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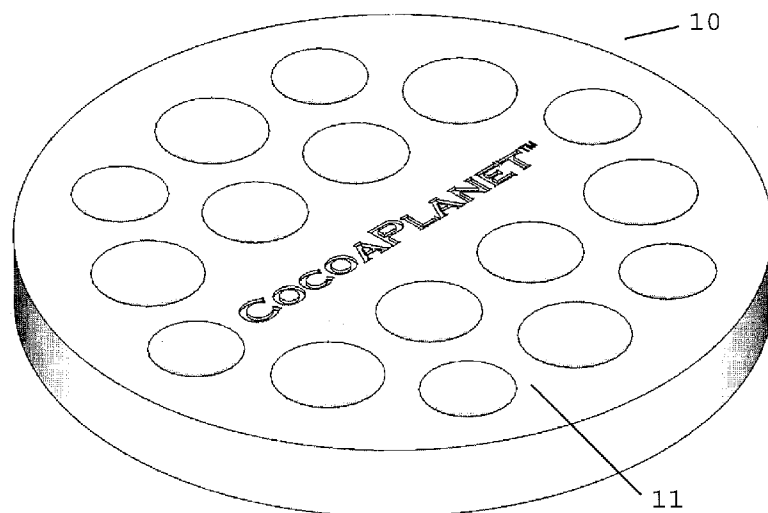
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FIGURE 5



(57) Abstract: A chocolate confectionery and a method for manufacturing same chocolate confectionery where the chocolate confectionery has multiple pearls of flavor distributed evenly throughout a base chocolate wafer such that the flavor and consistency of the chocolate confectionery is consistent throughout. In one form of the chocolate confectionery, small pearls of flavor are suspended within the chocolate creating a pleasing flavor balance and mouth feel with overall lower sugar content and higher cocoa content.

EDIBLE WAFER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from U.S. Provisional Application No. 61/609,896 filed on March 12, 2012 and U.S. Provisional Application No. 61/754024 filed on January 18, 2013.

FIELD OF THE INVENTION

[0002] The present invention generally relates to chocolate confectionery and more particularly to an edible chocolate wafer that has deposits of filling distributed evenly about the wafer.

BACKGROUND OF THE INVENTION

[0003] Chocolate confectionery includes those confections where chocolate is used as a coating for various fruits and fillings such as cherries. Traditional filled confections have a single, large cell of filling material that is either covered in enrobing chocolate or deposited into a molded chocolate form which is then “topped” with enrobing chocolate. The structural designs of these traditional products have a significantly low Chocolate to Filling Ratio. Also, in traditional filled confections, the sugar content of the filling material is typically higher than the sugar content of the chocolate.

[0004] The current industry method of producing a chocolate confectionary, such as a chocolate truffle is to use a standard single shot deposition method. Current usage pairs a single jacketed tube with a single mold cavity to create a filled confection with one large filling "center" (e.g. chocolate truffle).

[0005] Figure 1 depicts an isometric view with transparent surfaces of a jacketed tube with plates separated, while Figure 2 is an isometric segmented view of a jacketed tube with plates separated. In a standard single shot deposition, both chocolate **1** and filling **2** are introduced simultaneously to separate inputs in a two piece deposition plate that comprises a “jacketed tube” nozzle (See Figures 1 and 2). As illustrated, the chocolate passes through an opening **53** in the top plate **51** to the bottom plate **52** below. The filling **2** is guided through a first channel **54** in the top plate down into a small diameter tube **55**. As the chocolate reaches the bottom plate **52**, it is guided through a second channel **56** down to a large diameter opening, jacket **57**.

[0006] When the two plates **51**, **52** are assembled in place (Figures 3 and 4), the narrow tube **55** from the top plate **51** projects down through the larger jacket **57** in the bottom plate **52**. During deposition, the filling **2** extruded through the tube **55** is completely surrounded by the chocolate **1** extruded through the jacket **57**. One application of this technique involves the deposition of both filling **2** and chocolate **1** through a single jacketed tube into a single mold cavity to create a molded, filled chocolate truffle.

[0007] The ratio of chocolate to filling can be controlled by varying the pressure exerted on the respective inputs of each ingredient. Typically, the truffles produced in this method have a low Chocolate to Filling Ratio and thus have a relatively high sugar content. Additionally, the high sugar filling of a traditional confectionary is located in the center, thus concentrating the flavor in one area of the confection.

[0008] Considerations in making chocolate confectionery are Chocolate to Filling Ratio vs. Product Esthetics, Chocolate to Filling Ratio vs. Sugar Content, Consumer Attractiveness (Negative Health Impact of Sugar, Positive Health Impact of Chocolate), and Product Structure.

[0009] *Chocolate to Filling Ratio vs. Product Esthetics.* The chocolate and filling components of a filled chocolate confection can have significant differences in flavor characteristics and structural consistency. The Chocolate to Filling Ratio is one important consideration in determining the flavor balance and mouth feel of the finished product.

[0010] *Chocolate to Filling Ratio vs. Sugar Content.* As mentioned, in traditional filled confections, the sugar content of the filling material is typically higher than the sugar content of the chocolate. A product with a relatively higher Chocolate to Filling Ratio will typically result in relatively lower sugar content.

Consumer Attractiveness:

[0011] *Negative Health Impact of Sugar.* Despite the pleasing flavor attribute of sweetness, diets that are high in sugar have been linked to negative health impacts including dental decay, obesity and metabolic diseases including diabetes. Products which retain sweet flavor with reduced sugar content can be more attractive to many consumers.

[0012] *Positive Health Impact of Chocolate*. Cocoa, a fundamental ingredient in chocolate confections, contains antioxidants which have been linked to numerous health benefits. Chocolate confections with relatively high cocoa content can be attractive to many consumers.

SUMMARY OF THE INVENTION

[0013] The foregoing and other problems and deficiencies in known chocolate confectionery are solved and a technical advantage is achieved by an edible chocolate wafer that distributes the filling throughout the wafer and has a high chocolate to filling ratio. That is, the structure of the edible chocolate wafer distributes the flavored filling among multiple wells or pearls of flavor throughout the volume of the confectionery, allowing a pleasing flavor balance and mouth feel with overall lower sugar content and higher cocoa content. Creating a filled confection with several flavor deposits that have health, esthetic and structural benefits.

[0014] In accordance with an aspect of the present invention, there is provided an edible chocolate confectionery comprising a chocolate wafer having dimensions and one or more depressions formed on a top surface of the chocolate wafer, more than one flavored fillings embedded in the one or more depressions, and an enrobing layer of chocolate. The chocolate wafer may be made from one of white, milk or dark chocolate, while the flavored filling is either a chocolate-based filling or a sugar-based filling. The sugar-based filling includes syrups and caramel. The more than one flavored fillings are in a hemispherical shape and are distributed throughout the chocolate wafer.

[0015] In another embodiment, the edible chocolate confectionery comprises chocolate, and more than one flavored fillings. The more than one flavored fillings are suspended within the chocolate, and are in the shape of orbs, distributed symmetrically about the chocolate.

[0016] Another embodiment is a method of making an edible chocolate confectionery includes the steps of heating chocolate and a flavored filling such that both are in a liquefied phase, depositing the chocolate and flavored filling into a multi-nozzle jacketed tube assembly. The

flavored filling may be in a liquid or semi-liquid phase already and would not to be heated. The combined chocolate and flavored filling is deposited into a single cavity mold, and is cooled until the chocolate is in a solid phase and the flavored filling may be in a liquid, semi-liquid or solid phase. The tempered chocolate first enters the multi-nozzle jacketed tube assembly and the single cavity mold. Liquefied flavored filling is subsequently and simultaneously with the tempered chocolate deposited into the multi-nozzle jacketed tube assembly whereby as the flavored filling exits the multi-nozzle jacketed tube assembly it is surrounded by the tempered chocolate. Flow of the liquefied flavored fillings is terminated prior to the termination of the chocolate flow such that pearls of flavor are formed within the tempered chocolate, and the tempered chocolate continues to flow until the single cavity mold is completely filled. Chocolate used may be one of white, milk or dark chocolate, and the flavored filling is either a chocolate-based filling or a sugar-based filling. Sugar-based filling includes syrups and caramel. The more than one pearls of flavor are distributed throughout the chocolate wafer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The foregoing summary, as well as the following detailed description of the invention will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there are shown in the drawings embodiments which are presently preferred. It should be understood, however, that the invention can be embodied in different forms and thus should not be construed as being limited to the embodiments set forth herein.

[0018] Figure 1: Example Jacketed Tube with Plates Separated, Isometric View with Transparent Surfaces;

[0019] Figure 2: Example Jacketed Tube with Pieces Separated, Isometric Section View;

[0020] Figure 3: Example Jacketed Tube with Plates in Place, Isometric View with Transparent Surfaces;

[0021] Figure 4: Example Jacketed Tube with Plates in Place, Isometric Section View;

[0022] Figure 5: Single Shot Basic Product, Isometric View;

- [0023] Figure 6: Single Shot Basic Product, Isometric Section View;
- [0024] Figure 7: Three Stage Basic Product, Isometric View;
- [0025] Figure 8: Three Stage Basic Product, Isometric Section View;
- [0026] Figure 9: Basic Molded Chocolate Wafer, Isometric View;
- [0027] Figure 10: Basic Molded Chocolate Wafer, Isometric Section View;
- [0028] Figure 11: Basic Molded Chocolate Wafer, Plan View;
- [0029] Figure 12: Basic Molded Chocolate Wafer, Section View;
- [0030] Figure 13: Three Stage Basic Product, Exploded Isometric View;
- [0031] Figure 14: Three Stage Basic Product, Exploded Isometric Section View;
- [0032] Figure 15: Multi-Nozzle Jacketed Tube, Top Plate, Plan View;
- [0033] Figure 16: Multi-Nozzle Jacketed Tube, Bottom Plate, Plan View;
- [0034] Figure 17: Multi-Nozzle Jacketed Tube with Plates Separated, Isometric View;
- [0035] Figure 18: Multi-Nozzle Jacketed Tube with Plates Separated, Isometric Section View;
- [0036] Figure 19: Multi-Nozzle Jacketed Tube with Plates in Place, Isometric View;
- [0037] Figure 20: Multi-Nozzle Jacketed Tube with Plates in Place, Isometric Section View;
- [0038] Figure 21: Four Unit Multi-Nozzle Jacketed Tube with Plates Separated, Isometric Top View;
- [0039] Figure 22: Four Unit Multi-Nozzle Jacketed Tube with Plates Separated, Isometric Bottom View;
- [0040] Figure 23: Bottom Plate for Multi-Nozzle Jacketed Tube Deposition with Hydrothermal Regulation Channel, Plan View with Transparency;

[0041] Figure 24: Bottom Plate for Multi-Nozzle Jacketed Tube Deposition with Hydrothermal Regulation Channel, Isometric View with Transparency;

[0042] Figure 25: Mold for Multi-Nozzle Single Shot Deposition, Isometric View;

[0043] Figure 26: Mold for Multi-Nozzle Single Shot Deposition, Isometric Section View;

[0044] Figure 27: Multi-Nozzle Jacketed Tube with Mold, Isometric View with Staggered Section;

[0045] Figure 28: Multi-Nozzle Jacketed Tube with Mold, Section View;

[0046] Figure 29: Basic Molded Chocolate Wafer Mold, Isometric View;

[0047] Figure 30: Basic Molded Chocolate Wafer Mold, Isometric Section;

[0048] Figure 31: Cylindrical Multi-Nozzle, Isometric View;

[0049] Figure 32: Cylindrical Multi-Nozzle, Isometric Section View;

[0050] Figure 33: Basic Molded Chocolate Wafer with Cylindrical Multi-Nozzle, Isometric View;

[0051] Figure 34: Basic Molded Chocolate Wafer with Cylindrical Multi-Nozzle, Isometric Section View;

[0052] Figure 35: Conical Multi-Nozzle, Isometric View;

[0053] Figure 36: Conical Multi-Nozzle, Isometric Section View;

[0054] Figure 37: Plate Multi-Nozzle, Isometric View;

[0055] Figure 38: Plate Multi-Nozzle, Plan View**Error! Bookmark not defined.**

[0056] Figure 39: Basic Channeled Wafer with Single Nozzle, Isometric View;

[0057] Figure 40: Basic Channeled Wafer after Filling Deposition, Isometric View;

[0058] Figure 41: Thermal Plastic Sheetting, Basic Molded Chocolate Wafer Positive Form and Vacuum Forming Platen, Exploded Isometric View;

[0059] Figure 42: Basic Molded Chocolate Wafer Positive Form, Isometric View;

[0060] Figure 43: Basic Molded Chocolate Wafer Positive Form, Isometric Section View;

[0061] Figure 44: Basic Molded Chocolate Wafer Positive Form with Containing Walls, Isometric View;

[0062] Figure 45: Basic Molded Chocolate Wafer Silicone Negative Form Mold, Isometric View;

[0063] Figure 46: Small Three Stage Basic Product, Isometric View with Section View of Enrobing and Filling;

[0064] Figure 47: Small Basic Molded Chocolate Wafer, Plan View;

[0065] Figure 48 Square Wafer, Plan View;

[0066] Figure 49: Rectangular Wafer, Plan View;

[0067] Figure 50: Triangular Wafer, Plan View;

[0068] Figure 51: Hexagonal Wafer, Plan View;

[0069] Figure 52: Circular Wafer with 27 Circular Wells, Plan View;

[0070] Figure 53: Basic Product, Plan View;

[0071] Figure 54: Circular Wafer with 27 Circular Wells, Plan View;

[0072] Figure 55: Circular Wafer with 6 Circular Wells, Plan View;

[0073] Figure 56: Basic Molded Chocolate Wafer with Enlarged Wells, Plan View;

[0074] Figure 57: Basic Molded Chocolate Wafer with Reduced Wells, Plan View;

- [0075] Figure 58: Cylindrical Well, Isometric and Plan Views;
- [0076] Figure 59: Hemi-ellipsoidal Well, Isometric and Plan Views;
- [0077] Figure 60: Conical Well, Isometric and Plan Views;
- [0078] Figure 61: Truncated Conical Well, Isometric and Plan Views;
- [0079] Figure 62: Cuboidal Well, Parallel Projection and Plan Views;
- [0080] Figure 63: Square Section Hemi-ellipsoidal Well, Parallel Projection and Plan Views;
- [0081] Figure 64: Square Pyramidal Well, Parallel Projection and Plan Views;
- [0082] Figure 65: Truncated Square Pyramidal Well, Parallel Projection and Plan Views;
- [0083] Figure 66: Triangular Prismoidal Well, Isometric and Plan Views;
- [0084] Figure 67: Triangular Section Hemi-ellipsoidal Well, Parallel Projection and Plan Views;
- [0085] Figure 68: Triangle Pyramidal Well, Parallel Projection and Plan Views;
- [0086] Figure 69: Truncated Triangle Pyramidal Well, Parallel Projection and Plan Views;
- [0087] Figure 70: Star Prismoidal Well, Isometric and Plan Views;
- [0088] Figure 71: Star Section Hemi-ellipsoidal Well, Isometric and Plan Views;
- [0089] Figure 72: Star Pyramidal Well, Isometric and Plan Views;
- [0090] Figure 73: Truncated Star Pyramidal Well, Isometric and Plan Views;
- [0091] Figure 74: Circular Wafer with 27 Hexagonal Wells, Plan View;
- [0092] Figure 75: Circular Wafer with 27 Circular Wells, Plan View;
- [0093] Figure 76: Square Wafer with 9 Square Wells, Plan View;
- [0094] Figure 77: Square Wafer with 16 Square Wells, Plan View;

[0095] Figure 78: Rectangular Wafer with 18 Square Wells, Plan View;

[0096] Figure 79: Rectangular Wafer with 32 Square Wells, Plan View;

[0097] Figure 80: Triangular Wafer with 9 Triangular Wells, Plan View; and

[0098] Figure 81: Hexagonal Wafer with 24 Triangular Wells, Plan View.

DETAILED DESCRIPTION

[0099] The present subject matter will now be described more fully hereinafter with reference to the accompanying figures, in which representative embodiments are shown. The present subject matter can, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided to describe and enable one of skill in the art. Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the subject matter pertains. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety.

[00100] While reference herein is made to an edible chocolate wafer, it is to be understood that the present invention has application in any chocolate confectionery or other food products including such items as crackers, biscuits, cakes and cookies with inclusions of cheese, sweet fillings (e.g. chocolate or sugar-based) or savory fillings (e.g. mushroom paste) or spicy fillings (e.g. wasabi).

[00101] Described herein are various embodiments of a chocolate filled confection (e.g., a chocolate confection) that may be configured to achieve a variety of flavor balances, mouth feels, sugar contents, and cocoa contents not available with traditional confection manufacture. Included herein are descriptions of processes for simultaneous deposition of chocolate and filling, filling deposition, and mold creation.

[00102] It is also contemplated that one or more of the disclosed processes may be used to create other types of products such as biscuits or crackers having inclusions of cheese. In addition to cheese, sweet fillings (e.g. chocolate or sugar-based) or savory fillings (e.g. mushroom paste) or

spicy fillings (e.g. wasabi) may be used as inclusions in biscuits, crackers, cakes or cookies. In addition to the Three Stage Basic Process (discussed later), these food products may be produced by the modified Single Shot Process (described later).

[00103] The base product is, in some embodiments, a chocolate wafer that includes multiple deposits of flavored filling also known as inclusions or pearls of flavor distributed throughout the wafer in a geometric grid. Inclusions as known in the industry may refer to solid, semi-liquid or liquid substances. In the context of the embodiments described herein referring to the processes described, inclusions refer generally to semi-liquid or liquid substances. In certain embodiments, the inclusions may be in a solid phase. A variety of distinct manufacturing processes can be used to produce this filled chocolate wafer. Described herein are two such processes: Modified Single Shot Deposition and Three Stage Deposition.

Single Shot Basic Product

[00104] Figures 5 and 6 depict a single shot basic product **10**. The single shot basic product **10** is a molded chocolate wafer **11** containing several small orbs of flavored substances, also referred to as pearls of flavor **12**. Multiple small orbs of flavored substances are distributed throughout the wafer allowing for a consistent flavor experience when consuming the wafer, not a highly concentrated flavor at the center as with a traditional chocolate confectionery. Furthermore, the chocolate to filling ratio is also variable, allowing for a higher chocolate content, thus reducing the level of sugar as compared to a traditional chocolate confectionery. In both the Modified Single Shot Basic Product and the Three Stage Basic Product (described later) the reduced sugar amount is due to less filling substance compared to the quantity of chocolate. That is, the Modified Single Shot Basic Product and the Three Stage Basic Product have an 85:15 chocolate to filling ratio as compared to traditional confections which have 20:80 chocolate to filling ratio. As a result, traditional confections have a calculated 7.5% more sugar content than either the Modified Single Shot Basic Product or the Three Stage Basic Product. This assumes that the traditional confections use the same chocolate and filling as the Modified Single Shot Basic Product or the Three Stage Basic Product. In actuality, traditional confections use chocolates and fillings with higher sugar content than that used by the disclosed invention,

thereby increasing the difference in overall sugar content as compared to the Modified Single Shot Basic Products or the Three Stage Basic.

[00105] The molded chocolate wafer **11** may be made from a variety of chocolates, such as milk chocolate, dark chocolate, white chocolate, and any combination thereof. The physical characteristics of the molded chocolate wafer, size, shape, etc. are similar to those of the shaped molded chocolate wafer **21** of the three stage basic product **20**, described below. Examples of the flavored substance used in the pearls of flavor **12** include but are not limited to chocolate-based fillings and sugar-based fillings (including syrups and caramels). Both the chocolate-based and sugar-based fillings may contain one or more of salted caramel, vanilla espresso, chocolate olive, mandarin orange, and cocoamint (peppermint). Other substances for the fillings are contemplated. Variations in the viscosity of flavored substances also known as filling material used to produce the small pearls of flavor **12** can be used to tailor the mouth feel. The process for manufacturing a single shot basic product **10** is a modified single shot deposition process using a multi-nozzle jacketed tube assembly **30** combined with a single cavity mold which is described later.

[00106] The dimensions of the single shot basic product **10** are generally the same as those described for the three stage basic product. As with the three stage basic product, it is anticipated that the dimensions of the single shot basic product **10** may vary in size, depending on multiple reasons such as but not limited to, customer preference.

[00107] The diameter of the pearls of flavor is a function of the volume of filling material deposited. There are a number of factors that influence the volume of filling, including tube diameter, but also pressure of extrusion which is controlled by the (adjustable) length of retraction in the pistons that drive extrusion in the depositing machine. Another factor influencing diameter is whether the pearl of flavor maintains a perfectly spherical form or whether it flattens into an ovoid with a horizontal diameter that is greater than the vertical diameter. This is influenced by the presence of the tempered chocolate, which serves to limit the "flattening" or horizontal expansion. Typically, the diameter of a pearl of flavor has a range of 1/16 to 1/4 inch.

Three Stage Basic Product

[00108] Figures 7 and 8 depict a three stage basic product **20**. The three stage basic product **20** is a disc-shaped molded chocolate wafer **21** with several depressions (wells) **22** on the top surface **25**, each of which is filled with a flavored substance **23**. The filled wafer can optionally be covered with enrobing chocolate **24**. The outer dimensions of the three stage basic product **20** are 7 millimeter (mm) in height and a diameter of 58 mm.

[00109] Following is a description of components included in the three stage basic product in some embodiments of the product.

[00110] Molded Chocolate Wafer. The chocolate wafer **21** is a molded form. On the top surface **25** are arranged several depressions **22** (also referred to herein as “wells” and “cells”). The wafer **21** is in the shape of a disc having a height of 6 mm and a diameter of 56 mm. It has a weight of 20 grams. These dimensions and measurements are exemplary and it is anticipated that different size wafers may be used. The wafer may be made out of dark chocolate (64% cacao), white chocolate, milk chocolate or any variation thereof. Dark chocolate with a different percentage of cacao is also anticipated to be used in the manufacture of both the three stage basic product and the single shot basic product.

