although this is not required. (Alternately stated, preferably fields 150, 151 are parts of a single field with fold line 60 therethrough, and preferably fields 153, 154 are parts of a single field with fold line 67 therethrough.)

[0065] When the fold around fold line 66 is made, sealant field 151 will overlap sealant field 150, with gusset fold insulating seal 155, Fig. 4, resulting by provision of appropriate heat and pressure. Similarly, when folding around fold line 67 occurs, field 154 will overlap field 153, with gusset fold insulating seal 156, Fig. 4, resealing when appropriate heat and pressure are applied.

[0066] When the popcorn charge is positioned in region 63, the popcorn charge, and components such as oil/fat therein, are inhibited from flow to, i.e., from reaching, creases or folds 66, 67 (i.e., creases at 34, 39, Fig. 4), due to the presence of the seals 155, 156.

[0067] The seals 155, 156 can be configured to release, upon exposure to steam and heat during a microwave popcorn popping operation, if desired. However, such a release is typically not preferred, when these seals are used.

[0068] Herein, seals of the type of seals 155, 156, are sometimes be referred to herein as "insulating seals" with respect to an associated (typically adjacent) crease or fold. This is because these seals insulate the crease or fold, during package 1 storage, with respect to flow of material from within the popcorn charge, to direct contact with the associated crease or fold. Thus seal 155 is an insulating sealant field with respect to fold or crease along line 66 to form crease or fold 34 (Fig. 4); and field 156 is an insulating sealant field with respect to fold or crease line 67; i.e., fold or crease 39 (Fig. 4).

[0069] Referring to Fig. 3, it is noted that preferably fields 150, 151, 153 and 154 are continuous, i.e. without gaps therein, in extension along the folds 66, 67 respectively, defining edges 63a, 63b of central region 63. This continuous nature to the sealant fields, and in the resulting seals 155, 156 (Fig. 4) helps inhibit undesirable wicking or leaking at the creases caused in folds 66, 69. It is noted that some beneficial results would be obtained even if the insulating fields were not continuous, provided any gaps were sufficiently small.

[0070] When used, a preferred total length to the fields 150, 151 and 153, 154 is preferably at least 20% (usually at least 25% and typically at least 30%) of the entire length of the package (or length of the folds 66, 69) between ends 190, 193 (Fig. 2). More preferably there are each at least 45% of the length of the package 1, Fig. 2 or folds 66, 69, Fig. 3; most preferably and typically the length of the fields 150, 151, 153, 154 in the longitudinal direction of extension of the package, is 50% - 60% of the total length of package 1, or folds 66, 69, (Fig. 3), between ends 90, 93. While alternatives are possible, these will be preferred seals. In Fig. 3, the portions of sheet 60 that form ends 90, 93, Fig. 2, are edges 92a and 89a, respectively.

[0071] When used, most preferably the seals 155, 156 are at least positioned and configured to extend continuously between the folds 80, 81 of the tri-fold (corresponding folds 11, 12 respectively, Fig. 2). It can be seen from Fig. 3, that the sealant fields that form seals 155, 156 extend even further than this.

[0072] Most preferably, when used, the fields 150, 151, 153, 154, Fig. 3, terminate with ends spaced from associated edges 92a, 89a of the package sheet 60, which will correspond to ends 90, 93 of the folded package 1, Fig. 2. Preferably, the spacing is at least 70 mm (for example about 80-95 mm) from edge 89a; and, at least 70 mm from edge 92a. The spacing will not necessarily be the same, from each edge 89a, 92a. Indeed, in the embodiment shown it is not.

[0073] Referring to Fig. 3, attention is now directed to sealant fields 160, 161, 162, 163, 164, 165 and 166. During folding around line 66, field 160 will overlap field 161, with formation of a seal therebetween, upon application of heat and pressure. During folding around line 67, field 162 will overlap field 163, with formation of a seal therebetween upon application of heat and pressure. Region 164 will seal to regions 165, 166, when folding around fold lines 68, 70, 69 and 71 occur, after application of heat and pressure. It is noted that region 151a of sealant field 160 is also part of field 150. Similarly region 150a in region 161 is also part of region 150. Further, region 153a of field 163 is part of field 153; and region 154a of region 162 is part of region 154.

[0074] The net result will be formation of a region in a folded package 11 of a transverse containment seal extending between gusset fold insulating seals 155, 156, Fig. 4. This sealant field will help contain oil/fat within the popcorn 30, at a location between seals 155, 156, Fig. 4, and also at a location over center 63, during storage and use. The transverse containment seal is preferably continuous in extension between insulating seals 155, 156, although alternatives are possible.

[0075] It is noted, that as a result of seals 155, 156 (and the presence of transverse sealant field resulting from overlap of fields 160, 161, 162, 163, 164, 165 and 166) a three-sided insulated pouch around a center 63 (Fig. 3) of surface portion 21 a (Fig. 4) is formed, in which a popcorn charge is stored, during use. It is also noted that along region 168, Fig. 3, no analogously operating product transverse seal is positioned, in the embodiment shown. A second product transverse seal could be located across region 168, however, if desired.

[0076] The seals formed by fields 160, 161, 162, 163, 164, 165 and 166 can be made releasable seals, i.e., such that heat, steam and package expansion, during a popping operation, will generally open these seals.

[0077] In some instances it will be desirable to provide continuous adhesive at certain locations, and discontinuous adhesive at others. In Fig. 3, the fields indicated at 200, with the dotted print pattern, are indicating a preferred location for having continuous coverage, depending, in part, on the nature of the paper used for the plies 46, 47. This is because the sealant can preferably be chosen to provide some beneficial greaseproof effect. In the regions that are not dotted, it is expected that a discontinuous coverage can be used.

[0078] Referring to Fig. 4, preferably seals 155, 156 are at least 0.25 cm wide, typically and preferably at least 0.5 cm wide, typically about 0.8 - 1.4 cm. wide. In this context the "width" is the distance of extension inwardly, i.e., toward each other, from edges 155a, 156a, respectively. The seals 155, 156, of course, do not need to be of constant width, although they are shown this way.

[0079] It is noted that in some instances, depending on the oil/fat composition of the microwave popcorn charge, with arrangements according to Figs. 3 and 4 liquid oil migration toward weakened locations or locations of stress can be an issue. When this is the case, adhesive fields or other surface treatments can be applied at various locations in the arrangement, to change the surface tension of the paper and thus change the oil migration characteristics. Such an adhesive does not need to be sealed between substrates, to provide this affect. Rather the affect is from the surface tension change or surface characteristic change of the material (i.e., the inside of the inner ply) on which it is applied. Preferably, a non-fluorocarbon treatment agent such as PWF 3007 available from H.B. Fuller, St. Paul, MN, would be used. PWF 3007 is a polyvinyl acetate adhesive.

C. A Specific Example; Preferred Sealant Materials.

[0080] From the following specific example and general characterizations of preferred materials, a wide variety of applications of the principles of the present invention will be understood.

[0081] Consider, for example, a typical popcorn product containing a charge of about 20-90 grams, typically about 60-75 grams of popcorn. The charge may be conventional and also contain oil/fat and/or flavorings, with a total weight of about 90-100 grams. Typically the issue for which the present invention provides advantage, relates to reducing undesired levels of leakage of oil/fat through the package side wall, during storage and handling.