[00111] Figures 9 and 10 depict an embodiment of the present invention featuring a circular wafer plan shape with 19 hemispheric wells **22** arranged in a hexagonal matrix (tiling pattern) on the top surface **25**. Several aspects of this basic molded chocolate wafer design can be varied, including wafer size, wafer plan shape, well size, well shape, density and tiling patterns, as described below.

[00112] Figure 11 shows a plan view of the basic molded chocolate wafer **21** having a diameter of 56 millimeters (mm). In this example, the diameters of the wells **22** circling the perimeter of the wafer **21** are alternately larger 8.5 mm and smaller 7.2 mm than the diameter of the wells **22** in the center of the pattern 7.9 mm. The outer diameter wells **22** on the perimeter of the wafer are set 3.5 mm in the outer perimeter. Whereas, the distance between the wells of the outer perimeter and the inner wells is 2.8 mm and the distance between the wells having a 7.9 mm diameter is 2.6 mm. This variation in diameter allows the wells **22** in the hexagonal tiling pattern to be more evenly distributed within, and to be a more complete cover of, the circular perimeter of the wafer **21**. In some embodiments, the wells **22** are all of uniform size. The depth

[00113] Figure 12 shows a section view of the wafer **21**, including a hemispherical shape of the wells **22**. Other shapes can also be used, as applicable.

[00114] In some embodiments, the wells **22** in the wafer **21** are filled with a flavored substance through a deposition process. This allows the introduction of a variety of flavors that will be complimentary to the chocolate. Example filling materials for both the sugar-based fillings and the chocolate-based fillings include, but are not limited to, salted caramel, vanilla espresso, chocolate olive, mandarin orange and cocoamint (peppermint). Variations in the viscosity of filling material **23** can be used to tailor the mouth feel and deposition efficiency or to facilitate the distribution of filling **23** among the wafer's multiple wells **22**, or for other purposes.

[00115] The filled wafer may be covered on the top and sides with an outer shell of chocolate **24** (also referred to herein as "Enrobing Chocolate"). The enrobing chocolate may have a thickness of 1 mm. Other thicknesses are contemplated. Typically, the enrobing chocolate will be the same as the chocolate used to manufacture the wafer, for example milk, dark or white chocolate. However, it is contemplated that the chocolate used for the enrobing chocolate may be different than that of the chocolate wafer. Optionally, the enrobing chocolate **24** may be omitted. The decision to include or omit enrobing chocolate **24** may be driven by a variety of factors, such as esthetic considerations including appearance and mouth feel. Inclusion of enrobing chocolate **24** can also be used to structurally contain the filling material **23**, such as in the case of more viscous filling materials.

[00116] Figures 13 and 14 depict the components of the three stage basic product in exploded views.

[00117] As discussed, various factors can be modified to alter the taste, caloric, and health impact of the filed chocolate wafer. One such factor is the Chocolate to Filling Ratio (CFR). The ratio of total chocolate (i.e., wafer **21** plus enrobing **24**) to filling material **23** is one consideration in the design of a filled chocolate confection. Table 1 details an example calculation of the Chocolate to Filling Ratio (CFR) in terms of volume for the three stage basic

product described above. The data presented in Table 1 is exemplary and other values may be substituted.

Table 1 Example Calculation of Chocolate to Filling Ratio by Volume for Three Stage Basic Product

Filling	Standard Wells	Larger Wells	Smaller Wells
Well Diameter (cm)	0.79	0.85	0.72
Well Radius (cm)	0.40	0.43	0.36
Well Volume (cm ³)	0.13	0.15	0.11
Count of Wells	7	6	6
Total Volume (cm ³)	0.90	0.90	0.64
Filling Volume (cm³)	2.44		
Chocolate Wafer			
Filled Wafer Diameter (cm)	5.61		
Filled Wafer Radius (cm)	2.80		
Filled Wafer Plan Area (cm ²)	24.70		
Filled Wafer Height (cm)	0.60		
Filled Wafer Volume (cm ³)	14.82		
Filling Volume (cm ³)	(2.44)		
Chocolate Wafer Volume (cm³)	12.38		
Chocolate Enrobing			
Enrobing Thickness (cm)	0.05		
Enrobed Wafer Diameter (cm)	5.71		
Enrobed Wafer Radius (cm)	2.85		
Enrobed Wafer Plan Area (cm ²)	25.59		
Enrobed Wafer Height (cm)	0.65		
Enrobed Wafer Volume (cm ³)	16.63		
Filled Wafer Volume (cm ³)	(14.82)		
Chocolate Enrobing (cm³)	1.81		
Chocolate to Filling Ratio			
Chocolate Wafer Volume (cm ³)	12.38		
Chocolate Enrobing Volume (cm ³)	1.81		
Chocolate Volume (cm ³)	14.19	85%	
Filling Volume (cm ³)	2.44	15%	
Total Volume (cm ³)	16.63	100%	
Chocolate to Filling Ratio (by Volume)	5.81		

Modified Single Shot Production Process

[00118] The modified single shot production process used in manufacturing the single shot basic product employs a modified single shot deposition (discussed in the Background of Invention Section) using a unique multi-nozzle jacketed tube assembly **30** combined with a single cavity mold **40**. The multi-nozzle jacketed tube assembly **30** consists of two plates, an upper or top plate **31** and lower or bottom plate **32**.

[00119] The modified single shot deposition technique produces a single shot basic product describe above that is similar to a three stage basic product **20**. By arranging several jacketed tubes into the desired tiling pattern, the pearls of flavor **12** can be produced with a single simultaneous shot of both filling substance **2** and chocolate **1**.

[00120] Figure 15 depicts a plan view of the top plate **31** of an exemplary Multi-Nozzle Jacketed Tube assembly **30** designed to produce the 19 pearls of flavor **12** arranged in a hexagonal tiling pattern similar to the three stage basic product **20** previously described. Plate **31** is used in conjunction with a depositor machine (not shown) and has four circular inputs **33 a-d**, having a diameter of between 1/8 and 1/2 inch depending on the particular product dimensions, on the left for the filling substance **2** and four circular inputs **34 a-d**, having a diameter of between 1/8 and 1/2 inch depending on the particular product dimensions, on the right for the chocolate **1**. The inputs for the tempered chocolate extend through the top plate **31**. The filling substance **2** is introduced to each of the inputs **33 a-d** on the left and flows through channels **35 a-d** to a chamber where it is distributed among several narrow-diameter outputs (also referred to herein as “tubes”) **36**. Each channel **35** supports more than one tube **36**. The channels **35a-d** have a width of between 1/8 and 1/2 inch and a depth of between 1/8 and 1/2 inch. The length and configuration of the channels **35a-d** may vary depending on the final product dimension. The tubes **36** have a diameter of between 1/16 and 1/4 inch diameter, a wall thickness of between 1/64 and 1/16 inch, and extend through both the top and bottom plates **31** and **32**. Chocolate **1** is introduced to each of the inputs **34 a-d** on the right, and flows down through openings to the bottom plate **32** (see Figure 16). The flow rate of the filling substance **2** and chocolate **1** can be controlled by the depositor machine through temperature and the viscosity properties of the chocolate **1** and filling substance **2**.

[00121] Figure 16 depicts a plan view of the bottom plate **32** for the Multi-Nozzle Jacketed Tube assembly **30** corresponding to the top plate **31** illustrated in Figure 15. Tempered chocolate **1** passes through the openings **34 a-d** in the top plate **31** where it is introduced to each of the inputs on the right and flows through a channel **38 a-d** to a chamber where it is distributed among several wide-diameter outputs (jackets) **37**. The channels **38a-d** have a width of between 1/8 and 1/2 inch and a depth of between 1/8 and 1/2 inch. The length and configuration of the channels **38a-d** may vary depending on the final product dimension. The jackets **37** have a diameter of between 1/8 and 1/2 inch and extend through the bottom plate.

[00122] Figure 17 depicts an isometric view of a Multi-Nozzle Jacketed Tube Assembly **30** with plates separated, while Figure 18 depicts an isometric cross section view of a Multi-Nozzle Jacketed Tube Assembly **30** with plates separated. In the modified single shot deposition process, both chocolate **1** and filling substance **2** are introduced simultaneously to the separate inputs **34 a-d** and **33 a-d**, respectively, in the two piece deposition plates **31** and **32** that comprises multiple “jacketed tube” nozzles. The chocolate **1** passes through openings **34 a-d** in the top plate **31** to the bottom plate **32** below. The filling **2** is guided through first channels **35a-d** in the top plate **31** down into a small diameter tube **36**. As the tempered chocolate **1** reaches the bottom plate **32**, it is guided through second channels **38a-d** down to a large diameter opening, jackets **37**.

[00123] When the two plates **31, 32** are assembled in place (Figures 19 and 20), the narrow tubes **36** from the top plate **31** project down through the larger openings (jacket) **37** in the bottom plate **32**. During deposition, the filling substance **2** extruded through the tubes **36** is completely surrounded by the tempered chocolate **1** extruded through the jackets **37**. One application of this technique involves heating the chocolate **1** or both the filling substance **2** and chocolate **1** such that they have compatible viscosity properties and depositing both filling substance **2** and chocolate **1** through multiple jacketed tubes into the mold cavity of the single shot mold **40** to create mold, filled single deposition basic products. The filling substance **2** is suspended in the tempered chocolate forming orbs or pearls of flavor **12**, also known as inclusions. Due to the properties of the filling substance **2**, such as density and surface adhesion characteristics of both the chocolate and filling substance, the inclusions do not form tailings within the chocolate **1**, rather forming orbs or pearls of flavor **12**. Also, the pearls of flavor **12** do not bottom out in the

tempered chocolate **1**, but rather remain suspended in the chocolate **1** until the chocolate **1** solidifies.

[00124] The number of tubes **36** and jackets **37** correspond to the number of pearls of flavor **12** to be produced within the chocolate **1**. If the confectionery is to contain nineteen (19) pearls of flavor **12**, then the top plate **31** will have nineteen (19) tubes **36** and the bottom plate **32** will have nineteen (19) jackets **37**, as shown in Figures 15 and 16. The number of tubes **36** and number of jackets **37** are equal, and to vary the number of pearls of flavor **12** in the confectionary it is necessary to vary the number of tubes **36** and jackets **37**. That is, the multi-nozzle jacketed tube assembly **30** includes multiple jacketed tubes that can vary in quantity from 2 on up, depending on how many pearls of flavor **12** are to be formed in the chocolate.

[00125] The ratio of chocolate **1** to filling substance **2** can be controlled by varying the pressure exerted on the respective inputs of each ingredient by the depositor machine.

[00126] In a manufacturing line, multiple units of filled single deposition basic products will typically be produced concurrently. Figures 21 and 22 depict a multi-nozzle jacketed tube assembly **30** capable of producing four units concurrently. Other size plates with more or less number of units are contemplated.

[00127] The manifold topology of the Multi-Nozzle Jacketed Tube assembly (also known as a cluster) **30** makes it an efficient vehicle for heat exchange. This has the undesirable result that as tempered chocolate **1** passes through the narrow passages, heat dissipates and the tempered chocolate **1** will eventually begin to crystallize or “seize”, obstructing the nozzle passages and bringing production to a halt.

[00128] This effect of obstructing the nozzle passages can be remedied by regulating the temperature of the plates **31** and **32** themselves rather than by depending on the temperature of the tempered chocolate **1** alone to sustain adequate heat throughout the deposition process. The effectiveness of temperature regulation will depend on the thermal conductivity of the material used to construct the deposition plates **31** and **32**. For example, aluminum plates will respond more effectively to temperature regulation than will plates constructed of nylon or other plastics.

[00129] Electrothermal Regulation - The temperature of the deposition plates can be regulated through a combination of electrical heating and electrical temperature control devices. One embodiment of this principle would include adhesion of a silicone rubber heating strip to the exterior of the depositor plate and connecting it to an electrical temperature control device (not shown).

[00130] Hydrothermal Regulation - The temperature of the deposition plates can also be regulated using heated water or other fluid. This may be achieved by boring passageways through which water can flow. The temperature of the water can be managed to a specific temperature, which ensures that the deposition plates will maintain that same temperature throughout the process. The target temperature of the plates is solely a function of the type of chocolate being deposited. The primary goal is to keep the chocolate at a constant temperature. For example, dark chocolate needs to be at a constant temperature of 90 degrees Fahrenheit. The temperature for white and milk chocolates vary from that of dark chocolate.

[00131] Figures 23 and 24 depict a hydrothermal channel **39** bored through the bottom plate **32** of a multi-nozzle jacketed tube deposition assembly **30**. Hose connectors **not shown** can be threaded into either end **39a and 39b** of channel **39** and attached to water lines **not shown** through which heated water will flow, maintaining the plate at the desired temperature. Alternative connections, such as quick connects, may be used to connect water lines to the channel **39** of the bottom plate **32**.

Mold for Multi-Nozzle Single Shot Deposition

[00132] The Modified Single Shot Production Process described above may combine the Multi-Nozzle Jacketed Tube **30** with a single cavity mold **40**. Figures 25 and 26 depict a single cavity mold **40** for Multi-Nozzle Single Shot Deposition that will produce the Single Shot Basic Product **10** described previously. The single cavity mold **40** has, in some embodiments, a circular plan shape of diameter 58 mm and depth of 7.0 mm. The single cavity mold **40** dimensions may vary accordingly and may be similar to the mold employed by the Three Stage Production Process. Because a single shot deposition process introduces both chocolate and filling substance simultaneously, the Single Shot Mold **40** does not require structures to create wells for filling material as is described in conjunction with the Three Stage Mold. Unlike with

the Three Stage Basic Product where it is optional to include a layer of enrobing chocolate, the Single Shot Basic Product produced by the Modified Single Shot Product Process inherently includes a layer of “enrobing chocolate” because as described the filling substance **2** is completely surrounded by the chocolate **1** extruded through the jackets **37**.

[00133] In the manufacturing process, the chocolate **1** will enter the plates and ultimately the single shot mold **40** first to create a base layer of chocolate. The operator of the depositor machine will subsequently initiate the flow of the filling substance **2** into the Multi-Nozzle Jacketed Tube assembly **30** while the tempered chocolate **1** continues to flow. At the appropriate time, the operator will cease the flow of the filling substance **2** yet continuing the flow of chocolate **1** allowing the chocolate **1** to completely surround the filling substance **2**, due the fact that the filling substance **2** is no longer extruded out of the tubes **36** because the flow of filling substance was terminated. The flow of the tempered chocolate is continued and deposited into the single shot mold **40** until the single shot mold **40** is completely filled. The activation sequence/timing of the flow of chocolate **1** and filling substance **2** is determined by the viscosity properties of the substances, the temperature and physical characteristics of the Multi-Nozzle Jacketed Tube assembly **30**. The chocolate **1** and filling substance **2** in the single shot mold **40** are allowed to cool. Once the chocolate **1** is in solid form/phase the chocolate with the embedded pearls of flavor **12** is removed from the mold **40**. The filling substance **2** forming the pearls of flavor **12** may remain in a liquid or semi-liquid phase or may be in a solid phase after cooling.

[00134] The depositor machine may have the capability to automatically control the flow of the chocolate **1** and filling substance **2** through appropriate software and hardware, allowing the depositor to start and stop the flow of substances in accordance with a set of predetermined factors.

[00135] The single shot mold **40** can also include cosmetic features **41**. The bottom of this mold can include cosmetic features **41** including product logo text and shallow (e.g., 1 mm depth) ellipsoidal section depressions **42** that suggest the filling cells in the tiling pattern.

[00136] Figures 27 and 28 depict a single shot mold **40** positioned under the Multi-Nozzle Jacketed Tube assembly **30**, ready for single shot deposition.

Three Stage Production Process

[00137] An embodiment for the manufacturing of the three stage basic product **20** has three primary stages: chocolate deposition, filling deposition and enrobing.

[00138] Chocolate Deposition - In the first manufacturing stage, tempered chocolate is deposited into a negative form mold to create the (positive form) molded chocolate wafer described previously. Figure 29 depicts an example of a negative form mold **60**. Figure 30 is an isometric section of a basic molded chocolate wafer mold **60**. After deposition the mold may be shaken horizontally to aid distribution of the tempered chocolate within the mold. The filled mold may pass through a “cooling tunnel” (not shown) to reduce the temperature of the tempered chocolate and allow it to solidify. Then, the positive form molded chocolate wafer **21** is released (removed) from the negative form mold **60**.

[00139] Filling Deposition - In the second manufacturing stage, filling material **23** is deposited into the wells **22** of the wafer **21**. Distribution of the filling material **23** among the wafer’s multiple wells **22** can be achieved in a variety of different ways, examples of which are described below.

[00140] Multi-nozzle Deposition - Figures 31 and 32 depict a multi-nozzle designed for use with the wafer **21** for the three stage basic product. In some embodiments, multi-nozzle deposition uses a specially constructed manifold chamber **70** with a single input line (not shown) and multiple output nozzles **71**. The manifold chamber **70** has a wall **74** encircling the chamber to contain the filling substance within the manifold chamber. The design/layout of the multiple output nozzles **71** is to the same as the tiling pattern of the wafer **21** being filled.

[00141] There is one output nozzle **71** for each well **22** in the wafer’s **21** tiling pattern. Each of the output nozzles **71** is positioned to align above the center of a corresponding well **22** in the wafer **21** top surface (Figures 33 and 34). In wafer tiling patterns where the volume of all wells is not uniform, the diameter of each output nozzle **71** is adjusted (increased or decreased) in proportion to the variation in well volume relative to other wells **22**.

[00142] Optimal filling deposition in an automated process can be adjusted based on any of several variables, including well volume, nozzle diameter, viscosity of filling material and pressure exerted on filling material during deposition. Figures 33 and 34 depict a multi-nozzle design with conical rather than cylindrical nozzles. The conical nozzle **72** form reduces the diameter of the nozzle tip **73**, which increases the pressure and reduces the volume of filling material **23** extruded. This variation is suitable to filling materials **23** which are relatively more viscous.

[00143] Plate Multi-Nozzle Deposition - Some industrial depositors (machines used for deposition) employ a plate with perforations that are aligned to the targeted areas for deposition. Figures 37 and 38 show a plate **80** with multi-nozzle perforations **81** designed for use with six wafers **21** of the three stage basic product **20**.

[00144] Mobile Single Nozzle Deposition – A single nozzle **90** (one input line **not shown**, one output nozzle **91**) can also be used to distribute the filling material **23** among the wafer's **21** multiple wells **22**. The nozzle **91** is repositioned to align above the center of each well **22** on the wafer **21** top surface **25**.

[00145] Stationary Single Nozzle Deposition - A faster, less mechanically demanding method of single nozzle deposition involves a stationary single nozzle **90** and a modified wafer design **100** (also referred to herein as a “Channeled Wafer”). Figure 40 shows an example of a channeled wafer **100** with a single nozzle **90** positioned directly above the channel wafer **100**. In the Channeled Wafer **100**, all wells **101** are linked via linear depressions (also referred to herein as “channels”) **102** in the wafer surface. The single nozzle **90** is positioned to align above the center of a single (typically central) well **102** (Figure 39). The channels **102** allow filling material **23** to flow from the well **101** below the nozzle **91** to all other wells **101** in the tiling pattern. Horizontal shaking can aid the distribution of filling material throughout the network of channels **102** and wells.

[00146] Enrobing - In the third manufacturing stage, the filled wafer is covered (enrobed) in a thin coating of chocolate. The enrobing process known in the industry involves passing the filled wafer through a wide sheet (“curtain”) of continuously flowing tempered chocolate. This

enrobing curtain covers the filled wafer uniformly, and after the enrobing chocolate cools, it solidifies.

Wafer Mold Production

[00147] The negative form mold **60**, discussed previously, for molded chocolate wafers **21** can be produced using a variety of different techniques, including those described below.

Vacuum Forming

[00148] Figure 41 depicts an exploded isometric view of a thermal plastic sheeting, basic molded chocolate wafer positive form and a vacuum forming platen. Vacuum forming applies vacuum suction to deform heated (food grade) thermal plastic sheeting **110** around a positive form **111** by removing the air between the plastic **110** and the positive form **111**. As the thermal plastic **110** cools, it hardens into a negative form mold **60**. Typically, the vacuum suction is created by placing both the positive form **111** and the heated thermal plastic sheeting **110** on a flat, perforated surface (vacuum forming platen) **112** in which each perforation **113** is connected to a vacuum suction line **114**.

[00149] Figure 41 shows the placement of the positive form **111** on a typical vacuum forming platen **112**, and the positioning of the heated thermal plastic sheeting **110** above both platen **112** and form **110**. Figure 42 is an example stainless steel positive form for the basic molded chocolate wafer **21** and Figure 25 is an example of the negative form plastic mold **60** produced using vacuum forming.

[00150] The efficacy of vacuum forming depends in large degree on the variable elasticity of the thermal plastic sheeting **110** relative to temperature. Effective vacuum forming requires that, when heated, the plastic **110** be sufficiently elastic that it deforms to an extent which replicates the positive form **111** in detail. The vacuum suction is the driving force behind this deformation and also has a cooling effect on the thermal plastic **110**, introducing a risk that the plastic hardens without fully deforming.

[00151] Design of the positive form **111** is one factor in the effectiveness of vacuum forming. Figures 42 and 43 depict a positive form **111** for the basic molded chocolate wafer **21**.

[00152] Two exemplary aspects of positive form **111** design that aid vacuum forming efficacy are geometric attributes and material attributes.

[00153] Geometric Attributes - The top surface features circular perforations **116** that correspond to the wells **22** in the basic molded chocolate wafer's **21** tiling pattern. The bottom **117** of the form is open, and the bottom edge of the cylindrical side wall features an inverted crenellation **119**. The perforations **116** and crenels **119** allow air to flow through the positive form's **111** interior to facilitate vacuum suction down through the vacuum forming platen **112**.

[00154] As the thermal plastic sheet **110** is sucked into the circular perforations **116**, it deforms into a hemispheric or hemi-ellipsoidal shape. The resulting negative form mold **60** will therefore create hemispheric or hemi-ellipsoidal wells.

[00155] Material Attributes - The thermal properties of the material used for the positive form **111** may have impact the efficacy of vacuum forming. Positive forms **111** made of materials with higher thermal conductivity (e.g. metals) can be pre-heated prior to the vacuum forming process. Then, during the vacuum forming process, the positive form **111** will transfer additional heat to the plastic sheeting, thereby delaying cooling and extending time during which the plastic **110** remains elastic. Changing the wall **118** thickness of the positive form **111** allows it to store more or less heat, as the application requires.

Silicone Casting

[00156] Silicone casting is another process for manufacturing a wafer mold. Silicone casting involves a positive form **130** which is surrounded by a containing wall **120** into which (food grade) liquid silicone is poured. The liquid silicone is chemically cured to into a negative form mold **121**.

[00157] Figure 44 is an isometric view of a basic molded chocolate wafer positive form with containing walls. Figure 44 shows a positive form **111** with containing walls **120** for the basic molded chocolate wafer **21**. Figure 45 shows the silicone negative form mold produced by the positive form in Figure 44.

Variations

[00158] Variations of the Basic Products described above can be achieved by adjusting any of several attributes. Some of these variations are process independent, i.e. they can be varied in both the Modified Single Shot Production Process and the Three Stage Production Process. Other variations are only relevant to the Three Stage Production Process.

Process Independent Variations

[00159] Attributes that can be varied in both the Modified Single Shot Production Process and the Three Stage Production Process include, but are not limited to, wafer size, wafer shape, and tiling pattern. The following are exemplary variations with exemplary values. It is contemplated that these values may vary.

[00160] Variant Wafer Sizes – Wafer **10** or **20** size can be varied by increasing or decreasing the wafer's height, width, or depth. Figures 46 and 47 illustrate a variant with smaller wafer diameter (37 mm) than the Basic Products described previously. The number of cells **22** or pearls of flavor **12** is reduced to 7 (from 19).

[00161] Variant Wafer Shapes - The wafer **10** or **20** can also be varied by modifying the shape of the wafer's plan (i.e. the geometric shape of the wafer when viewed from above). The Basic Products described previously feature a circular plan shape. Examples of variations in plan shape include square (Figure 48), rectangular (Figure 49), triangular (Figure 50) and hexagonal (Figure 51). Any geometric shape is conceivably feasible.

[00162] Variant Tiling Patterns - The wafer **10** or **20** may also be varied by modifying the shape of the wafer's tiling pattern (i.e. the geometric grid within which cells **22** or pearls of flavor **12** are arranged. These modifications can include variations across a wide range structural attributes.

[00163] The Basic Products previously described featured circular plan (hemispheric) cells arranged in a hexagonal tiling pattern where the center of the wafer plan aligns with the center of one of the circular cells in the tiling pattern. One variation is to change this alignment such that, for example, the center of the wafer plan aligns with a point equidistant from the centers of three circular cells in the tiling pattern (Figure 52). Compared to the Basic Products described

previously (Figure 53), the variation depicted in Figure 52 will have more cells **22** or pearls of flavor **12** (27 versus 19), resulting in a lower Chocolate to Filling Ratio.

[00164] Another modification is to vary the size of cells or pearls of flavor within the tiling pattern. For example, Figure 54 shows a tiling pattern of circular plan pearls of flavor or cells **12** or **22** arranged in concentric rings where the well diameter decreases as the diameter of the concentric ring increases. Figure 55 shows a tiling pattern where the diameter of circular cells is varied to allow a minimum number of pearls of flavors or cells **12** or **22** to optimally cover a circular wafer with a hexagonal tiling pattern

Three Stage Product Variations

[00165] Examples of attributes that can be varied in the Three Stage Production Process include well diameter, well shape and combinations of wafer shape, and tiling pattern.

[00166] Variant Well Diameters – The well diameter can be increased (Figure 56) or decreased (Figure 57) by a greater range than the diameter of the pearls of flavor **12** in a modified single shot deposition process. Values depicted in these figures are examples and it is contemplated that other diameters possible. Varying the well diameters will impact the Chocolate to Filling Ratio, as well as the structural properties of the wafer which in turn impacts mouth feel.

[00167] Variant Well Shapes - Well shape can be varied in a variety of ways. These variations can have an impact on Chocolate to Filling Ratio, esthetics and the efficacy of mold release.

[00168] The three stage basic product, previously described, features hemispheric wells, which have a circular plan (i.e. the opening at the top has a circular shape). Variations of a circular plan well may include cylindrical (Figure 58), Hemi-ellipsoidal (Figure 59), Conical (Figure 60), and Truncated Conical (Figure 61).

[00169] Well shape can also be varied by changing the shape of the well plan. Examples of square plan wells include cuboidal (Figure 62), square section hemi-ellipsoidal (Figure 63), square pyramidal (Figure 64) and truncated square pyramidal (Figure 65).

[00170] Shape variations of triangle plan wells include triangular prismoidal (Figure 66), triangular section Hemi-ellipsoidal (Figure 67), triangle pyramidal (Figure 68) and truncated triangle pyramidal (Figure 69).

[00171] Well plan shapes can also included non-convex polygons, such as a five-pointed star (regular concave decagon). Examples include star prismoidal (Figure 70), star section hemiellipsoidal (Figure 71), star pyramidal (Figure 72), and truncated star pyramidal (Figure 73).

Combinations of Wafer Shape, Well Shape, and Tiling Pattern

[00172] The choice of which tiling pattern to use with a particular wafer plan shape is one consideration in product design. Likewise, the shape of the wells within the tiling pattern can also be varied.

[00173] Adjusting the wafer shape within a given tiling pattern can impact the structural properties of the wafer. Figure 74 features hexagonal well shapes within the same tiling pattern as the circular well shapes reproduced in Figure 75. The hexagonal wells **22** result in more uniform and thicker well walls, adding structural strength to the wafer.

[00174] The Modified single shot deposition produces filling cells with a circular plan. With the variant of well shapes made possible by the Three Stage Production Process, well shape and tiling pattern can be co-varied to increase well wall uniformity in wafers with non-circular plan shapes.

[00175] Figure 76 shows a square wafer **20** with an alternate tiling pattern, featuring square wells **22** arranged in a rectilinear grid. Figure 77 shows a similar tiling pattern with smaller sized square wells **22** arranged a more densely packed rectilinear grid. This variation will result in a lower Chocolate to Filling Ratio for the same sized wafer than the tiling pattern featured in Figure 76.

[00176] Figures 78 and 79 show similar variants of square cells **22** arranged in rectilinear grids within a rectangular wafer **20**.

[00177] Figure 80 shows a triangular wafer **20** with triangular wells **22** arranged in a hexagonal grid. Figure 81 shows a hexagonal wafer **20** with triangular wells **22** arranged in a hexagonal grid.

[00178] It should be understood that various changes, substitutions, additions and alterations can be made by one skilled in the art without departing from the spirit and scope of the invention as defined by the appended claims. Moreover, the scope of the present application is not intended to be limited to the particular embodiments of the process, machine, manufacture, and composition of matter, means, methods and steps described in the specification. As one of ordinary skill in the art will readily appreciate from the disclosure herein, processes, machines, manufacture, composition of matter, means, methods, or steps, presently existing or later to be developed that perform substantially the same function or achieve substantially the same result as the corresponding embodiments described herein may be utilized according to the present invention.

CLAIMS

1. An edible chocolate confectionery comprising:
a chocolate wafer having dimensions and one or more depressions formed on a top surface of the chocolate wafer:
more than one flavored fillings embedded in the one or more depressions: and
an enrobing layer of chocolate.
2. The edible chocolate confectionery according to claim 1, wherein the chocolate wafer is made from one of white, milk or dark chocolate.
3. The edible chocolate confectionery according to claim 1, wherein the flavored fillings is either a chocolate-based filling or a sugar-based filling.
4. The edible chocolate confectionery according to claim 3, wherein the sugar-based filling includes syrups and caramel.
5. The edible chocolate confectionery according to claim 1, wherein the more than one flavored fillings are in a hemispherical shape.
6. The edible chocolate confectionery according to claim 1, wherein the more than one flavored fillings are distributed throughout the chocolate wafer.
7. An edible chocolate confectionery comprising:
chocolate;
more than one flavored fillings;
wherein the more than one flavored fillings are suspended within the chocolate;
wherein the more than one flavored fillings are in the shape of orbs: and
wherein the more than one flavored fillings are distributed symmetrically about the chocolate.
8. A method of making an edible chocolate confectionery, the steps comprising:
heating chocolate and a flavored filling such that both are in a liquefied phase;
depositing the tempered chocolate and flavored filling into a multi-nozzle jacketed tube assembly;
depositing the tempered into a single cavity mold by extruding the chocolate through multiple jackets of the multi-nozzle jacketed tube assembly;

extruding the flavored filling through multiple tubes of the multi-nozzle jacketed tube assembly, whereby the extruded flavored filling is surrounded by the extruded tempered chocolate; and

cooling the combination of chocolate and flavor filling until the chocolate is in a solid phase,

wherein:

tempered chocolate first enters the multi-nozzle jacketed tube assembly and the single cavity mold,

liquefied or semi-liquefied flavored fillings is subsequently and simultaneously with the chocolate deposited into the multi-nozzle jacketed tube assembly whereby as the flavored filling is extruded from the multi-nozzle jacketed tube assembly it is surrounded by the tempered chocolate,

flow of the liquefied flavored fillings is terminated prior to the termination of the chocolate flow such that pearls of flavor are formed within the tempered chocolate, the flavored filling may remain in a semi-liquid or liquid phase after cooling, and the tempered chocolate continues to flow until the single cavity mold is completely filled.

9. The method of manufacture according to claim 8, wherein the chocolate is one of white, milk or dark chocolate.
10. The method of manufacture according to claim 8, wherein the flavored fillings is either a chocolate-based filling or a sugar-based filling.
11. The method of manufacture according to claim 10, wherein the sugar-based filling includes syrups and caramel.
12. The method of manufacture according to claim 8, wherein the more than one flavored fillings are distributed throughout the chocolate wafer.

FIGURE 1 PRIOR ART

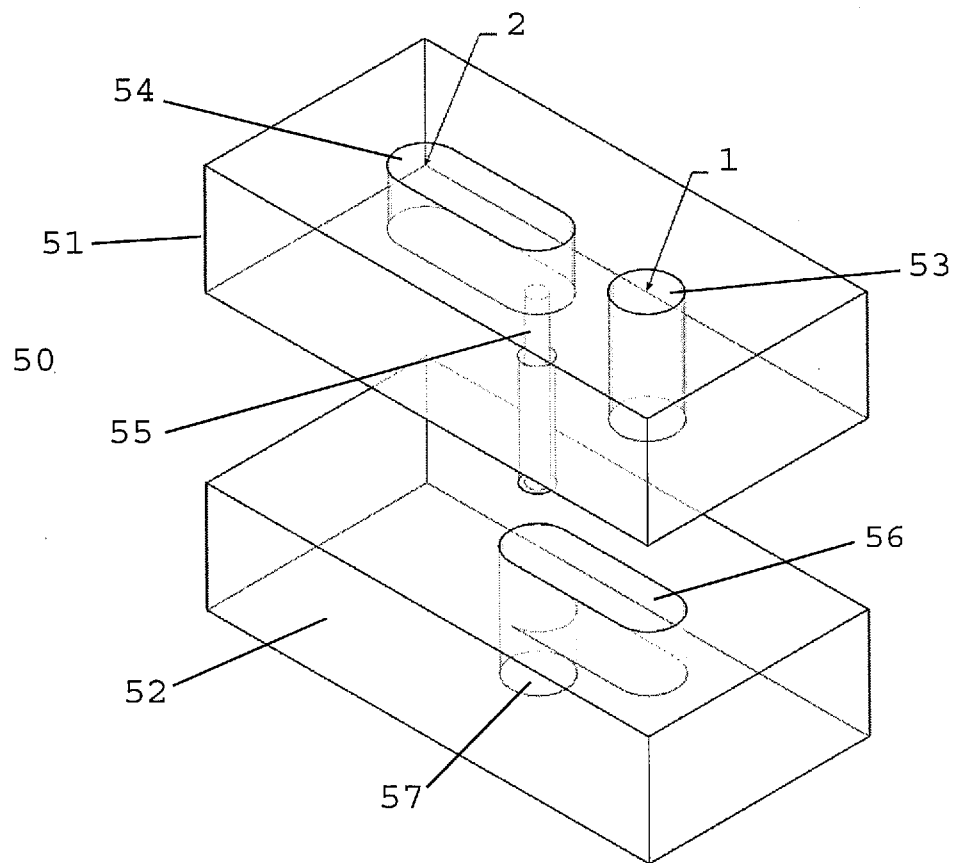


FIGURE 2 PRIOR ART

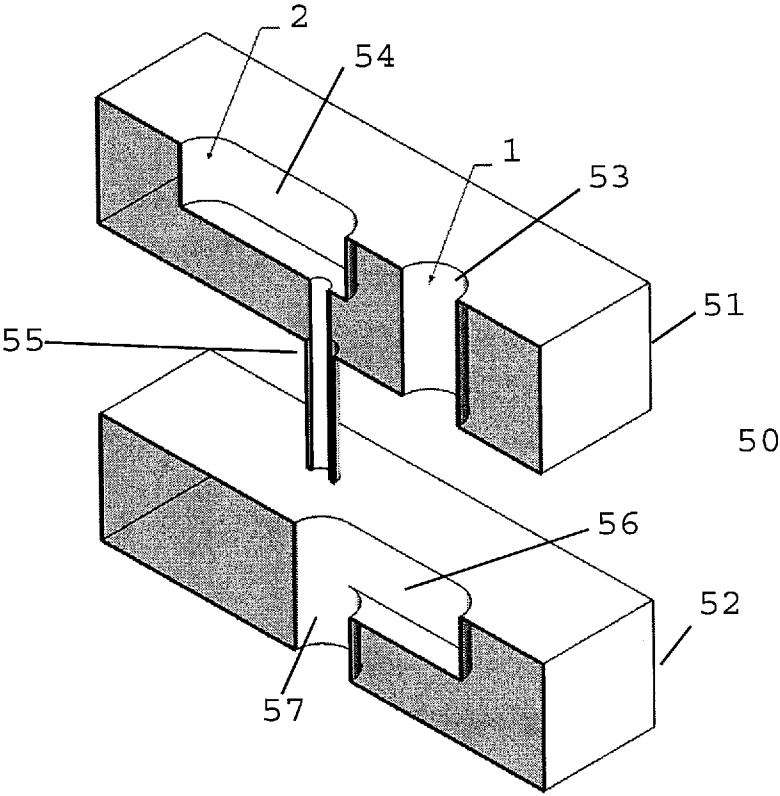


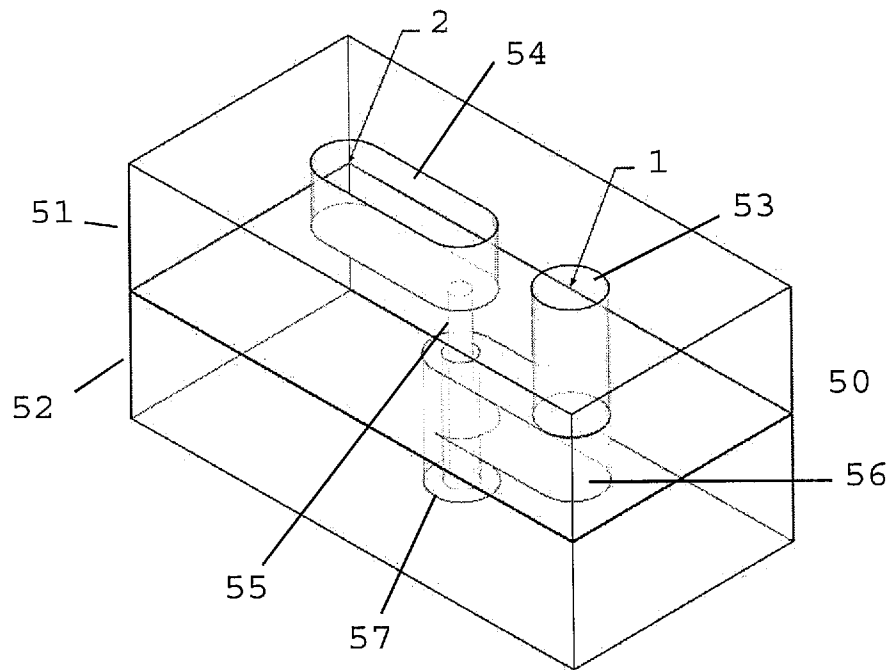
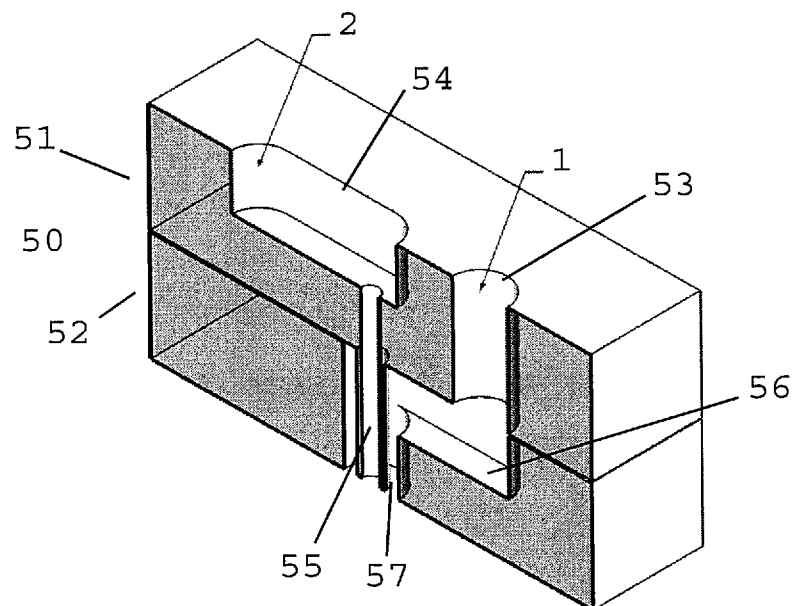
FIGURE 3 PRIOR ART**FIGURE 4 PRIOR ART**