[0082] For an example of such an arrangement, sheet 60, Fig. 3, would have a rectangular configuration with outer dimensions of about 11.625 by 21 inches (29.5 cm. by 53.3 cm). The various fold lines would be oriented such that region 63, defined by line 62, would have an outer perimeter of about 5.625 inches by 6.5 inches (14.3 cm by 16.5 cm).

[0083] The multi-ply laminate for sheet 60 could comprise the following materials, although alternates are possible. The non-fluorocarbon treated sheet of paper which forms the outer surface of the bag, when folded, would be Wausau Grade 238-9696 or a similar paper with the preferred characteristics described herein. The non-fluorocarbon treated sheet of paper which forms the innermost ply paper would be Wausau Grade 238-9577 or a similar paper with the preferred characteristics described herein.

[0084] The microwave interactive or susceptor arrangement would preferably be positioned between the two plies. The microwave interactive material would preferably comprise metallized polyester such as a Saehan America, Fort Lee, N.J. polyester film (typically 48 gauge) vacuum metallized with aluminum to give a density of 0.25 +/- 0.05 as measured by a Tobias densitometer. Companies which can prepare such a material include: Rolvac, Windham NH; and Vacumet Corp., Wood Dale, IL.

[0085] In general, for the preferred embodiment described, the same adhesive (for example PWF 3007, H.B. Fuller, St. Paul, MN) is utilized as the adhesive at all locations on the backside of the package blank. For those seals which are to be released as the bag expands, typically the seal is formed with either relatively low pressure, by comparison to other locations, over less surface area of contact between the secured surfaces, or both. Conventional techniques to accomplish this may be used.

[0086] For the laminating adhesive between plies, the product PWF 3007 or PWF 8540 (also available from H.B. Fuller) can be used. PWF 8540 is an ethylene vinyl acetate-polyvinyl alcohol (EVA-PVOH) adhesive, and can be used

to improve greaseproofness.

[0087] Attention is now directed to Fig. 5, in which various dimensions and angles are indicated with letters. These provide an example, of a useable package. The dimensions for the particular example shown, are as follows: (A) 21 inches (53.3 cm); (B) 3.4375 inches (8.73 cm); (C) 2.0625 inches (5.24 cm); (D) 2.0625 inches (5.24 cm); (E) 5.8750 inches (14.9 cm); (F) 1.0 inches (2.54 cm); (G) 0.8579 inches (2.18 cm); (H) 2.9375 inches (7.46 cm); (I) 37°; (J) 0.375 inches (0.953 cm); (K) 5.6250 inches (14.3 cm); (L) 0.5 inches (1.27 cm); (M) 2.5625 inches (6.51 cm); (N) 5.8750 inches (14.9 cm); (O) 5.1875 inches (13.2 cm); (P) 6.5 inches (16.5 cm); (Q) 1.6875 inches (4.29 cm); (R) 0.2 inches (0.51 cm); (S) 1.1562 inches (2.94 cm); (T) 0.1875 inches (0.48 cm); (U) 11.6250 inches (29.5 cm); (V) 4 inches (10.2 cm); (W) 3.625 inches (9.21 cm); (X) 1.375 inches (3.49 cm); (Y) 5.0 inches (12.7 cm); (Z) 5.8125 inches (14.8 cm); (AA) 2.625 inches (6.67 cm); (BB) 0.125 inches (0.32 cm); (CC) 0.250 inches (0.64 cm); (DD) 3.6250 inches (9.21 cm); (EE) 0.6250 inches (1.59 cm); (FF) 0.2188 inches (0.56 cm); (GG) 0.0625 inches (0.159 cm). Other dimensions would be to scale.

[0088] It is anticipated that arrangements according to the example could readily be formed in a continuous process, from a feed sheet material or stock, having seal material appropriately applied thereon, such as through horizontal form/fill/seal methods or techniques. Conventional folding equipment and equipment for positioning a popcorn charge within the arrangement, can be readily used.

D. Some Optional Bag Variations

[0089] In this section, in connection with Figs. 6 and 7, alternate adhesive patterns are provided to form a bag generally in accord with Fig. 4, except as modified by the following descriptions, are provided. The adhesive fields depicted in Figs. 6 and 7 are analogous to those in Figs. 3 and 5, with alternative adhesive and seal locations being provided as examples.

[0090] Attention is now directed to Fig. 6. In Fig. 6, a top plan view of a bag blank, panel or sheet 260 from which an alternate arrangement according to Fig. 1 can be folded, is shown. Many of the features illustrated in Fig. 6 are generally analogous to features shown and described in U.S. Patent Nos. 5,195,829; 5,044,777; and 5,650,084, as well as above with respect to Fig. 3. As will be discussed in detail below, a variety of sealant arrangements are utilized to provide for desirable features in the package 1. Various combinations of these can be implemented, as well as variations, as desired. The sealant fields indicated are meant to provide examples of useable arrangements.

[0091] As will be apparent from the following descriptions, in Fig. 6 sealant fields are indicated that can be alternatively or optionally used, to provide desirable arrangements. This will be understood from further descriptions below.

[0092] The view in Fig. 6 is of what is sometimes referred to as the "backside" of sheet 260; i.e., the side 265 of sheet 260 which forms the interior surface of the assembled package 1, Fig. 1. The side opposite the side viewable in Fig. 6, is sometimes referred to as the "front side," and will form the exterior surface of the package 1. Of course a mirror image arrangement is also possible.

[0093] Still referring to Fig. 6, line segment 262 defines a region 263 within which, for preferred embodiments, most of the microwave interactive material, such as a susceptor 45, Fig. 4, would be associated. The microwave interactive construction, for example susceptor 45, Fig. 4, may be positioned on an interior of the arrangement, an exterior, or between plies 46, 47. In general, for preferred embodiments, susceptor 45 is positioned between plies 46, 47 of the blank 260.

[0094] Still referring to Fig. 6, again the surface 265 viewed is the surface which, when package 1 has been folded, forms the interior surface of the package 1. The popcorn charge 30, Fig. 4, then, will eventually be positioned over central region 263.

[0095] Still referring to Fig. 6, line 266 generally indicates where fold 34, Fig. 4, will be formed; and, line 267 generally indicates where fold 39, Fig. 4, will be formed. Folds or creases 34, 39 are generally outwardly directed folds or creases in opposite side gussets 22, 23 adjacent one face 21. Surface 21 a, for positioning of a popcorn charge thereon, in use, extends between the folds 34, 39. Line 268 corresponds with fold 35 (Fig. 4); line 269 with fold 40 (Fig. 4); line 270 with fold 33 (Fig. 4); and, line 271 with fold 38 (Fig. 4). Thus, region 275, between fold lines 268 and 266, will generally define gusset panel section 48, Fig. 4; and, region 277 between fold lines 267 and 269 will generally define gusset panel section 49, Fig. 4.

[0096] In general, the tri-fold, Fig. 1, is eventually formed by folding the overall package 1 such that it folds along appropriately spaced perpendicular to lines 266, 267, 268, 269, 270, 271. It will be understood that this latter folding would generally be after the bag construction, Fig. 2, has been otherwise assembled.