FIGURE 5

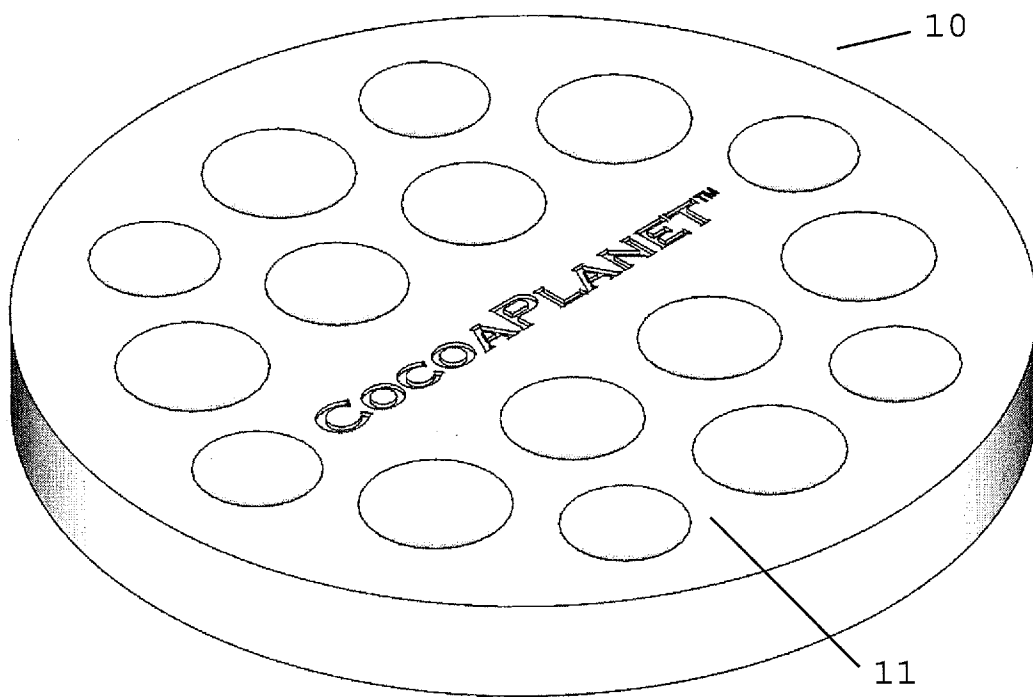


FIGURE 6

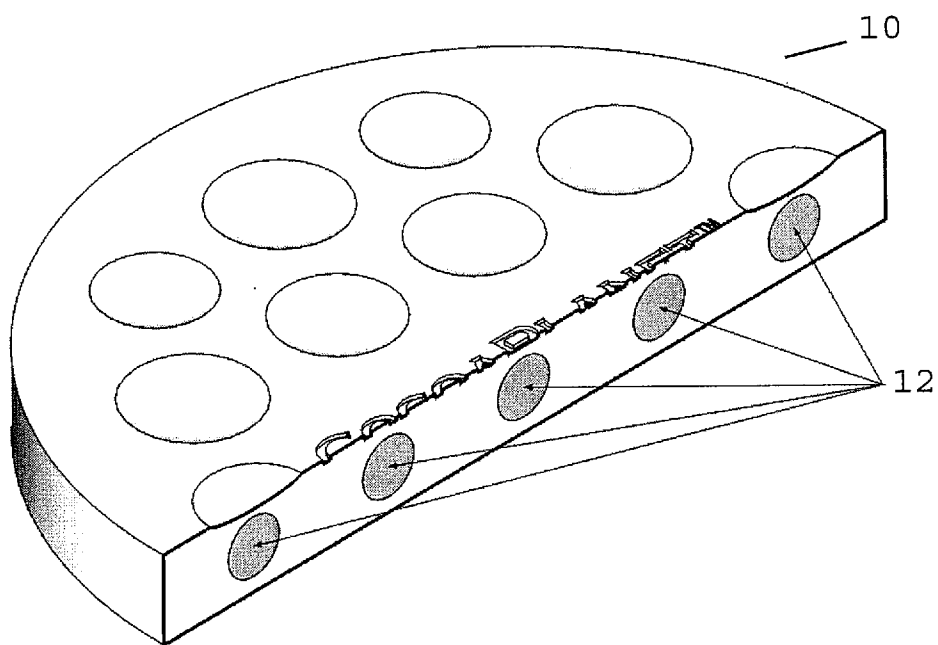


FIGURE 7

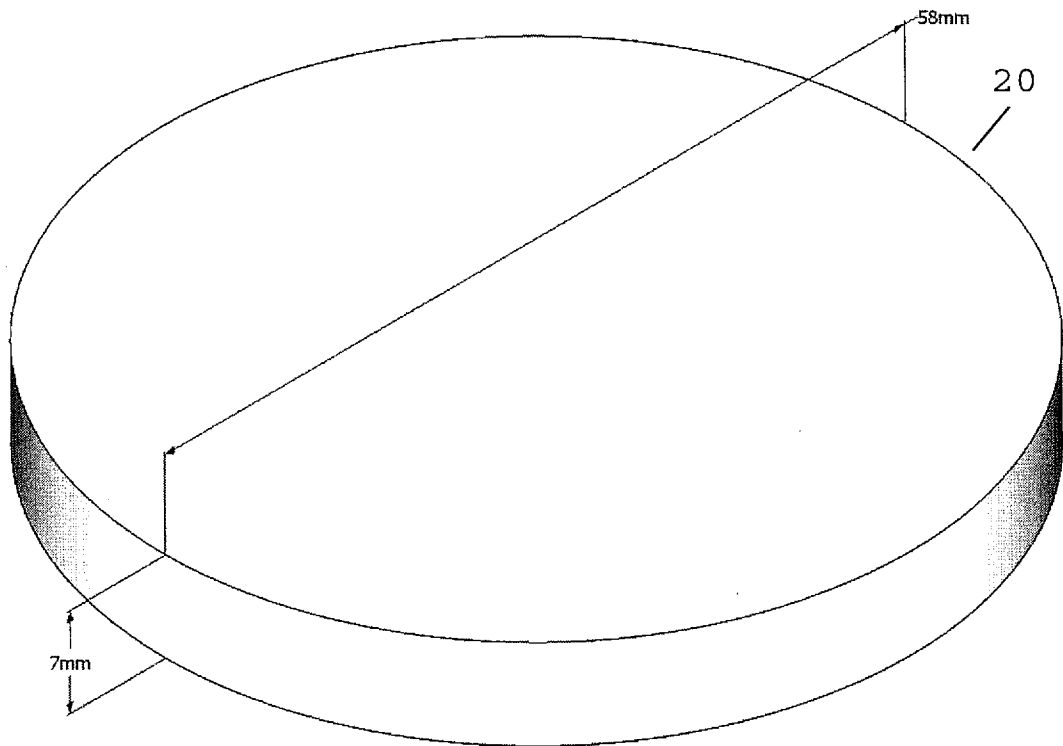


FIGURE 8

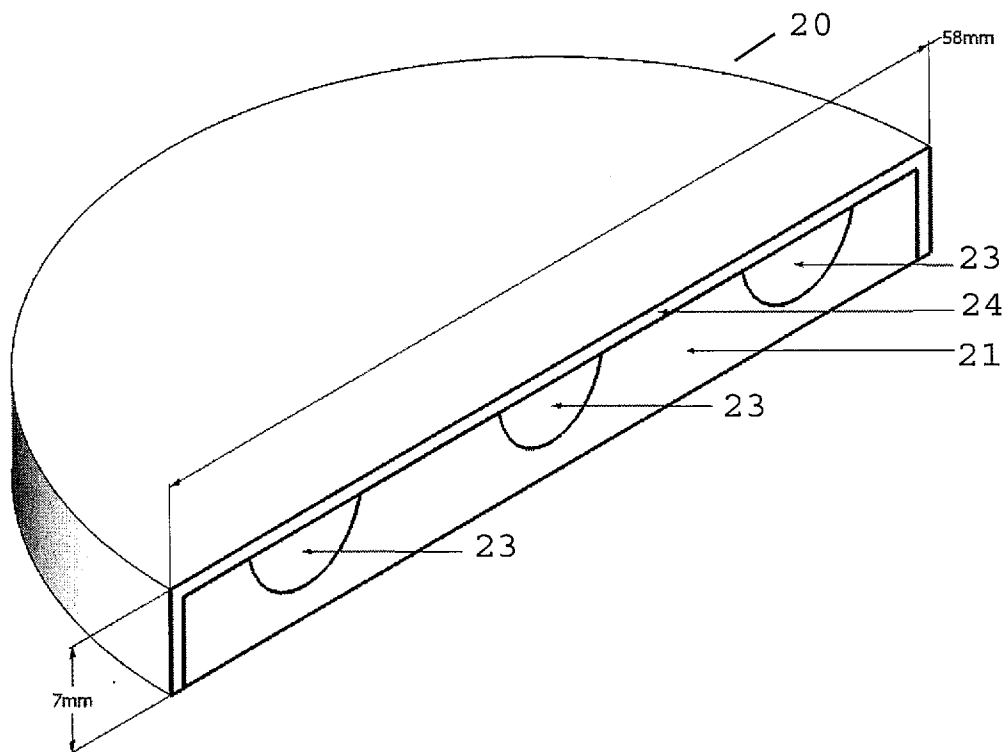


FIGURE 9

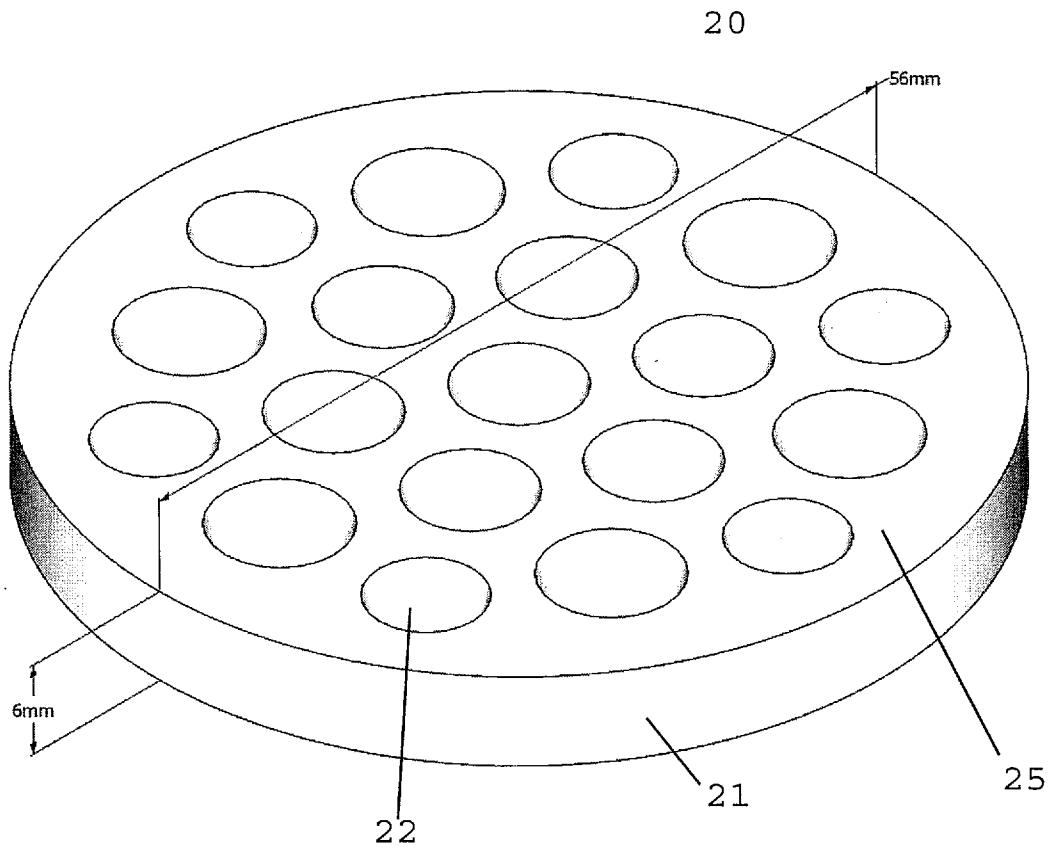


FIGURE 10

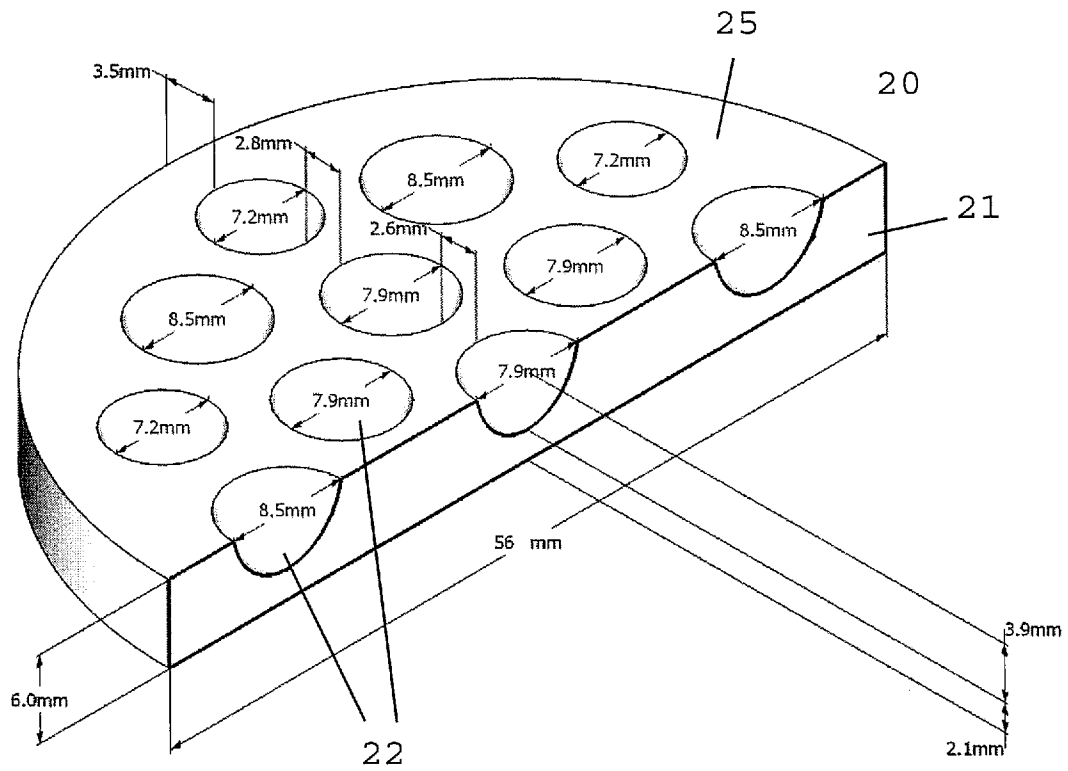


FIGURE 11

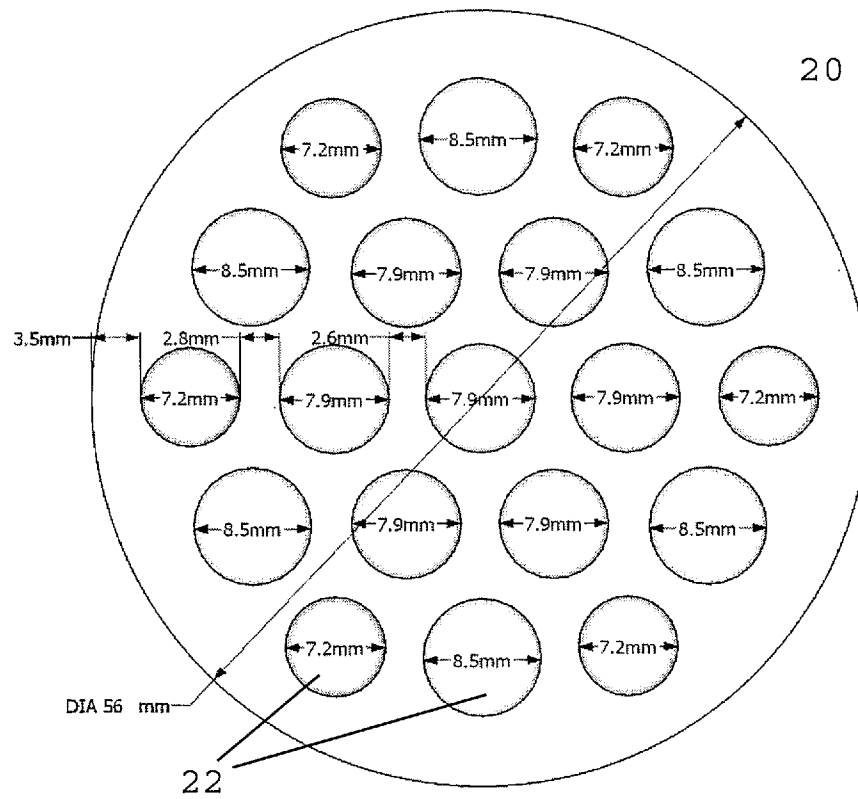


FIGURE 12

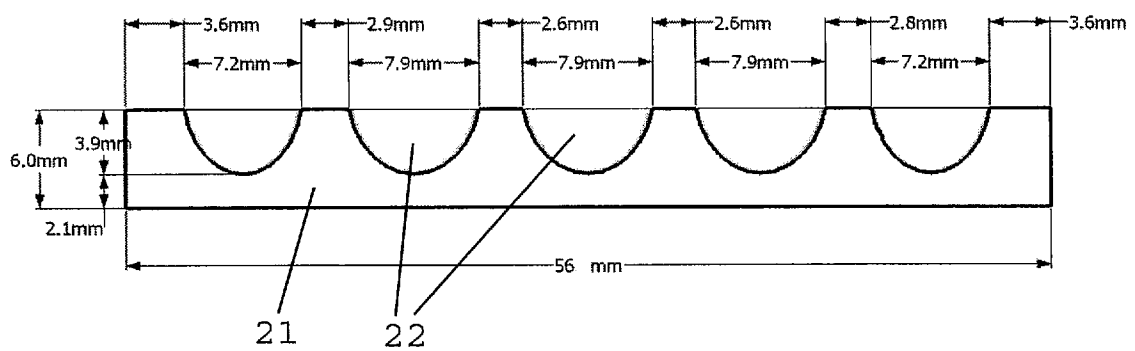


FIGURE 13

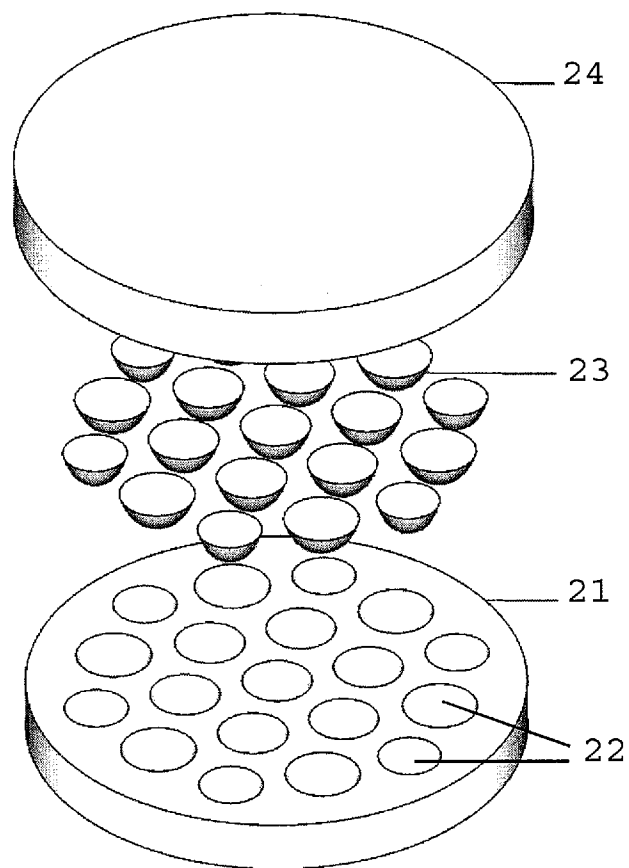


FIGURE 14

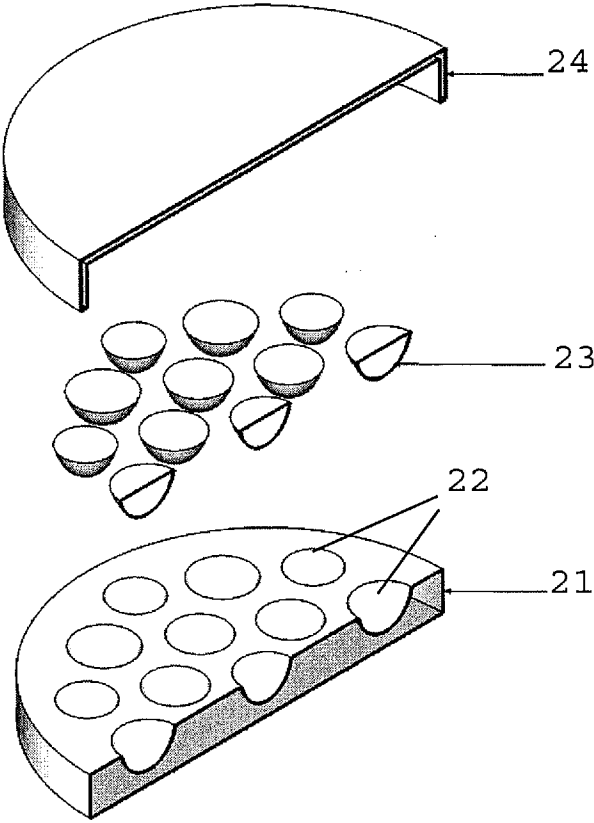


FIGURE 15

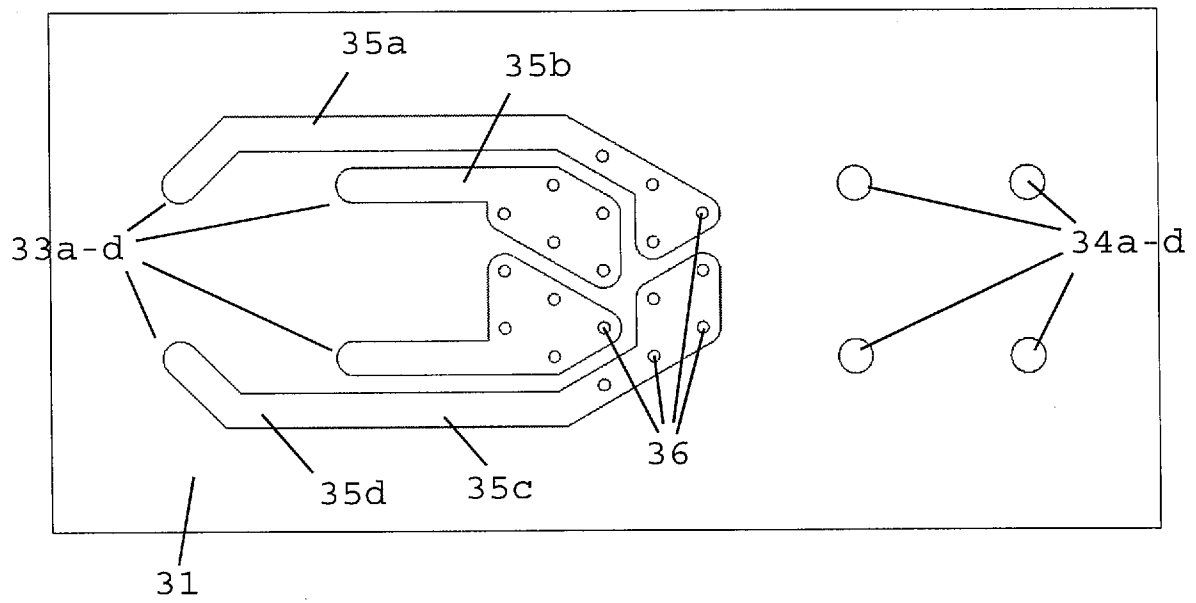


FIGURE 16

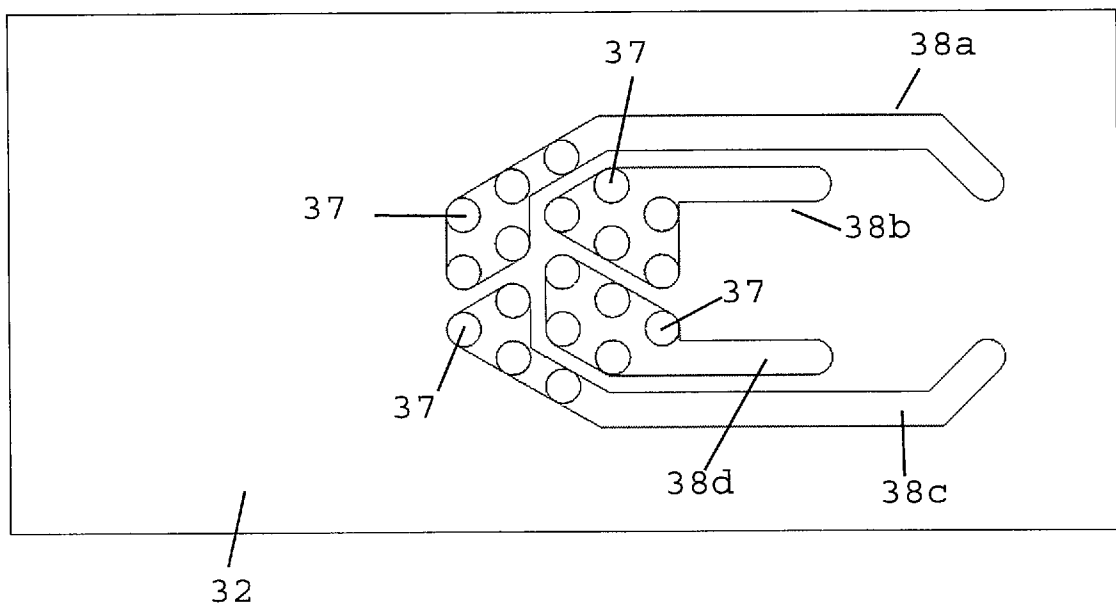


FIGURE 17

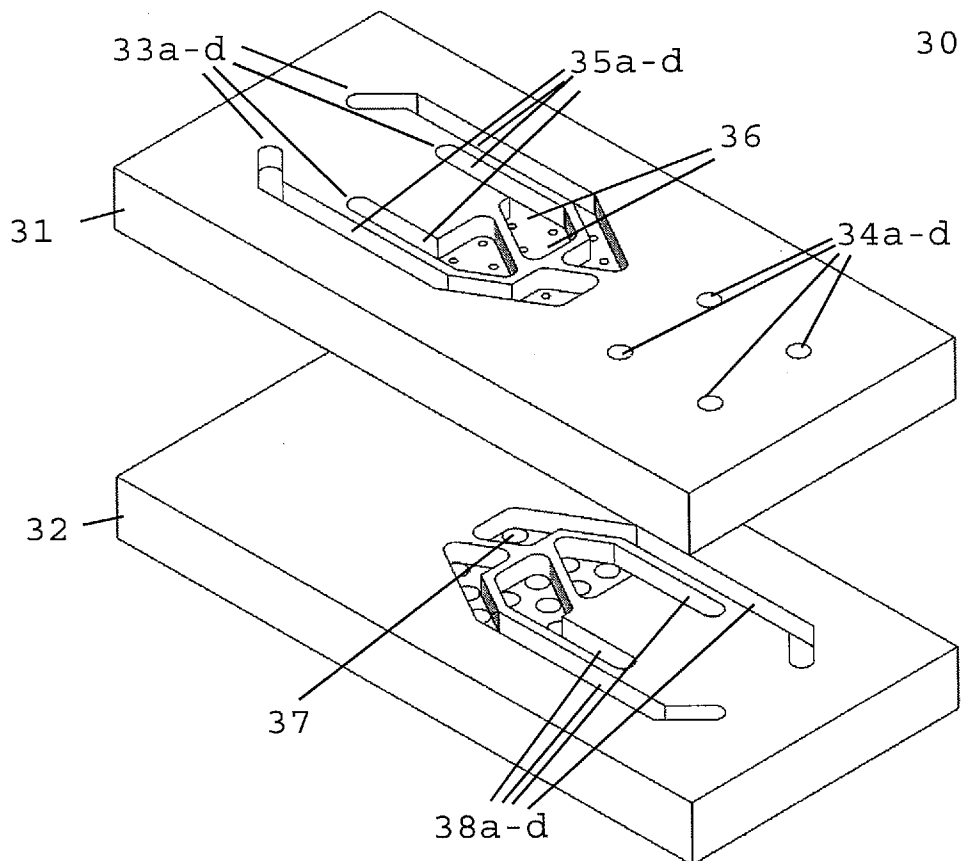


FIGURE 18

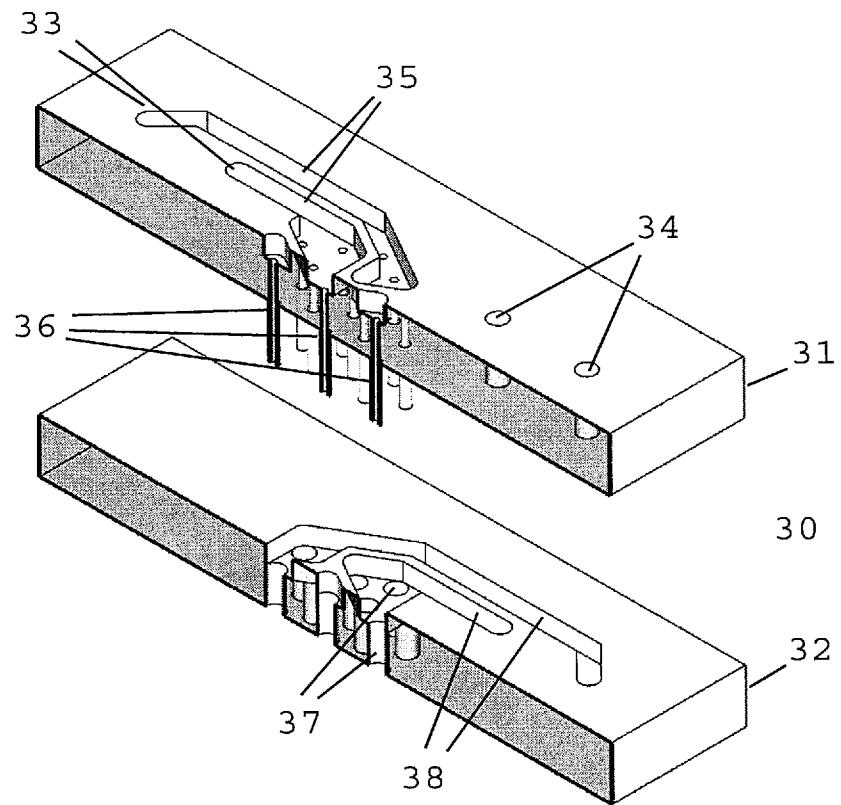


FIGURE 19

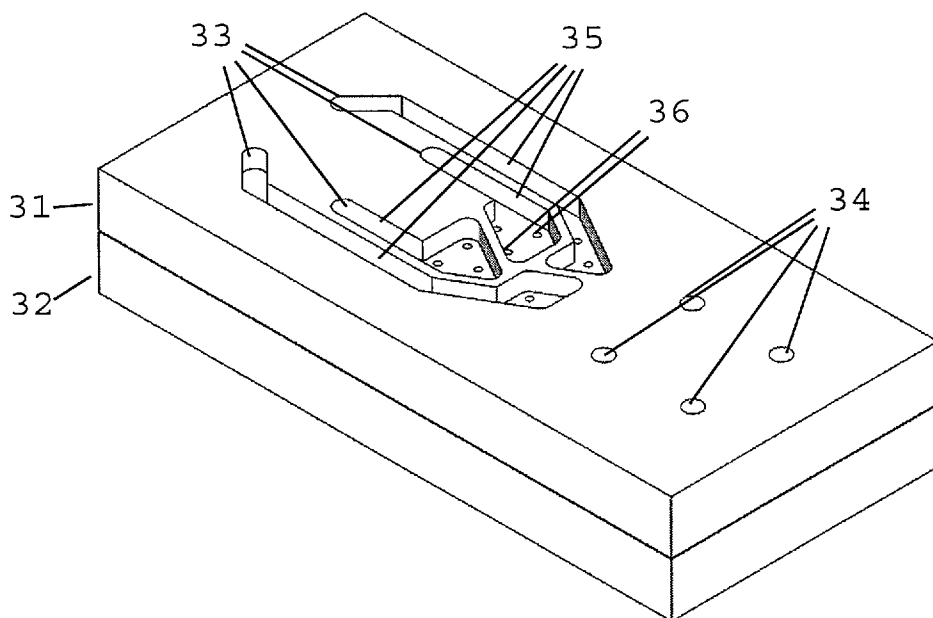


FIGURE 20

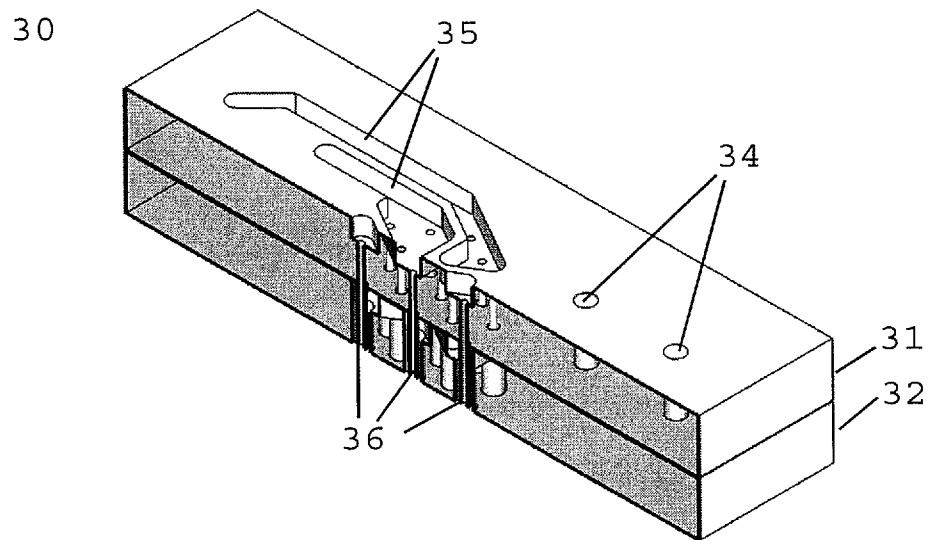


FIGURE 21

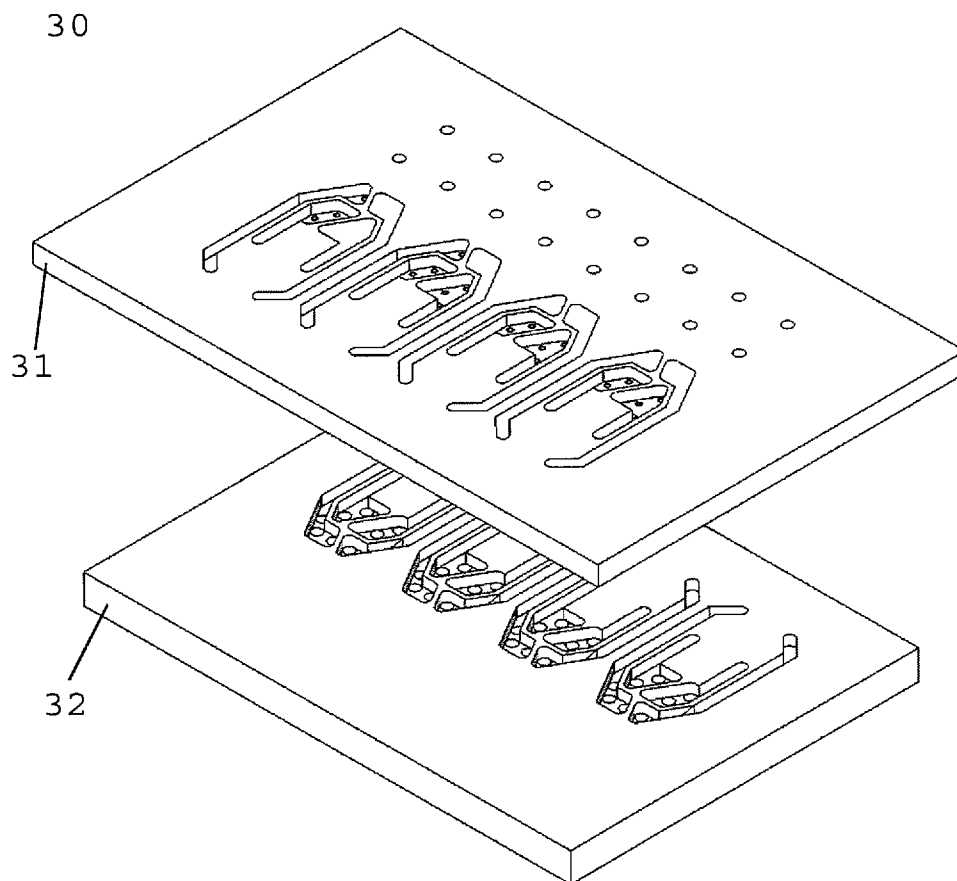


FIGURE 22

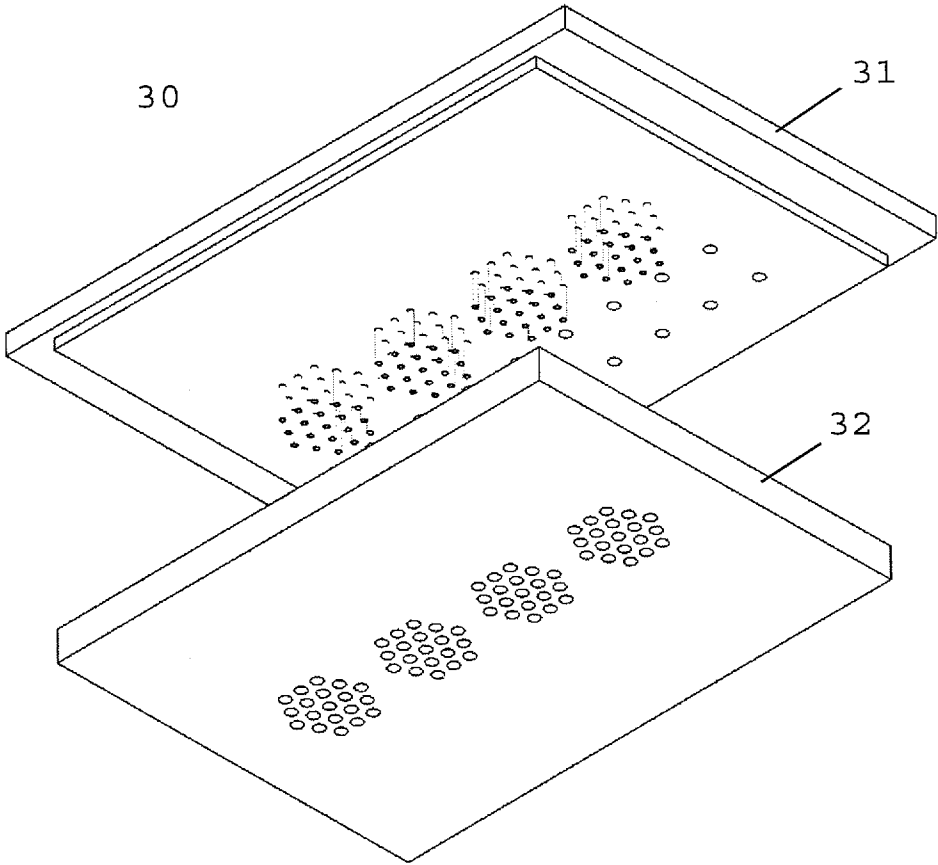


FIGURE 23

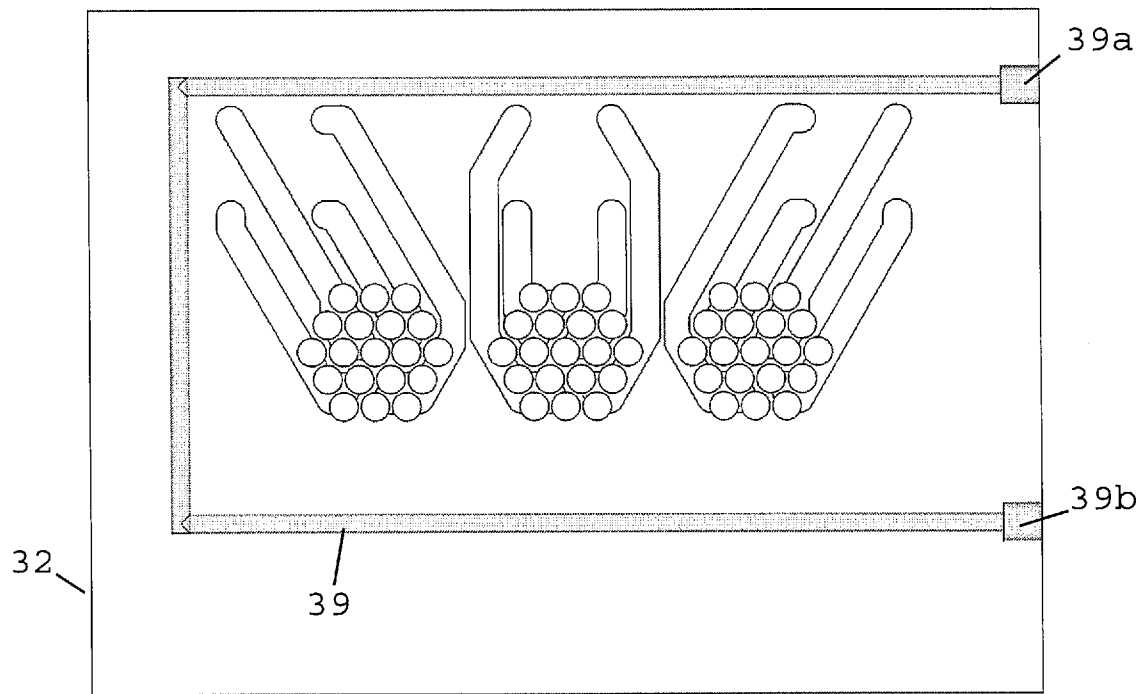


FIGURE 24