[0097] Referring to Fig. 6, sealant field 284, along edge 284a positioned an opposite side of panel 260 from side 265, is used to engage field 285 along edge 285a, during folding (typically with applied heat and pressure), to form the longitudinal seam or seal 42, Fig. 4. It will also be apparent that, during folding, various portions of field 289 along edge 289a on side 265 will line up with one another to form various portions of end seal 90, Fig. 2 (typically with application of heat and pressure); and, various portions of field 292, along edge 292a on side 265, Fig. 6, will line with one another to form end seal 93, Fig. 2, typically with application of heat and pressure. In general, field 292 will form a top edge of

the completed bag, through which popped popcorn is removed, after popping. Sealant fields 295 and 296, on the opposite side of the panel 260, Fig. 6, will align with one another, when folding around fold line 268 is conducted, and heat and pressure are applied, to help secure panel 260 in a preferred configuration, along end 90, Fig. 2, after folding. This is analogous to what was done in the arrangement of U.S. patent 5,195,829, Fig. 1 a. Similarly, sealant fields 298 and 299, on underside of panel 260, Fig. 6, are aligned with one another when the panel is folded around fold line 269, also to provide a secure end and preferred end configuration to end 90, Fig. 2, when heat and pressure are applied.

[0098] Attention is now directed toward sealant fields 303, 304, 305, 306, 307, 308, 309 and 310. Analogous fields were shown in U.S. patent number 5,195,829. During folding, portions of fields 303-310 align with one another to retain selected portions of the panel adhered to one another (typically after application of pressure and heat) to provide for preferred configuration during expansion. In particular, field 303 engages field 304; field 305 engages field 306; field 308 engages field 307; and, field 310 engages field 309, during folding and after pressure and heat application. Engagement between fields 305 and 306, and also between fields 308 and 307, tend to retain selected portions of panels 48 and 49 against panel 21, Fig. 4, in regions where the popcorn charge is not located in the collapsed fold or tri-fold 2 (Fig. 1). Sealant field 303 folded and sealed against field 304, and field 310 folded against field 309, help ensure that the popcorn charge 30, Fig. 4, is retained where desired in the arrangement. Advantages from this are described, in part, in U.S. patent number 5,195,829.

[0099] Still referring to Fig. 6, fields 303a-310a indicate optional extensions to fields 303, 310 respectively, to create a V or chevron shape to the overlapping seals. These can be and have been used in popcorn packaging, as indicated in U.S. patent 5,195,829. However the optional portions 303a-310a can be avoided to advantage, if desired. This is because extensions 303-310 project at an angle appropriate to generate the desirable resulting seal in the folded arrangement, without necessarily using the complete chevron shape.

[0100] It is noted that for the bag arrangement of U.S. 5,195,829 chevron fields adjacent region 92 were also used, to advantage. For the particular arrangements reflected by Fig. 6, these were not shown. It is expected that such fields would not be used in preferred arrangements. However, it is noted that they could optionally be used.

[0101] Attention is now directed to sealant fields 329, 330, 333 and 334. In the preferred embodiment shown, these are used to ensure that panels 315 and 316 are sealed against panel 20, Fig. 4, so that the popcorn charge 30 is substantially retained in tube 29 (Fig. 4), and does not expand or spread substantially into tube 28 until desired during heating. In particular, fields 329 and 330 are oriented to engage one another, when the arrangement is folded about fold line 270 (with application of heat and pressure); and, fields 333 and 334 are oriented to engage one another, when the arrangement is folded about fold line 271 (with application of heat and pressure).

[0102] Seals of the type associated with fields 329, 330, 333, 334 have been used in previous constructions. For example, see U.S. patent number 5,044,777.

[0103] In general, sealing results from application of heat and pressure, after folding, to the region where the sealant is located. It is noted that for the various seals discussed, sealant is positioned on both adjoining paper surfaces. This is convenient. However if sealant is only positioned on one side, and the two sides are folded together with follow-up application of appropriate heat and pressure, a seal can be formed.

[0104] It is noted that the sealant fields discussed are configured to form seals with application of heat and pressure. Alternate types of seals, for example cold seals, could be implemented in arrangements according to the present disclosure.

[0105] In the remaining discussion of sealant fields on surface 265 of package arrangement 260, Fig. 6, options are provided for preferred management and control of wicking and flow characteristics of the oil/fat in the popcorn charge, during storage, handling and use. It is noted that the sealant fields are used in one of two ways, as follows. First, a sealant field can actually be used to form an insulating seal, to manage location of the oil/fat, by insulating it from portions of the package. Secondly, application of a sealant to a paper surface changes the surface tension properties of that surface, and thus its interaction with the oil/fat material. In general the properties of the sealants used will operate for some containment of the oil/fat material into untreated locations. Thus, sealant fields can be applied to the paper at preferred locations where it is desired to inhibit flow of the oil/fat material as its liquefies. Both of these properties are discussed below, and options for implementing them.

[0106] There can, for example, be provided a seal arrangement that helps keep the popcorn charge, prior to popping, separated from undesirable levels of direct contact with creases at fold lines 266, 267, Fig. 6; i.e., folds 34, 39, Fig. 4. This technique is described in U.S. Provisional 60/544,873.

[0107] With respect to fold line 266, attention is directed to sealant fields 350, 351; and, with respect to fold line 267, attention is directed to sealant fields 353, 354. It is noted that for the optional arrangement shown, fields 350, 351 are integral with one another, and meet at fold line 260, and that similarly fields 353, 354 are integral with one another and meet at fold line 267, although this is not required. (Alternately stated, fields 350, 351 are parts of a single field with fold line 260 therethrough, and preferably fields 353, 354 are parts of a single field with fold line 267 therethrough.)

[0108] When the fold around fold line 266 is made, sealant field 351 will overlap sealant field 350, with gusset fold insulating seal 155, Fig. 4, resulting by provision of appropriate heat and pressure. Similarly, when folding around fold

line 267 occurs, field 354 will overlap field 353, with gusset fold insulating seal 156, Fig. 4, resealing when appropriate heat and pressure are applied.

[0109] When the popcorn charge is positioned in region 263, the popcorn charge, and components such as oil/fat therein, would be inhibited from flow to, creases or folds 266, 267 (i.e., creases at 34, 39, Fig. 4), due to the presence of the seals 155, 156. The seals 155, 156 would typically be configured to release, upon exposure to steam and heat during a microwave popcorn popping operation.

[0110] Again, seals of the type of seals 155, 156, are sometimes be referred to herein as "insulating seals" with respect to an associated (typically adjacent) crease or fold. This is because these seals insulate the crease or fold, during package 1 storage, with respect to flow of material from within the popcorn charge, to direct contact with the associated crease or fold. Thus seal 155 is an insulating sealant field with respect to fold or crease along line 266 to form crease or fold 34 (Fig. 4); and field 156 is an insulating sealant field with respect to fold or crease line 267; i.e., fold or crease 39 (Fig. 4).

[0111] Referring to Fig. 6, it is noted that if used, preferably fields 350, 351, 353 and 354 are continuous, i.e. without gaps therein, in extension along the folds 266, 267. This continuous nature to the sealant fields, and in the resulting seals 155, 156 (Fig. 4) would help inhibit undesirable wicking or leaking at the creases caused in folds 266, 269. It is noted that some beneficial results would be obtained even if the insulating fields were not continuous.