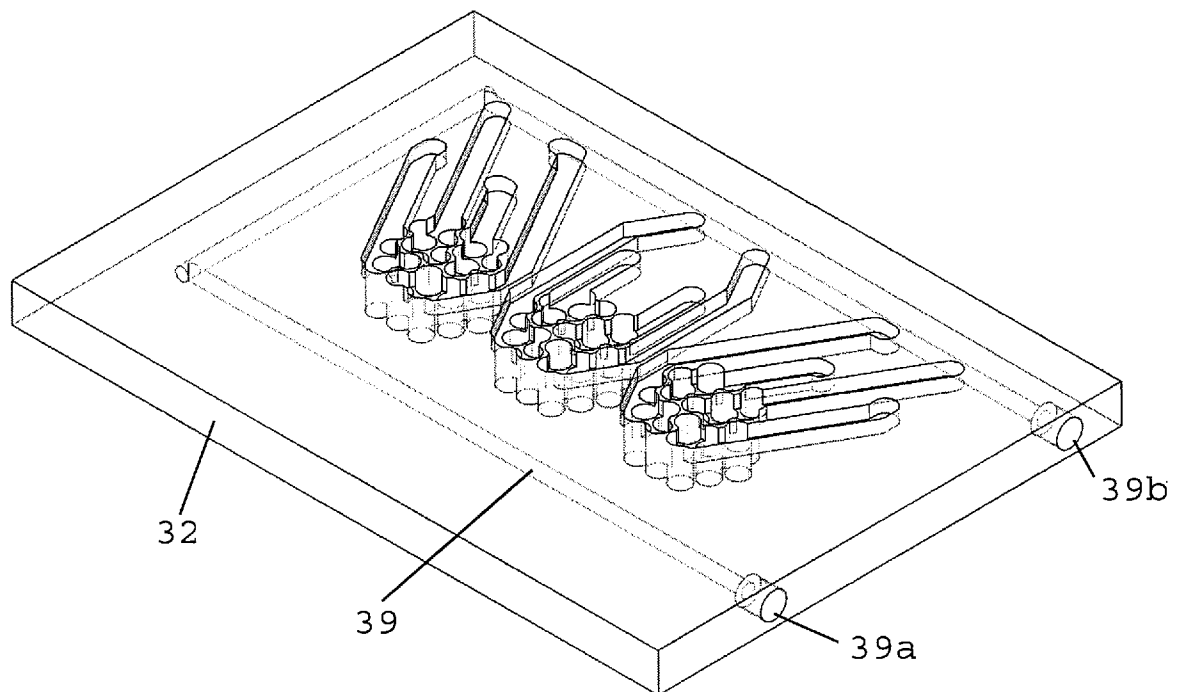


FIGURE 25

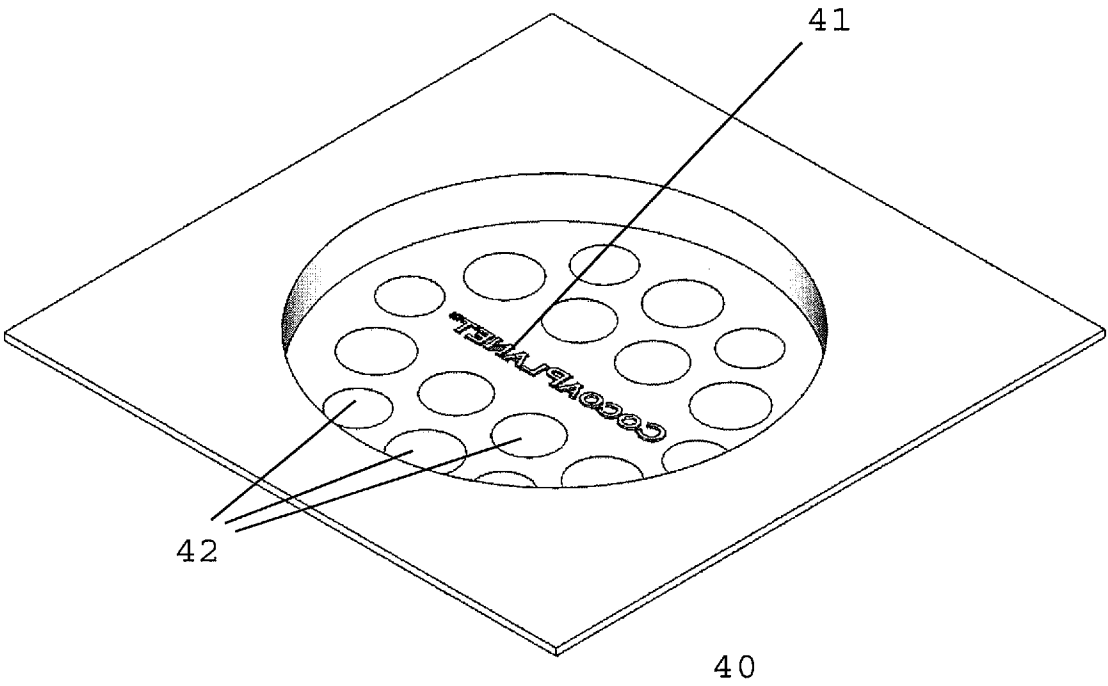


FIGURE 26

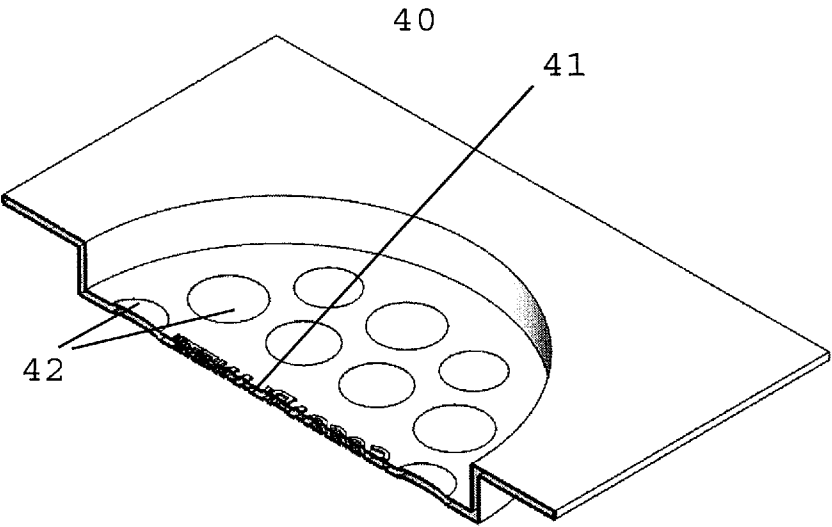


FIGURE 27

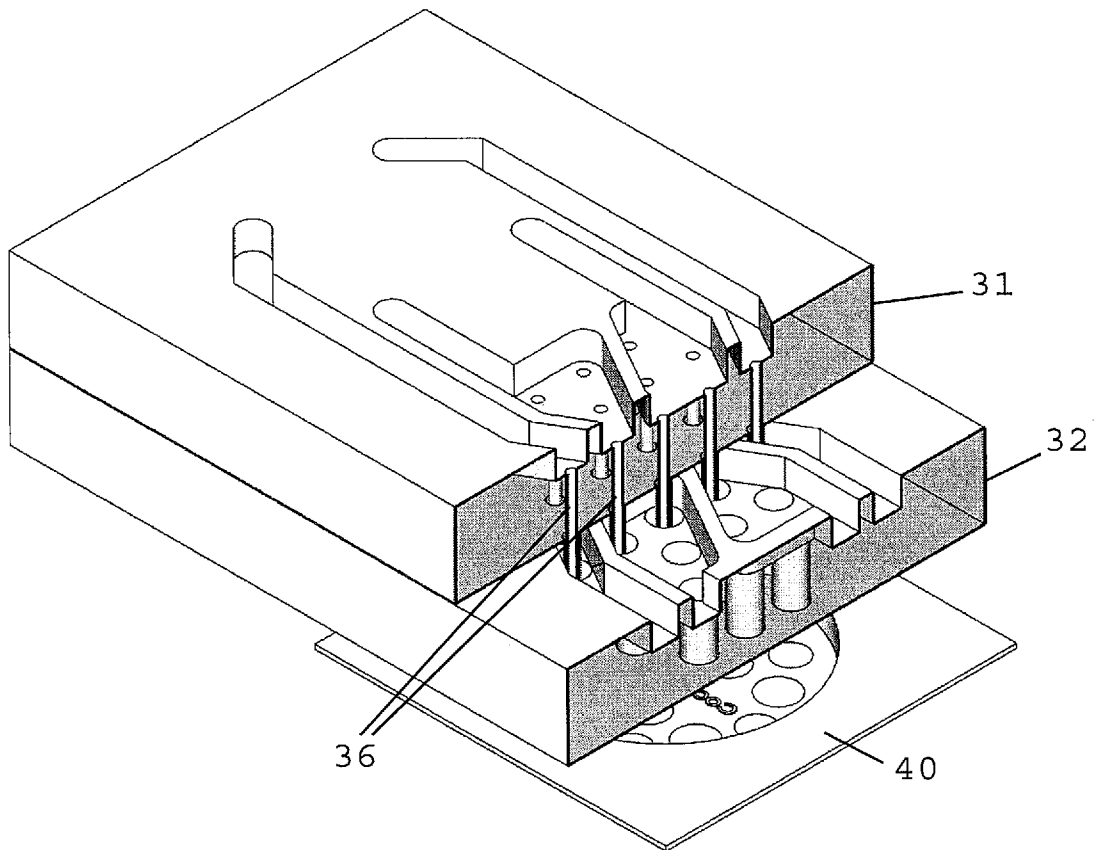


FIGURE 28

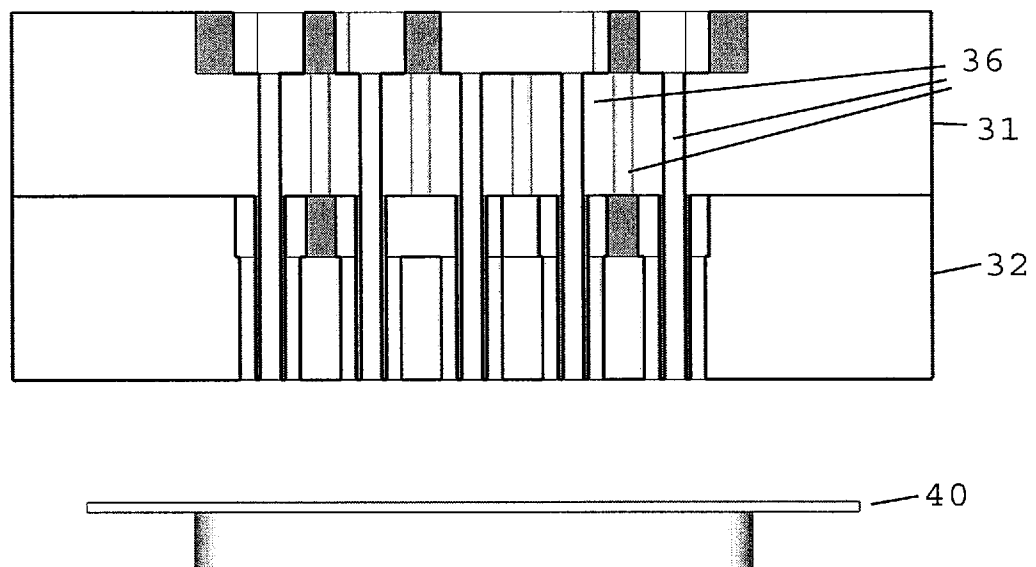


FIGURE 29

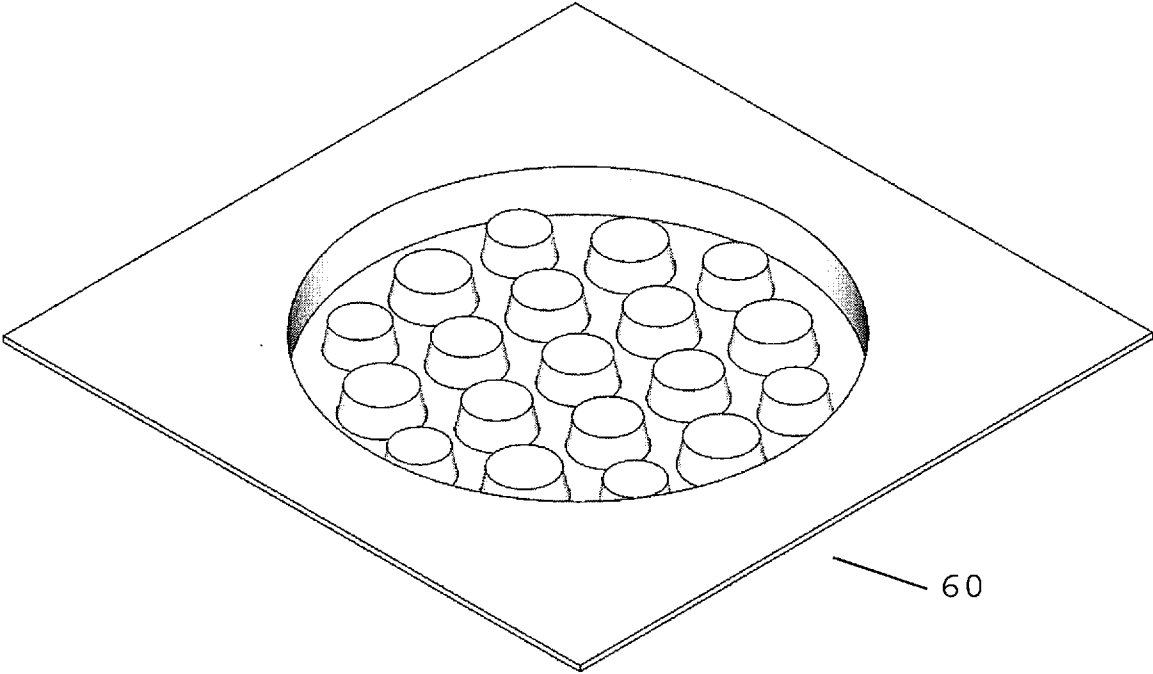


FIGURE 30

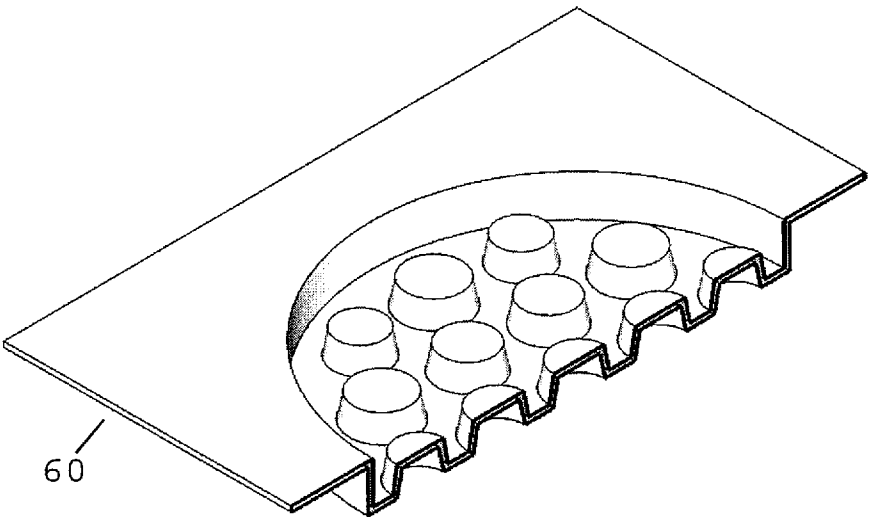


FIGURE 31

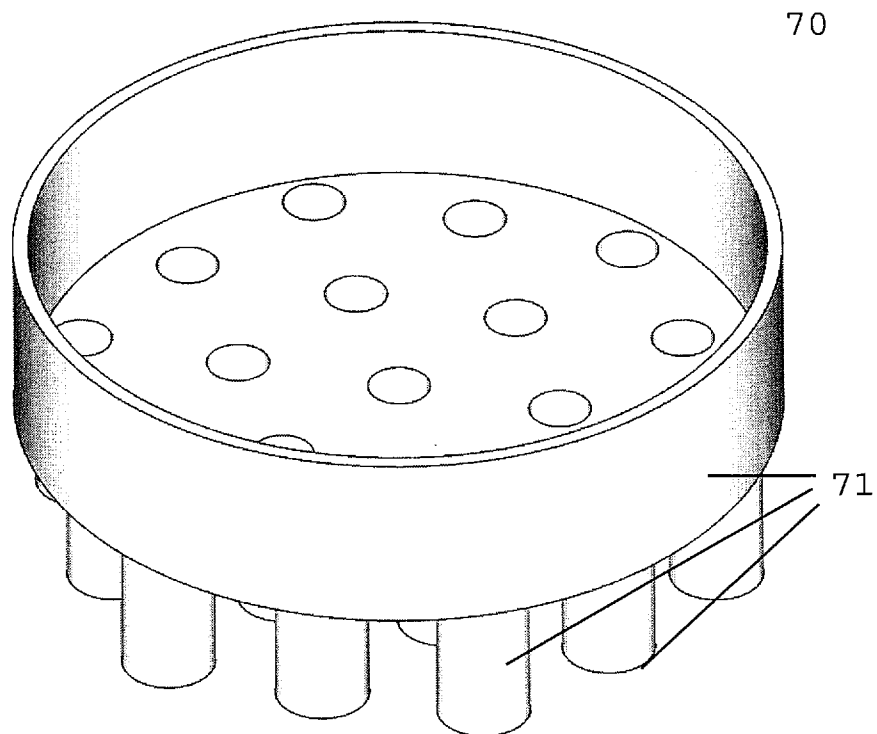


FIGURE 32

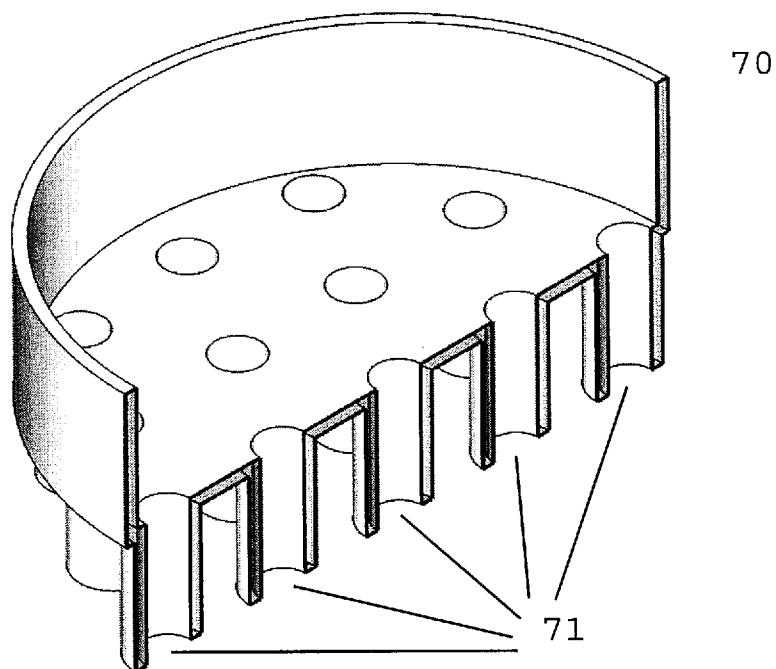


FIGURE 33

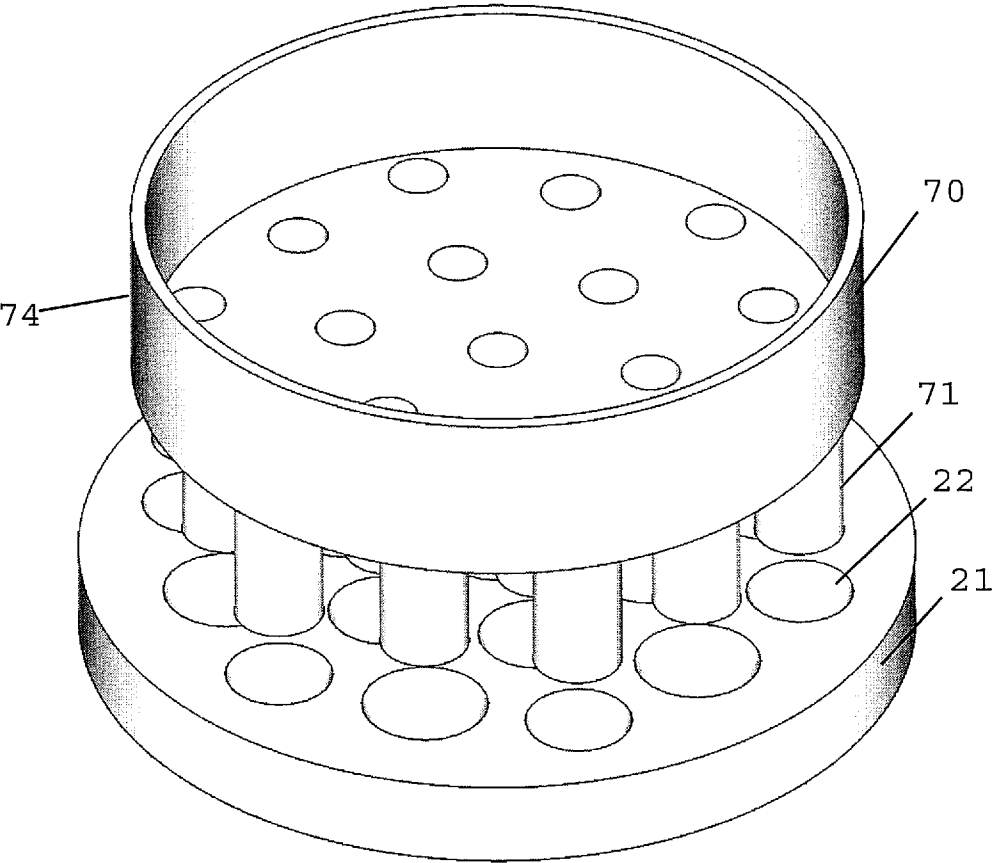


FIGURE 34