[0112] When used, a preferred total length to the fields 350, 351 and 353, 354 is preferably at least 20% (usually at least 25% and typically at least 30%) of the entire length of the package (or length of the folds 266, 269) between ends 90, 93 (Fig. 2). More preferably there are each at least 45% of the length of the package 1, Fig. 2 or folds 266, 269, Fig. 6; most preferably and typically the length of the fields 350, 351, 353, 354 in the longitudinal direction of extension of the package, is 50% - 60% of the total length of package 1, or folds 266, 269, (Fig. 7), between ends 90, 93. While alternatives are possible, these will be preferred seals. In Fig. 6, the portions of blank 260 that form ends 90, 93, Fig. 2, are edges 292a and 289a, respectively.

[0113] When used, most preferably the seals 155, 156 are at least positioned and configured to extend continuously between the folds of the trifold (corresponding folds 11, 12 respectively, Fig. 2).

[0114] Most preferably, when used, the fields 350, 351, 353, 354, Fig. 6, terminate with ends spaced from associated edges 292a, 289a of the package blank 260, which will correspond to ends 90, 93 of the folded package 1, Fig. 2. Preferably, the spacing is at least 70 mm (for example about 80-95 mm) from edge 289a; and, at least 70 mm from edge 292a. The spacing will not necessarily be the same, from each edge 289a, 292a. Indeed, in the embodiment shown it is not.

[0115] It is noted that a transverse seal between location 360, 361, similar to as described in the U.S. provisional application 60/544,873 could also be used.

[0116] In some arrangements it may be desirable not to use continuous seals provided by fields 350, 351 and 353, 354. In some applications it may be desirable simply to provide seals formed by region 363, 364; 365, 366; 367, 368; and, 369, 370, when folding along lines 266, 267 as conducted. Specifically fields 363, 364 comprise circular dots of adhesive over lines 266; and fields 365, 366 similarly form a circular field of adhesive over line 266. When folding along line 266 occurs, these fields will form spots of sealed adhesive adjacent the resulting gusset fold 34, Fig. 4, at these locations. This can help contain the oil/fat material, without using continuous seals.

[0117] An analogous affect is achieved along fold line 267, through seals formed by a circular pattern from fields 367, 368; and 369, 370.

[0118] Of course, alternate shapes from circular can be used for fields 363-370.

[0119] In some embodiments it may be desirable to provide adhesive over region 263, in the areas indicated at 375, 376, leaving central area 377 adhesive free. In general oil/fat does not flow over a sealant field as well as it flows over an untreated paper surface, especially if the paper surface is not fluorocarbon treated. Thus, sealant fields 375, 376, can help contain oil/fat material positioned in region 377. Similarly sealant treatment in regions 380 can be used for this purpose. That is, it would not actually form seals, but rather comprise surface treatments to inhibit undesirable flow of oil/fat material from region 377. The above features are optional, and can be used for different effects depending on the materials involved.

[0120] With respect to adhesive between plies, in some instances it will be desirable to provide continuous adhesive at certain locations, and discontinuous adhesive at others. In Fig. 6, the fields indicated at 400, with the dotted print pattern, are indicating a preferred location for having continuous coverage, depending, in part, on the nature of the paper used for the plies 46, 47. This is because the sealant can preferably be chosen to provide some beneficial greaseproof effect. In the regions 401 that are not dotted, it is expected that a discontinuous adhesive coverage such as, for example, described in: 5,753,895; 5,928,554 and 6,396,036, each of which is incorporated herein by reference, can be used.

[0121] Referring to Fig. 4, if used, preferably seals 155, 156 are at least 0.25 cm wide, typically and preferably at least 0.5 cm wide, typically about 0.8 - 1.4 cm. wide. In this context the "width" is the distance of extension inwardly, i.e., toward each other, from edges 155a, 156a, respectively. The seals 155, 156, of course, do not need to be of constant width, although they are shown this way.

[0122] Attention is now directed to Fig. 7. Fig. 7 is a view analogous to Fig. 6, except with letter designations of certain

dimensions. The dimensions provided herein, are for an example, as follows: (A) 21 inches (53.3 cm); (B) 3.4375 inches (8.7 cm); (C) 2.0625 inches (5.2 cm); (D) 2.0625 inches (5.2 cm); (E) 5.8750 inches (14.9 cm); (F) 2.0625 inches (5.2 cm); (G) 2.0625 inches (5.2 cm); (H) 3.4375 inches (8.7 cm); (I) 1 inch (2.5 cm); (J) 2.9375 inches (7.5 cm); (K) 0.2000 inches (0.5 cm); (L) 1.1562 inches (2.9 cm); (M) 0.8579 inches (2.2 cm); (N) 0.1875 inches (0.5 cm); (O) 10.0000 inches (25.4 cm); (P) 5.6250 inches (14.3 cm); (Q) 0.5 inches (1.3 cm); (R) 0.5 inches (1.3 cm); (S) 2.5625 inches (6.5 cm); (T) 5.8750 inches (14.9 cm); (U) 11.6250 inches (29.5 cm); (V) 4.0000 inches (10.2 cm); (W) 4.0000 inches (10.2 cm); (X) 3.6250 inches (9.2 cm); (Y) 0.5 inch (1.3 cm); (Z) 0.5 inch (1.3 cm); (AA) 0.750 inch (1.9 cm) diameter; (BB) 6.5 inch (16.5 cm); (CC) 1.6875 inch (4.3 cm); (DD) 5.8125 inch (14.8 cm); (EE) 0.1250 inch (0.3 cm); (FF) 1.0 inch (2.5 cm); (GG) 0.250 inch (0.6 cm); (HH) 3.6250 inch (9.2 cm); (II) 0.1250 inch (0.3 cm); (JJ) 0.2500 inch (0.6 cm); (KK) 37°; (LL) 0.6250 inch (1.6 cm); (MM) 0.2188 inch (0.6 cm); (NN) 0.06250 inch (0.2 cm); (OO) 1 inch (2.5 cm); (PP) 5.1875 inch (13.2 cm). Other dimensions can be determined assuming scale.

[0123] If non-fluorocarbon treated paper is characterized in the section as used, the following adhesives are example of useable materials. First, for the adhesive on surface the adhesive applied to surface 65, PWF 3007, available from H.B. Fuller, St. Paul, Minnesota can be used. For the adhesive in regions 201 and 200 between plies, as a laminating adhesive, the product PWF 8540, also available from H.B. Fuller, can be used.

E. Some General Observations.

[0124] According to the above, generally a preferred microwave popcorn product, with respect to avoidance of fluorocarbon treated package materials, results when the preferred papers defined are used. Also, preferably the package is such that it is a folded bag having a bag interior and including a first and second opposite face panels joined by first and second opposite, inwardly directed, side gussets.

[0125] When the arrangement is used, a popcorn charge is positioned on an inside surface or against an inside surface of the first face panel.

[0126] In addition, an advantageous arrangement is provided in which a microwave interactive construction is positioned in association with a bag, between the two plies. The microwave interactive construction is provided in thermally conductive contact with a popcorn charge retention surface, i.e., a portion of the inside of the bag against which the microwave popcorn charge is placed.

Claims

1. A microwaveable popcorn arrangement (1) comprising:

(a) a folded bag arrangement having an interior and comprising an inner ply of non-fluorocarbon treated paper and an outer ply of non-fluorocarbon treated paper;

(i) the inner ply having a porosity of no greater than 300,000 Gurley-sec; and

(ii) the outer ply having a porosity of no greater than 30,000 Gurley-sec; and,

(b) a popcorn charge including unpopped popcorn kernels and an oil/fat component positioned within the bag interior.

2. A microwaveable popcorn arrangement according to claim 1 wherein:

(a) the inner ply has a porosity of no greater than 600,000 Gurley-sec; and,

(b) the outer ply has a porosity of no greater than 35,000 Gurley-sec.

3. A microwaveable popcorn arrangement according to claim 2 wherein:

(a) the inner ply has a porosity of no greater than 950,000 Gurley-sec; and,

(b) the outer ply has a porosity of no greater than 40,000 Gurley-sec.

4. A microwaveable popcorn arrangement according to claim 3 including:

(a) a microwave interactive construction positioned between the inner ply of non-fluorocarbon treated paper and the outer ply of non-fluorocarbon treated paper.

5. A microwaveable popcorn arrangement according to claim 4 wherein:

(a) the popcorn charge comprises: at least 50 grams of unpopped popcorn kernels; and, at least 20 grams of an oil/fat component having a melting point no greater than 54.4°C.

6. A microwaveable popcorn arrangement according to claim 5 wherein:

(a) the folded bag comprises first and second opposite face panels (20, 21) joined by first and second, opposite, inwardly directed side gussets (22, 23).

Patentansprüche

1. Mikrowellenherdgeeignete Popcornanordnung (1), umfassend:

(a) eine gefaltete Beutelanordnung, die einen Innenraum aufweist und eine innere Lage von nicht fluorkohlenwasserstoffbehandeltem Papier und eine äußere Lage von nicht fluorkohlenwasserstoffbehandeltem Papier umfasst;

(i) wobei die innere Lage eine Porosität von nicht größer als 300.000 Gurley-Sekunden aufweist; und
(ii) die äußere Lage eine Porosität von nicht größer als 30.000 Gurley-Sekunden aufweist; und

(b) eine Popcornfüllung, die nicht aufgegangene Popcornkörner und eine Öl-Fett-Komponente aufweist, die innerhalb des Innenraums des Beutels positioniert ist.

2. Mikrowellenherdgeeignete Popcornanordnung nach Anspruch 1, wobei:

(a) die innere Lage eine Porosität von nicht größer als 600.000 Gurley-Sekunden aufweist; und,
(b) die äußere Lage eine Porosität von nicht größer als 35.000 Gurley-Sekunden aufweist.

3. Mikrowellenherdgeeignete Popcornanordnung nach Anspruch 2, wobei:

(a) die innere Lage eine Porosität von nicht größer als 950.000 Gurley-Sekunden aufweist; und,
(b) die äußere Lage eine Porosität von nicht größer als 40.000 Gurley-Sekunden aufweist.

4. Mikrowellenherdgeeignete Popcornanordnung nach Anspruch 3, aufweisend:

(a) eine mit Mikrowellen wechselwirkende Vorrichtung, die zwischen der inneren Lage von nicht fluorkohlenwasserstoffbehandeltem Papier und der äußeren Lage von nicht fluorkohlenwasserstoffbehandeltem Papier positioniert ist.

5. Mikrowellenherdgeeignete Popcornanordnung nach Anspruch 4, wobei:

(a) die Popcornfüllung umfasst: mindestens 50g von nicht aufgegangenen Popcornkörnern; und mindestens 20g einer Öl-Fett-Komponente, die einen Schmelzpunkt von nicht höher als 54,4 °C aufweist.

6. Mikrowellenherdgeeignete Popcornanordnung nach Anspruch 5, wobei:

(a) der gefaltete Beutel ein erstes und zweites gegenüberliegendes Wandelement (20, 21) umfasst, die durch eine erste und eine zweite, gegenüberliegende, nach innen gerichtete Seitenfalte (22, 23) verbunden sind.

Revendications

1. Emballage pour maïs soufflé pour cuisson au micro-ondes (1), comprenant :

(a) un emballage formant un sac plié ayant un intérieur et comprenant une couche interne de papier traité non fluorocarboné et une couche externe de papier traité non fluorocarboné ;

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- (i) la couche interne ayant une porosité inférieure ou égale à 300 000 Gurley/s ; et
- (ii) la couche externe ayant une porosité inférieure ou égale à 30 000 Gurley/s ; et,

(b) une charge de maïs soufflé comprenant des grains de maïs non soufflés et un composant d'huile/matière grasse positionnés à l'intérieur du sac.

2. Emballage pour maïs soufflé pour cuisson au micro-ondes selon la revendication 1, dans lequel:

- (a) la couche interne a une porosité inférieure ou égale à 600 000 Gurley/s et,
- (b) la couche externe a une porosité inférieure ou égale à 35 000 Gurley/s.

3. Emballage pour maïs soufflé pour cuisson au micro-ondes selon la revendication 2, dans lequel :

- (a) la couche interne a une porosité inférieure ou égale à 950 000 Gurley/s ; et
- (b) la couche externe a une porosité inférieure ou égale à 40 000 Gurley/s.

4. Emballage pour maïs soufflé pour cuisson au micro-ondes selon la revendication 3, comprenant .

- (a) une construction d'interaction pour micro-ondes positionnée entre la couche interne de papier traité non fluorocarboné et la couche externe de papier traité non fluorocarboné.

5. Emballage pour maïs soufflé pour cuisson au micro-ondes selon la revendication 4, dans lequel :

- (a) la charge de maïs soufflé comprend : au moins 50 grammes de grains de maïs non soufflés ; et au moins 20 grammes d'un composant d'huile/matière grasse ayant un point de fusion inférieur ou égal à 54,4°C.

6. Emballage pour maïs soufflé pour cuisson au micro-ondes selon la revendication 5, dans lequel .

- (a) le sac plié comprend un premier et un second panneaux de face (20, 21) opposés reliés par un premier et un second soufflets latéraux (22, 23) opposés orientés vers l'intérieur.