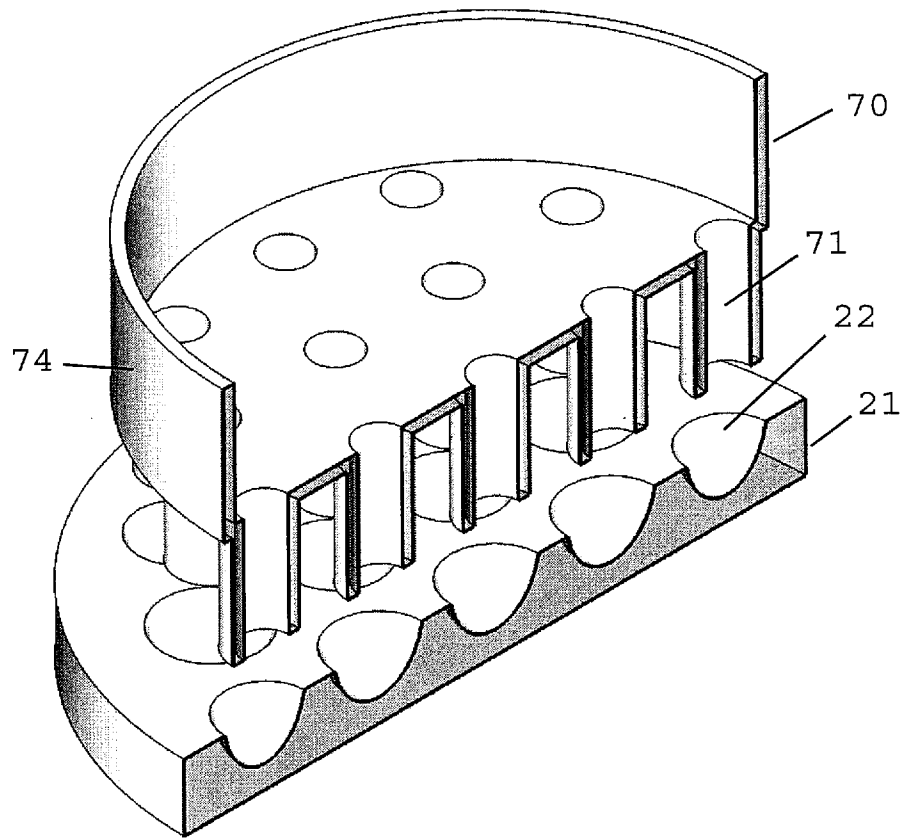


FIGURE 35

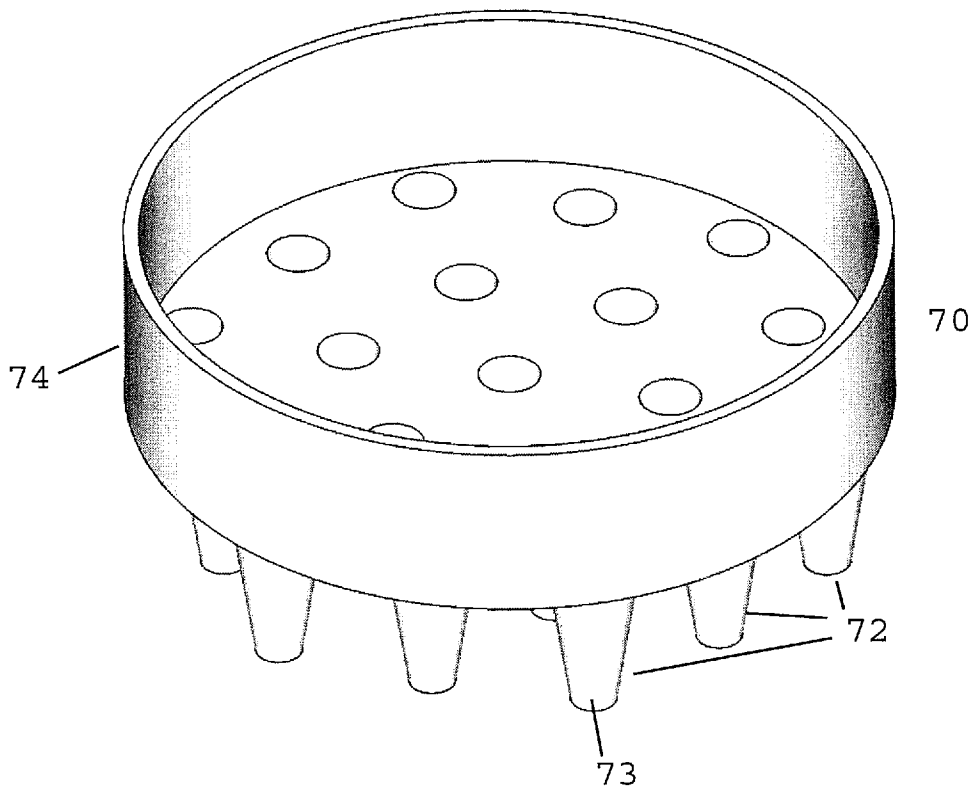


FIGURE 36

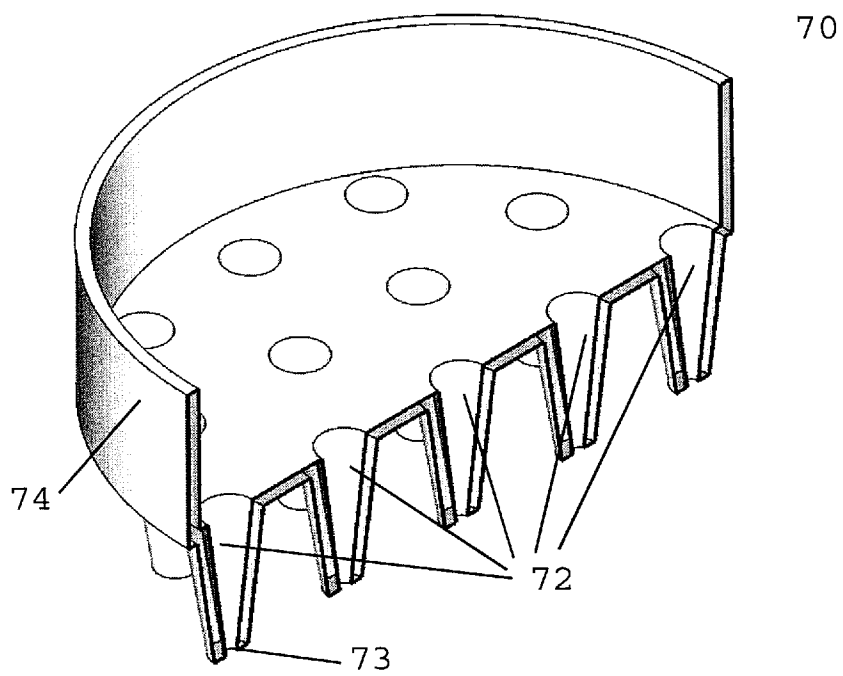


FIGURE 37

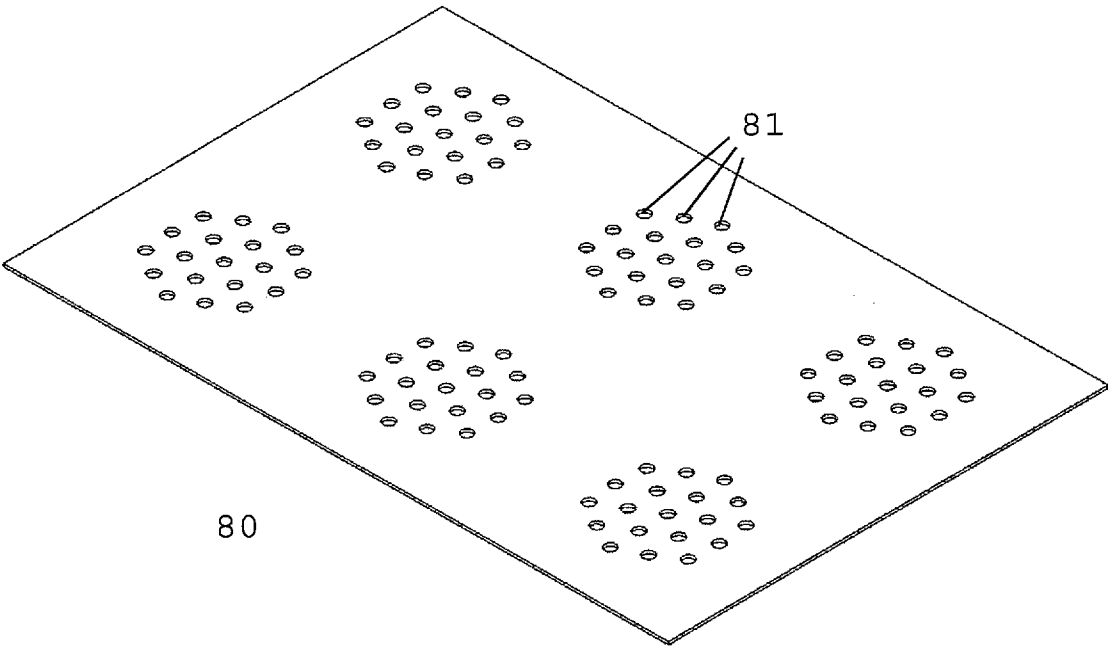


FIGURE 38

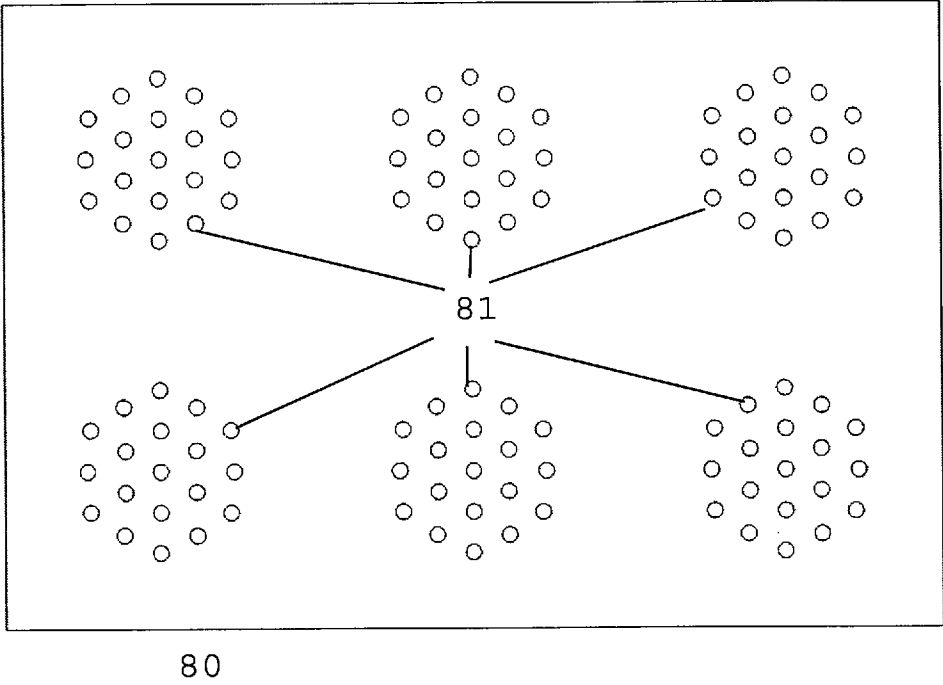


FIGURE 39

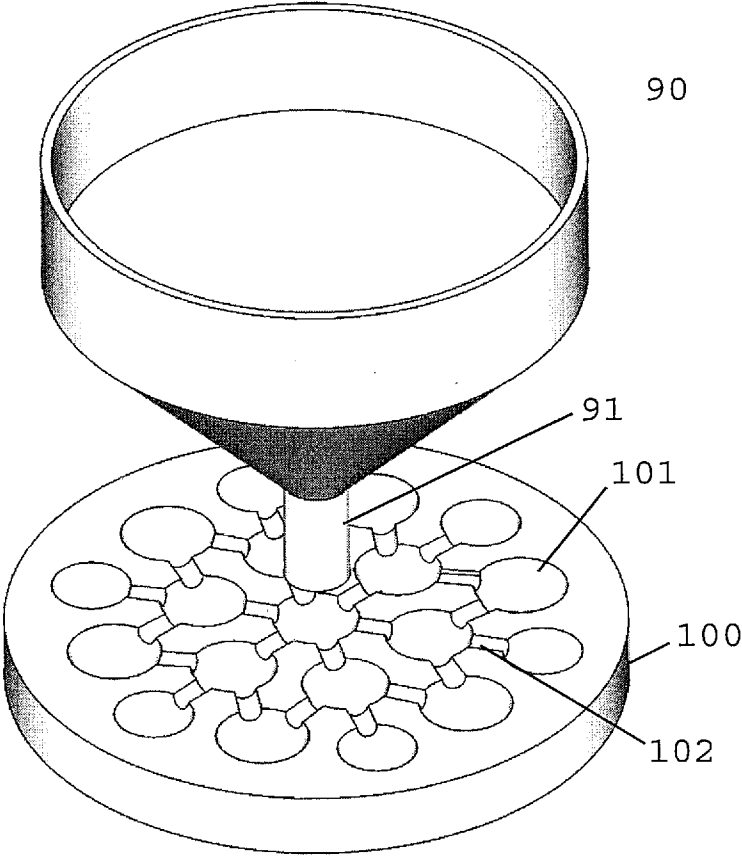


FIGURE 40

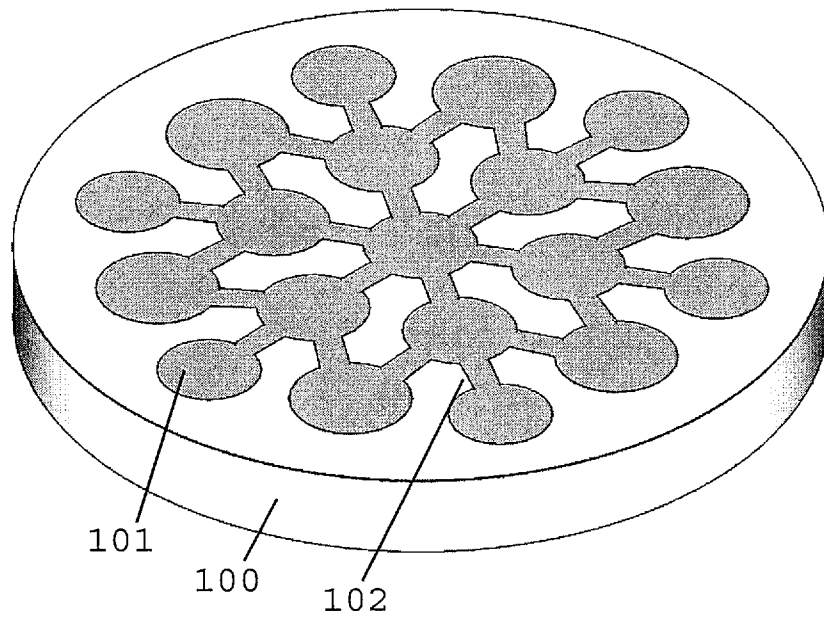


FIGURE 41

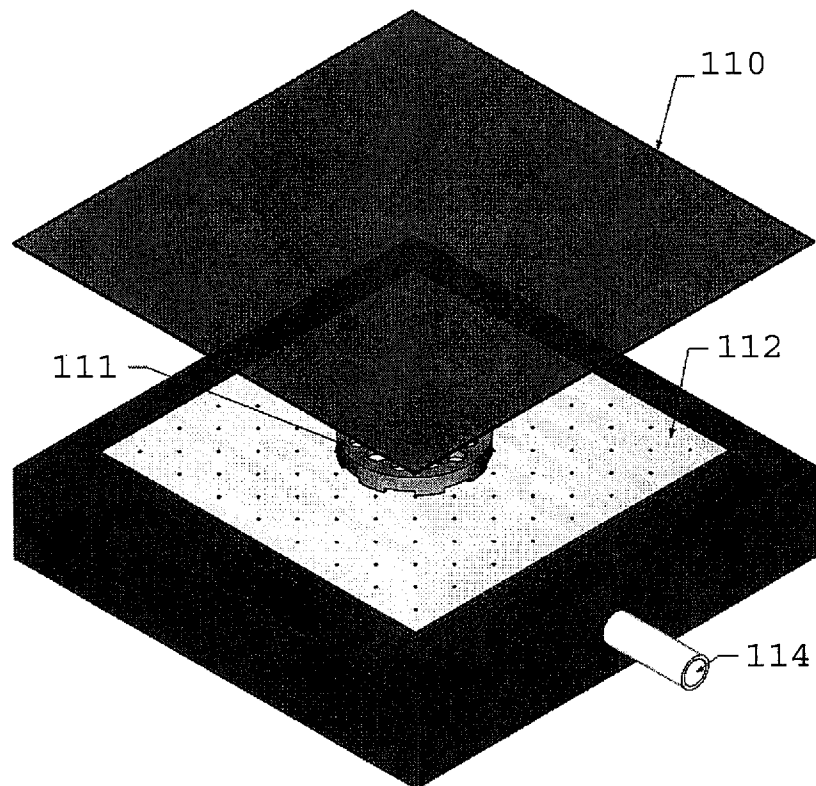


FIGURE 42

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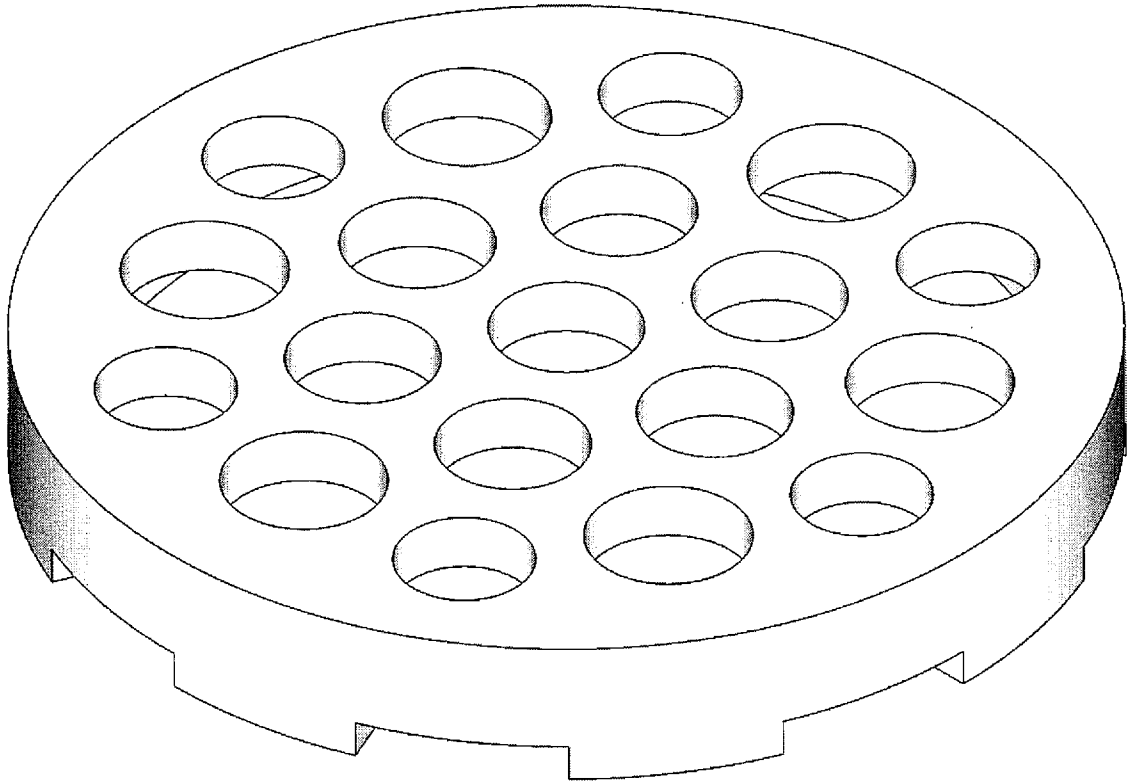