FIG.1

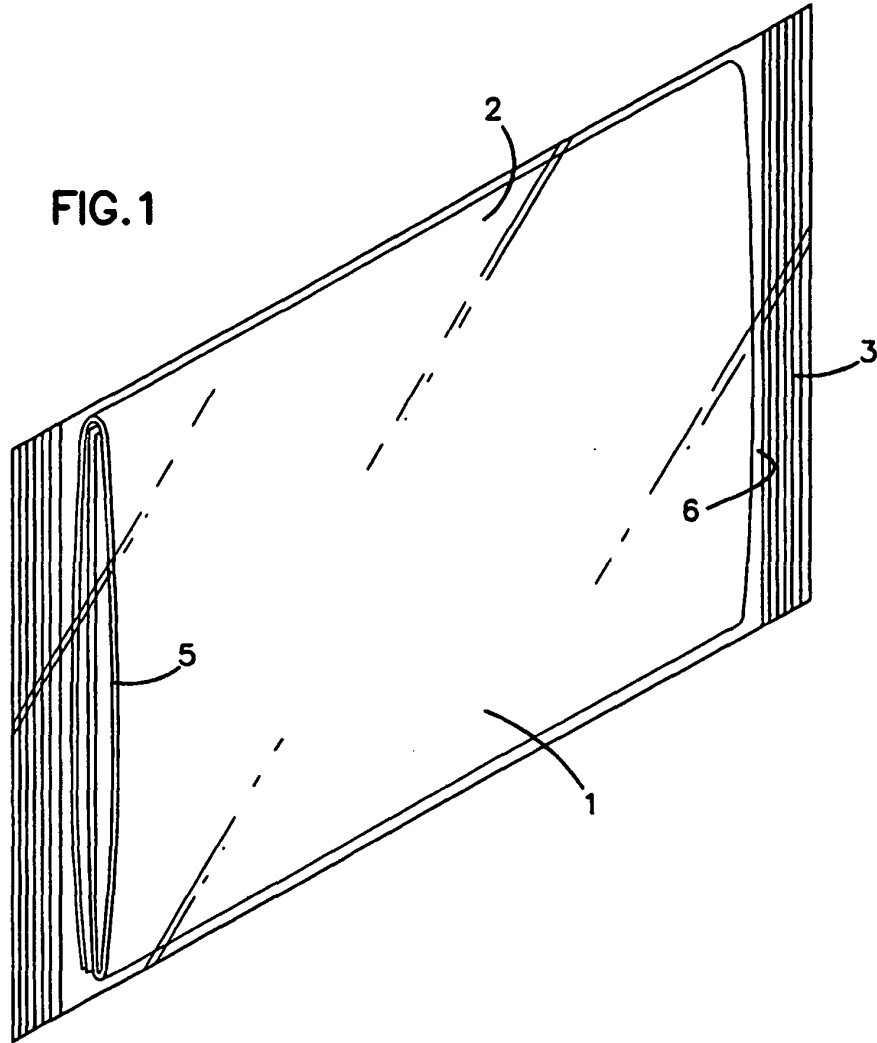


FIG.2

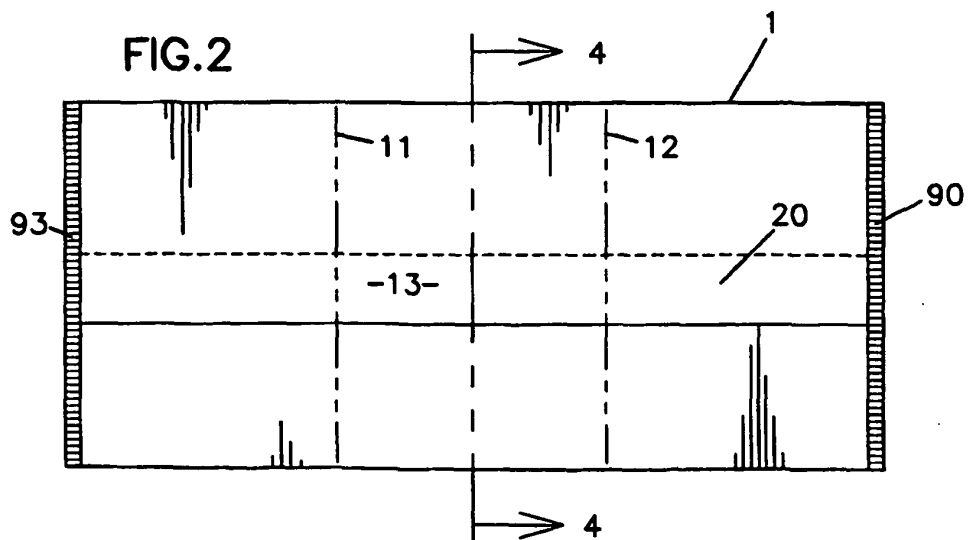


FIG. 3

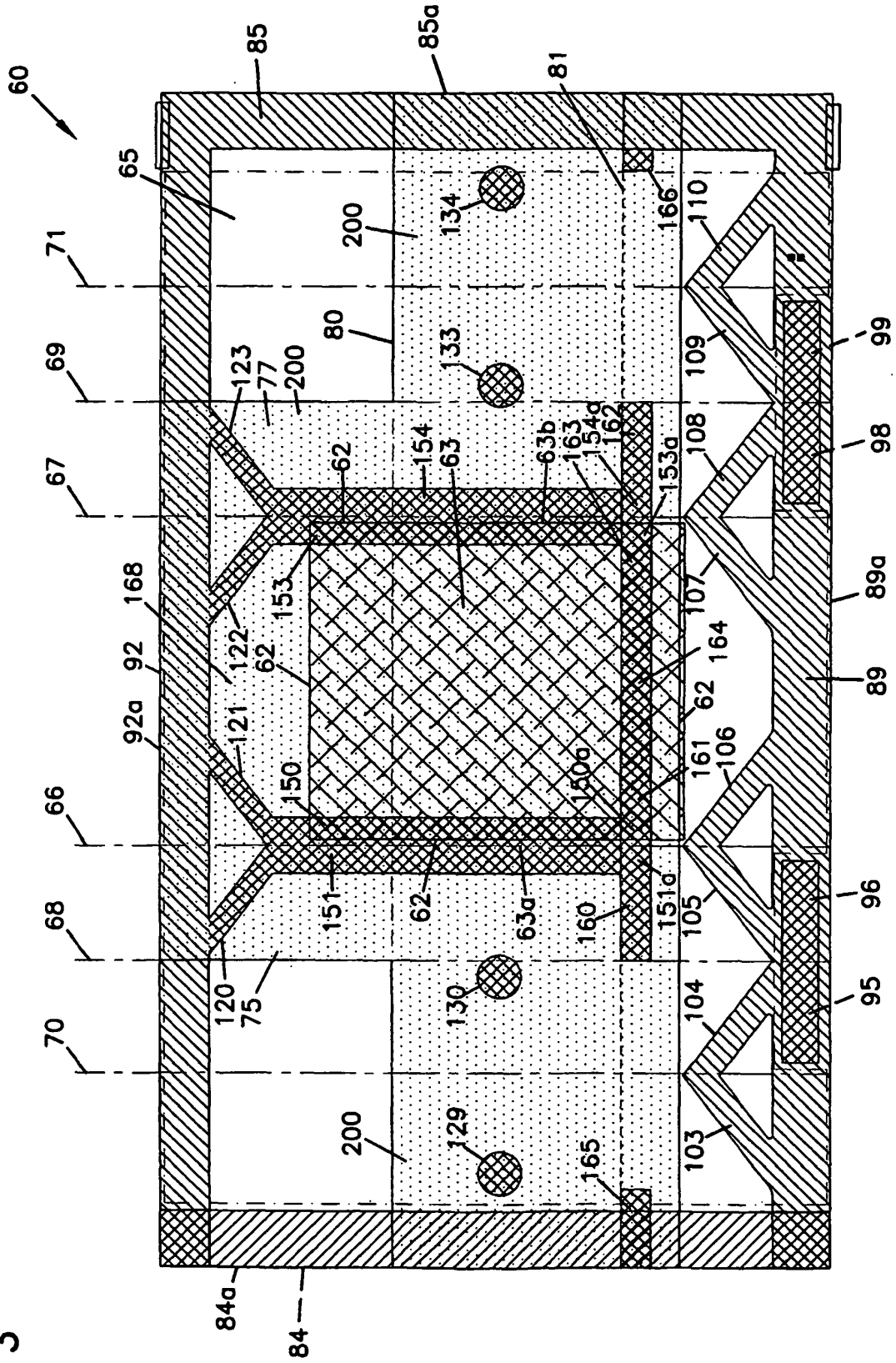
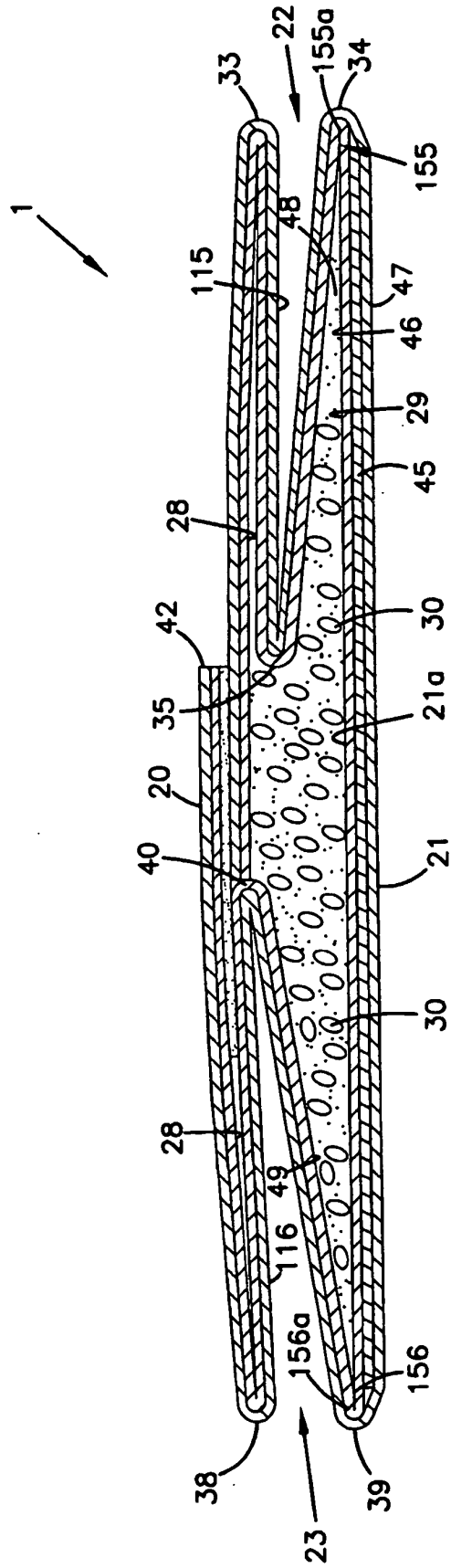


FIG. 4



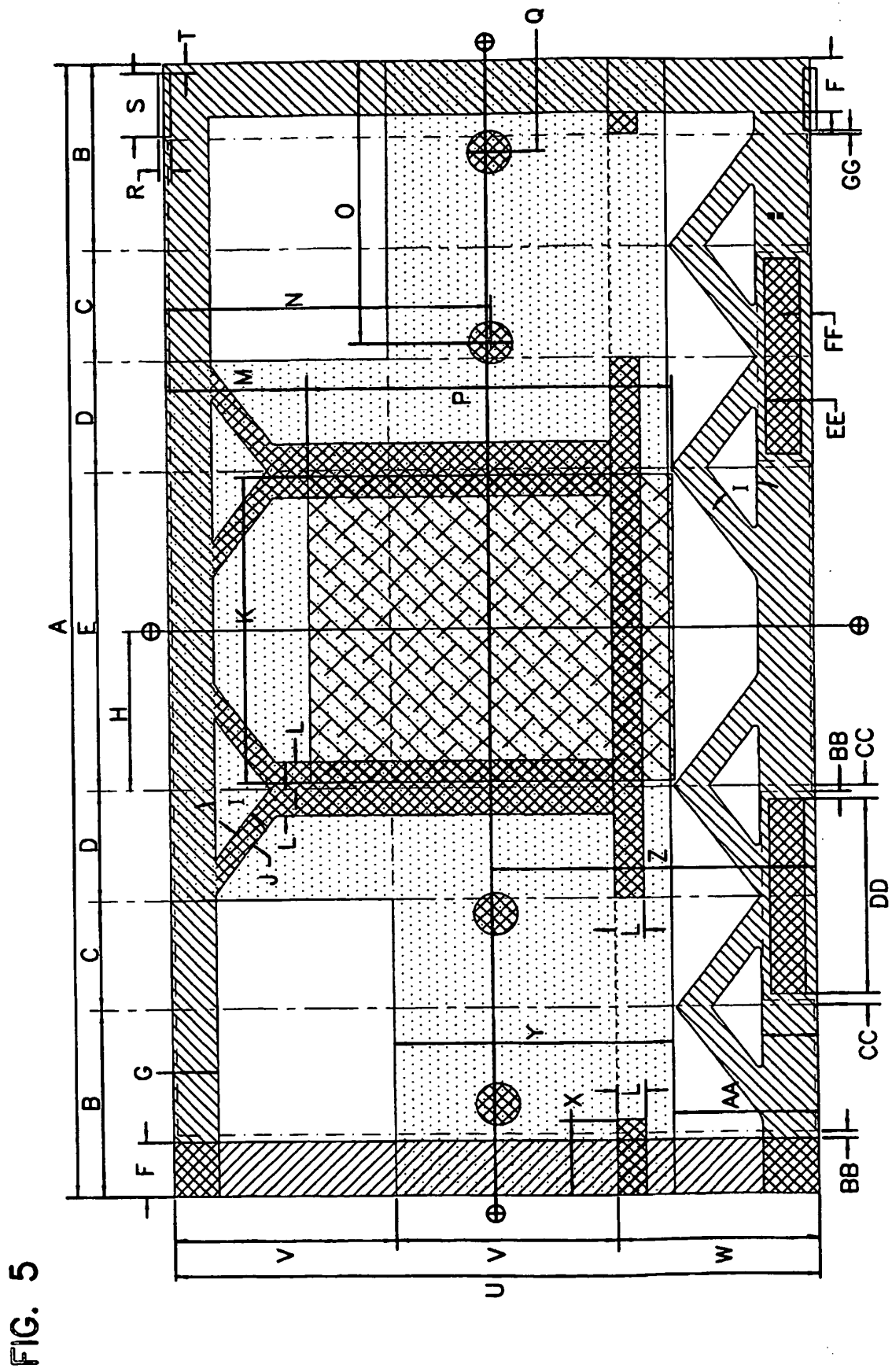
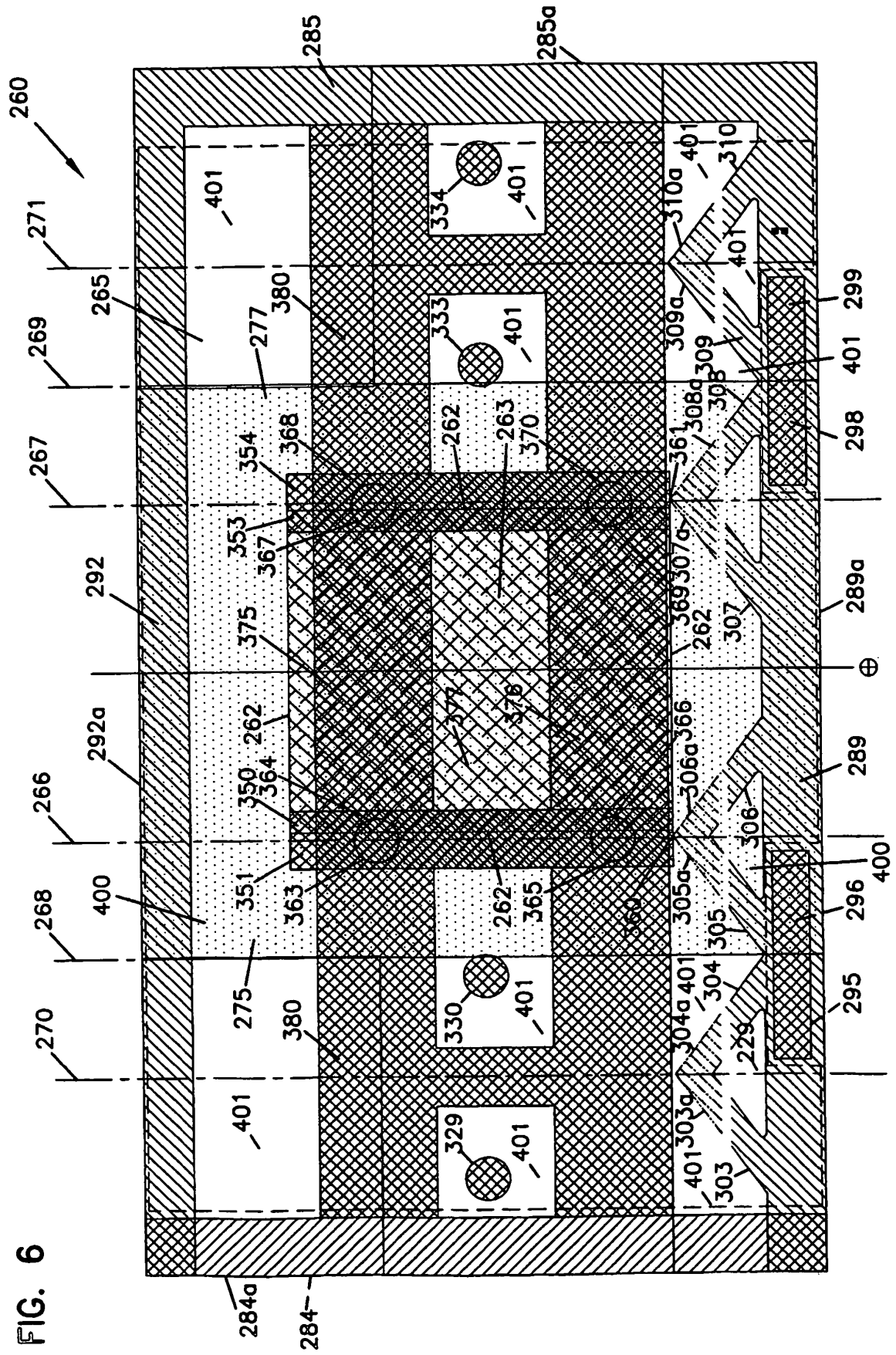
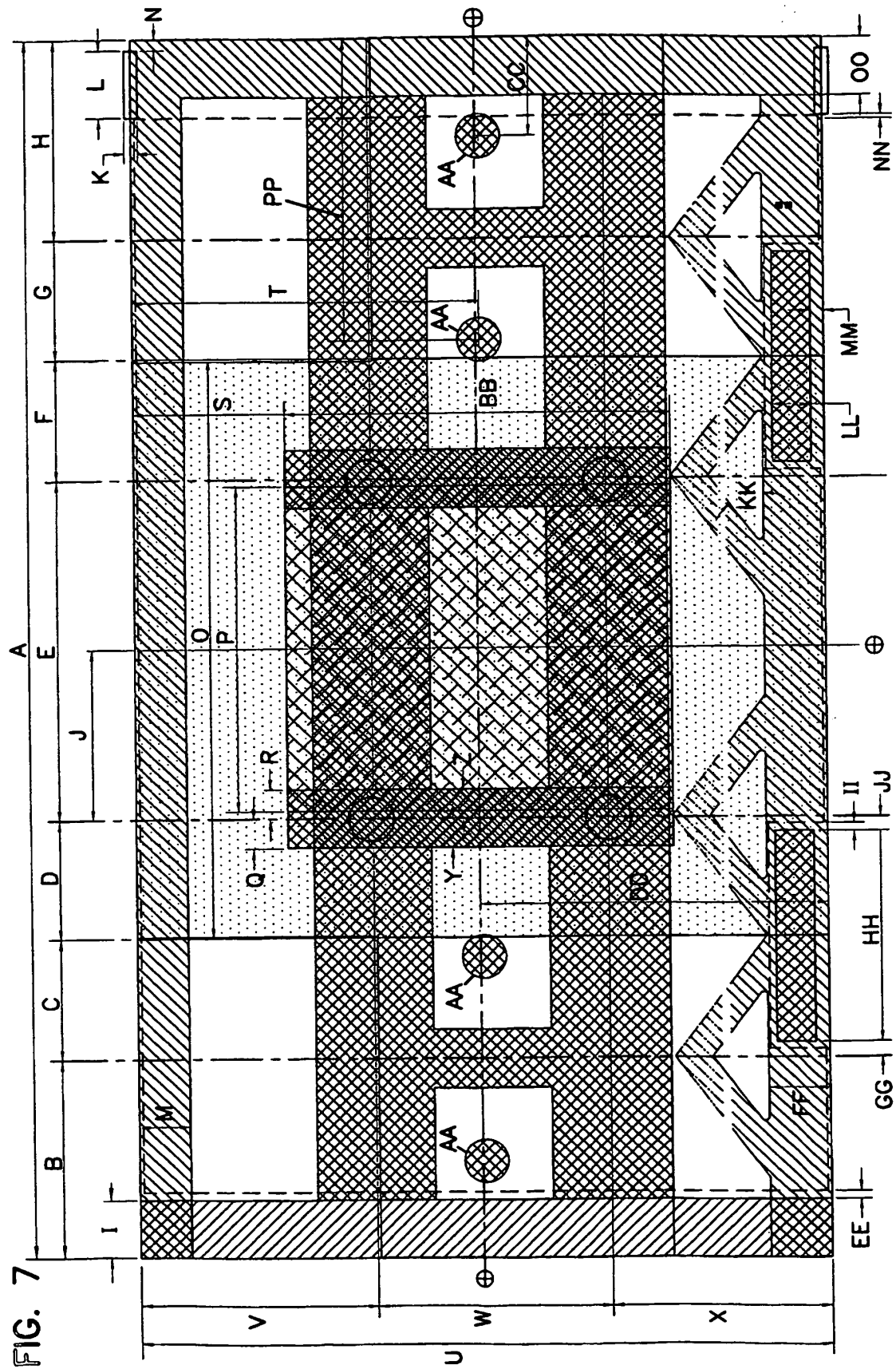


FIG. 6





REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 55256004 P [0001]
- US 60574703 B [0001]
- US 4548826 A [0005] [0007] [0008]
- US 4691374 A [0005] [0007] [0008]
- US 5081330 A [0005]
- US 5044777 A [0005] [0006] [0006] [0047] [0050] [0060] [0090] [0102]
- US 5195829 A [0005] [0007] [0050] [0056] [0057] [0057] [0058] [0090] [0097] [0098] [0098] [0099] [0100]
- US 5302790 A [0005]
- US 5650084 A [0005] [0007] [0047] [0050] [0090]
- US 4044777 A [0007]
- US 5690853 A [0009]
- US 60544573 B [0034]
- US 5195 A [0047]
- US 829 A [0047]
- US 60544873 B [0106]
- US 544873 P [0115]