FIGURE 43

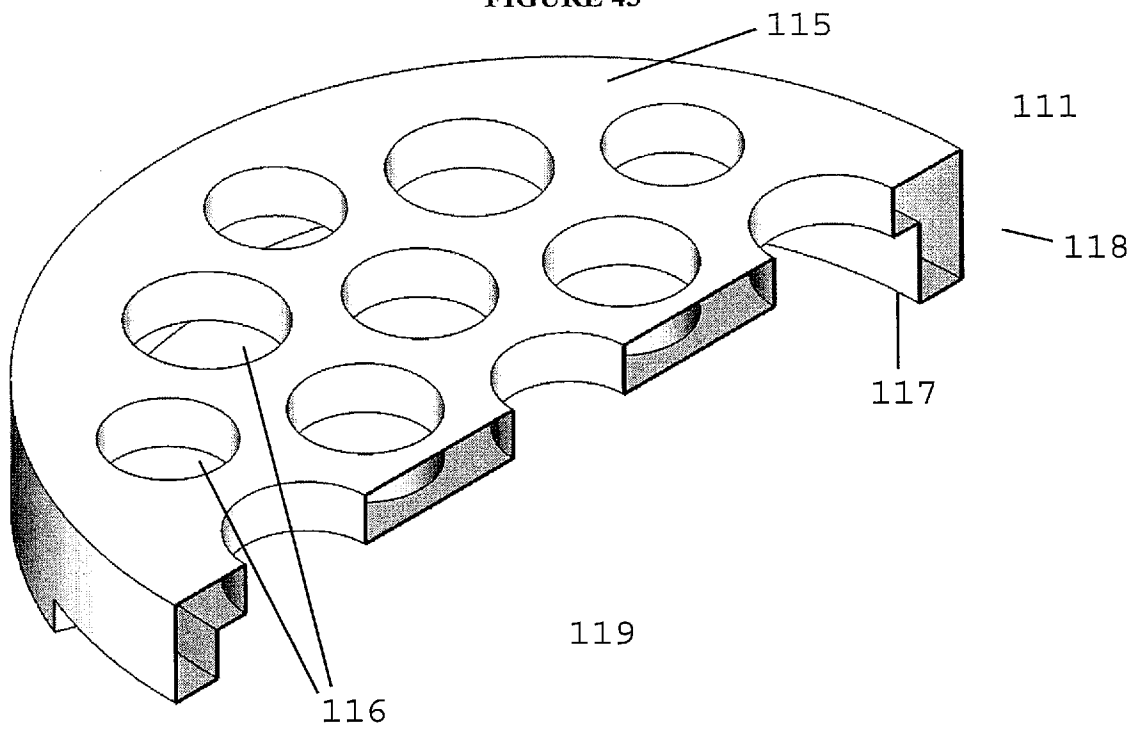


FIGURE 44

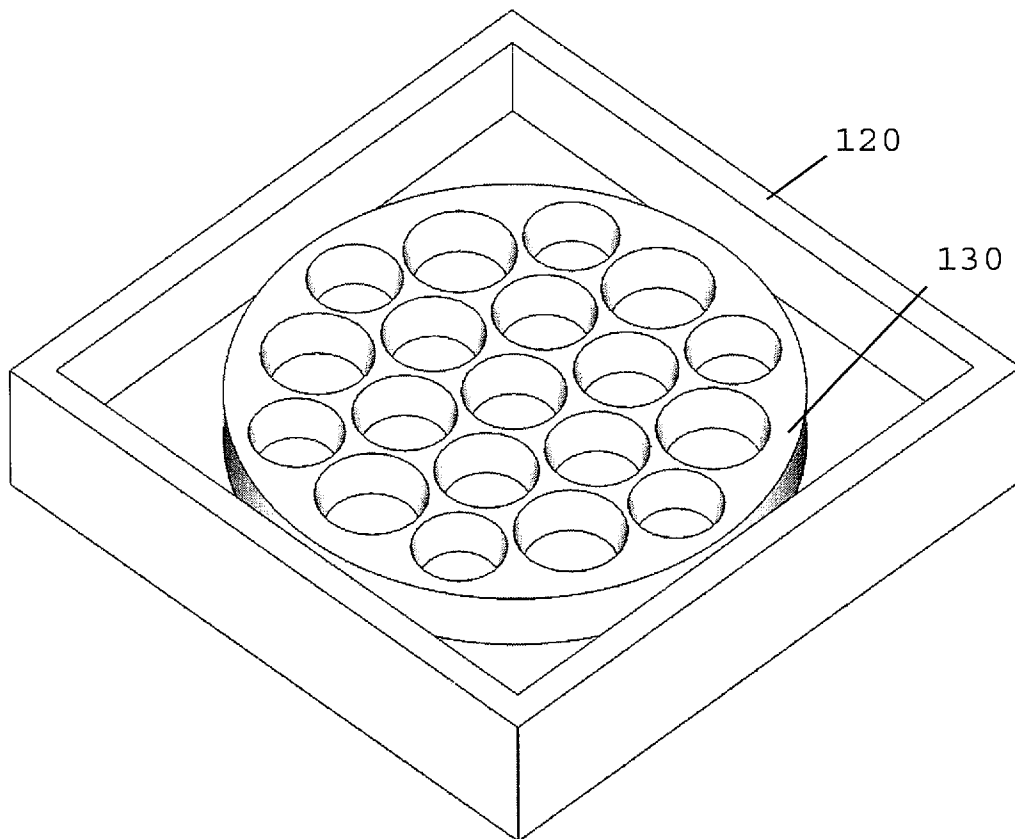


FIGURE 45

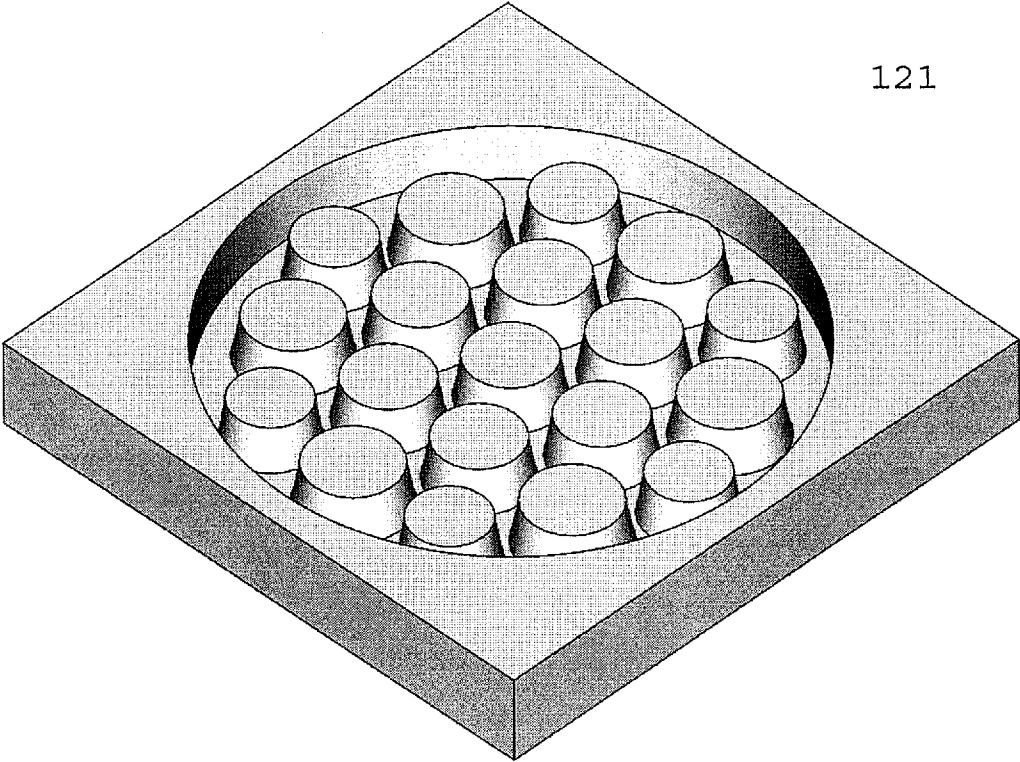


FIGURE 46

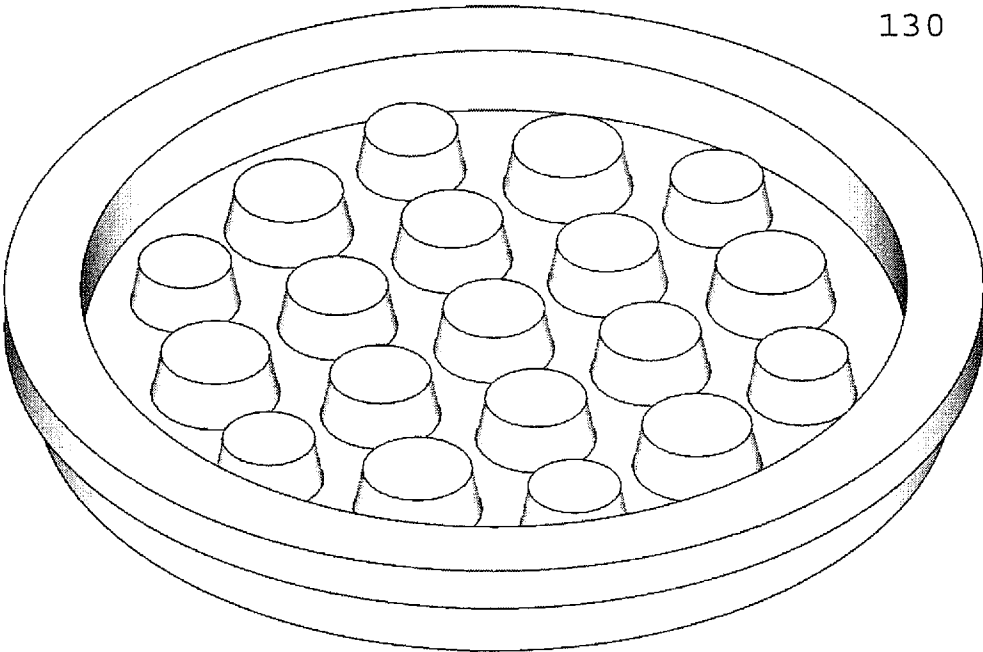


FIGURE 47

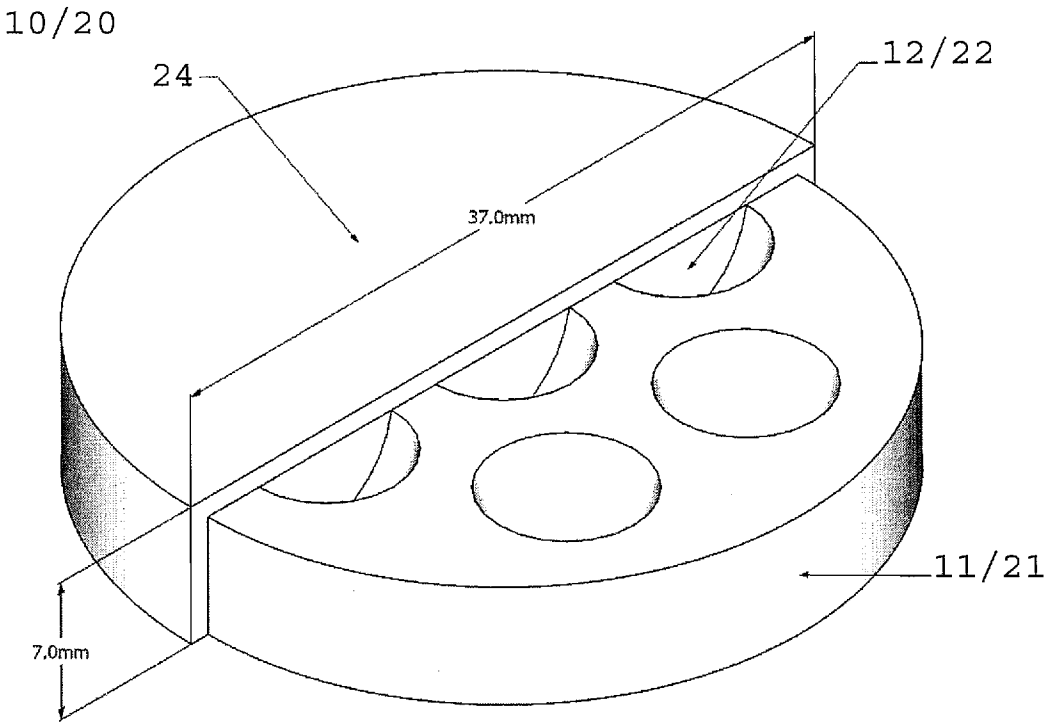


FIGURE 48

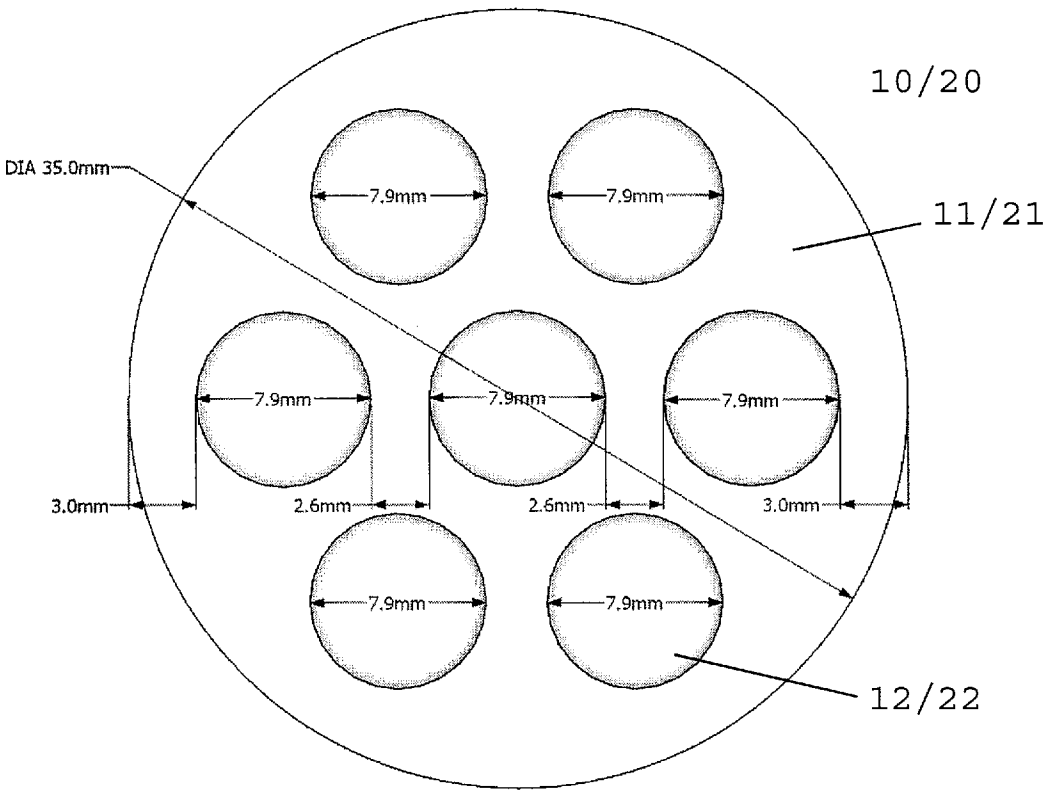


FIGURE 49

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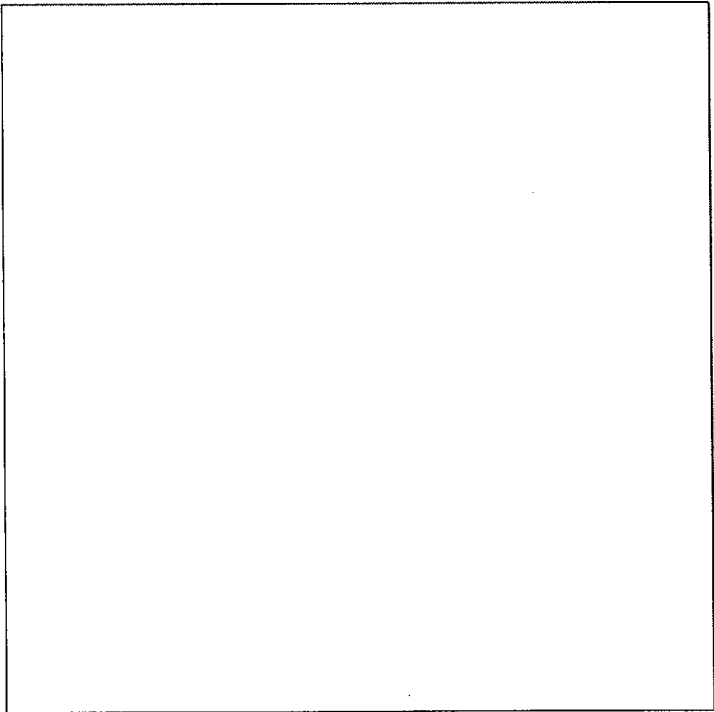


FIGURE 50

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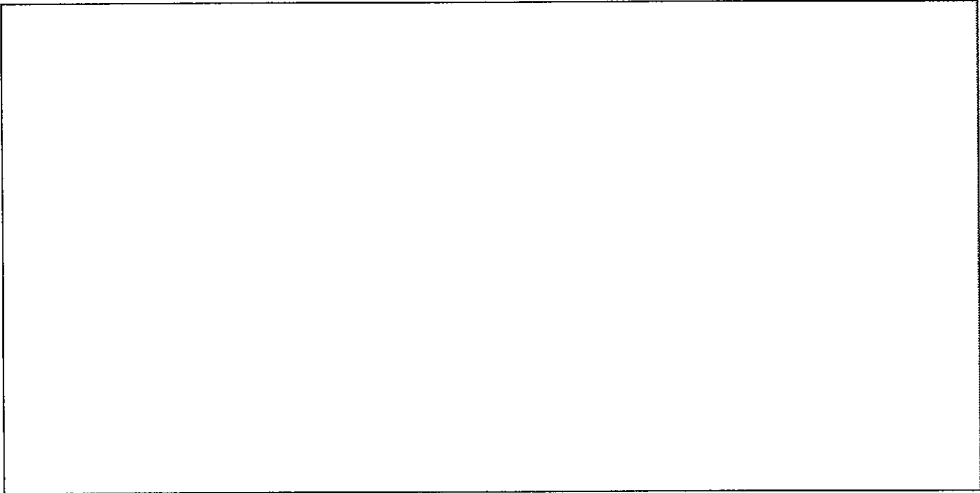


FIGURE 51

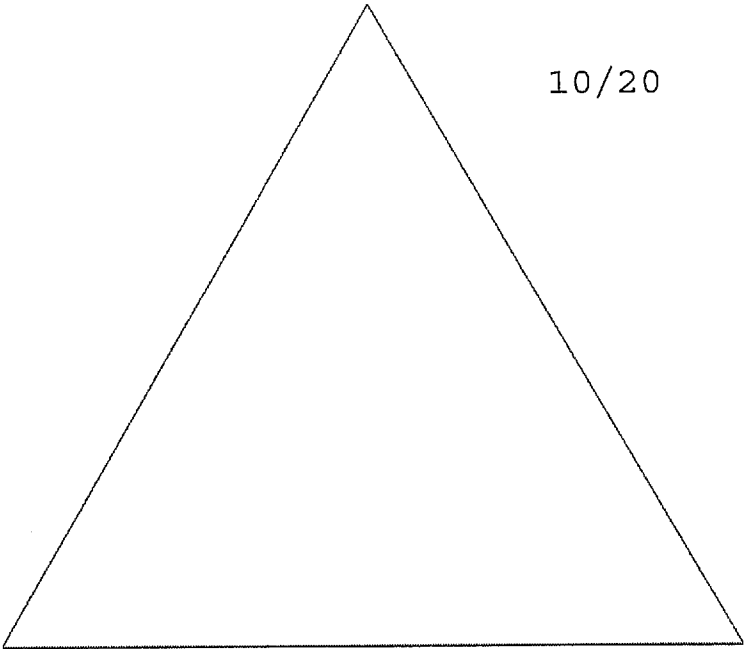


FIGURE 52

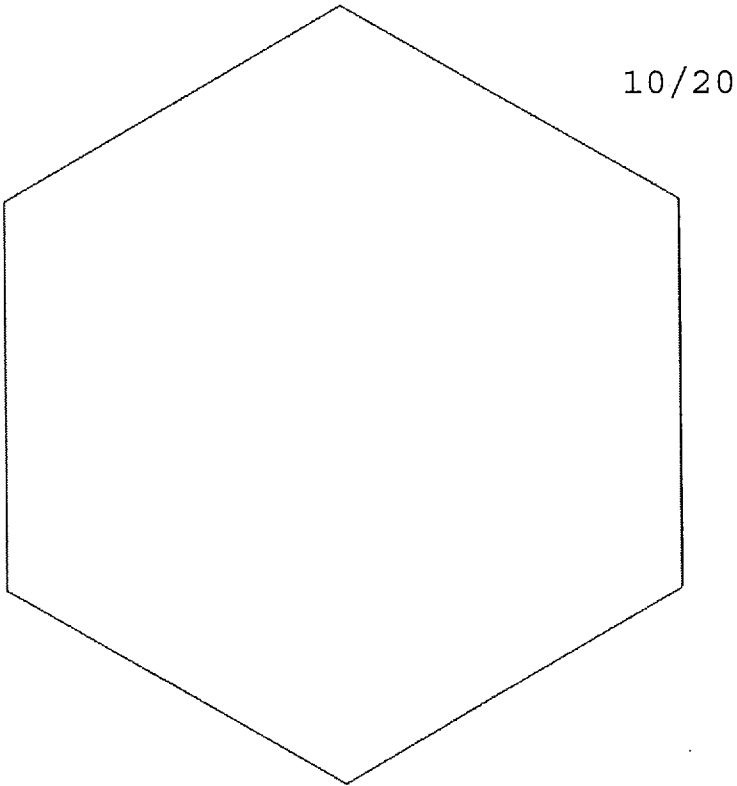


FIGURE 53

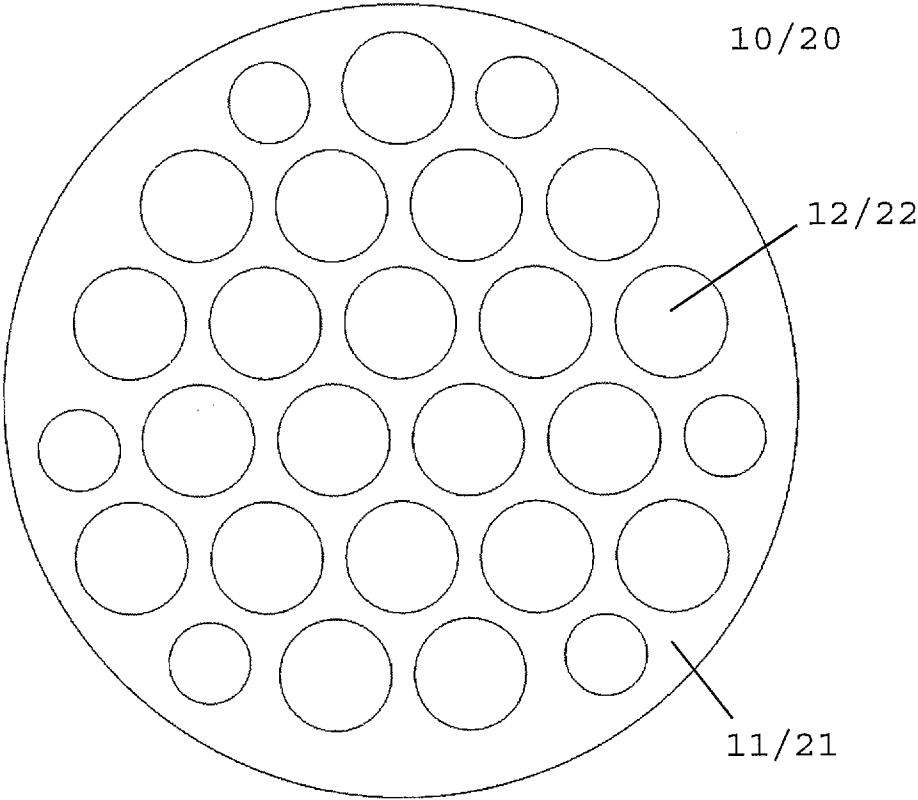


FIGURE 54

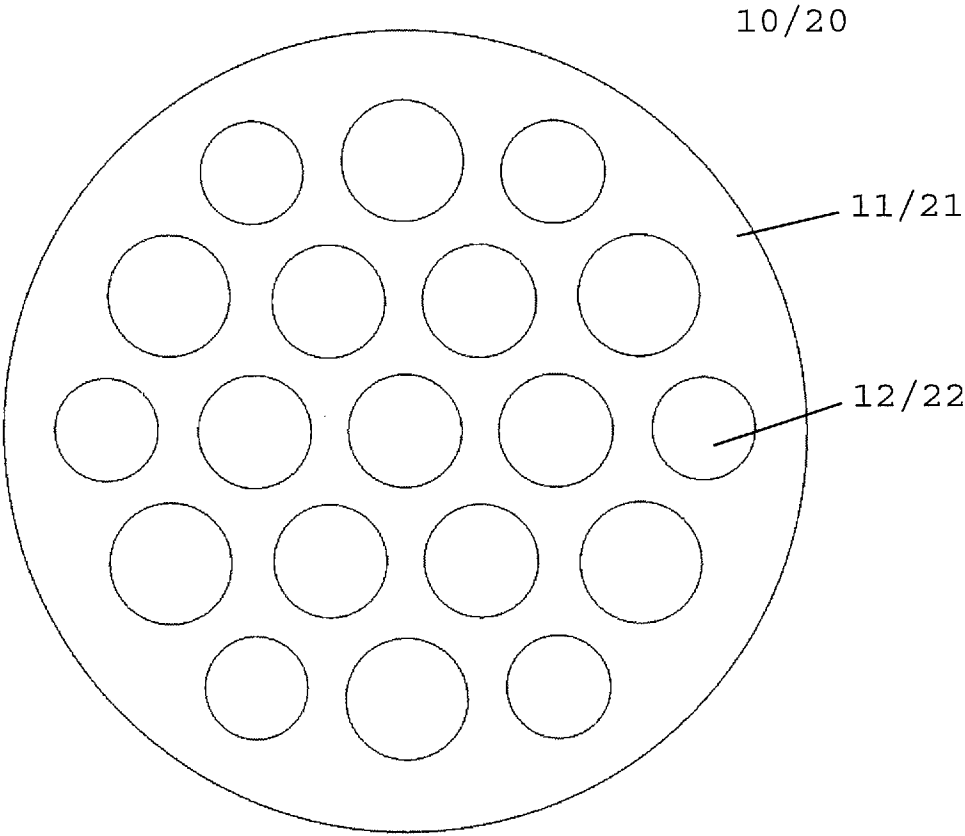


FIGURE 55

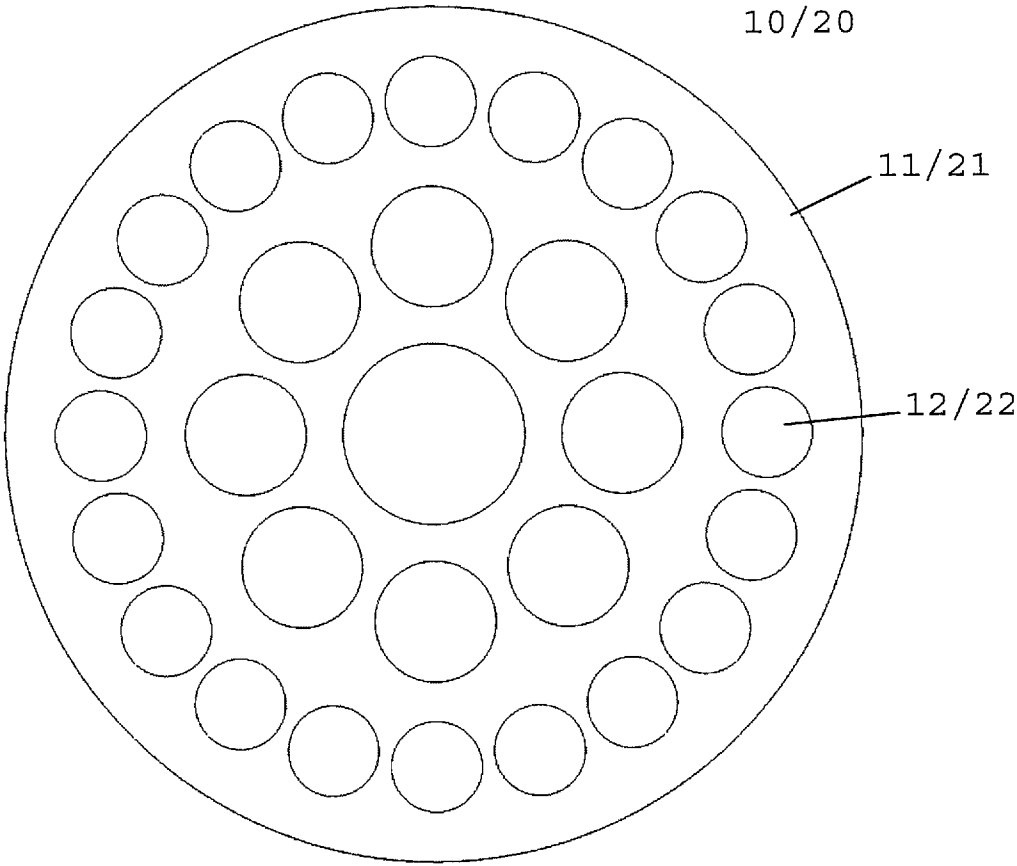


FIGURE 56

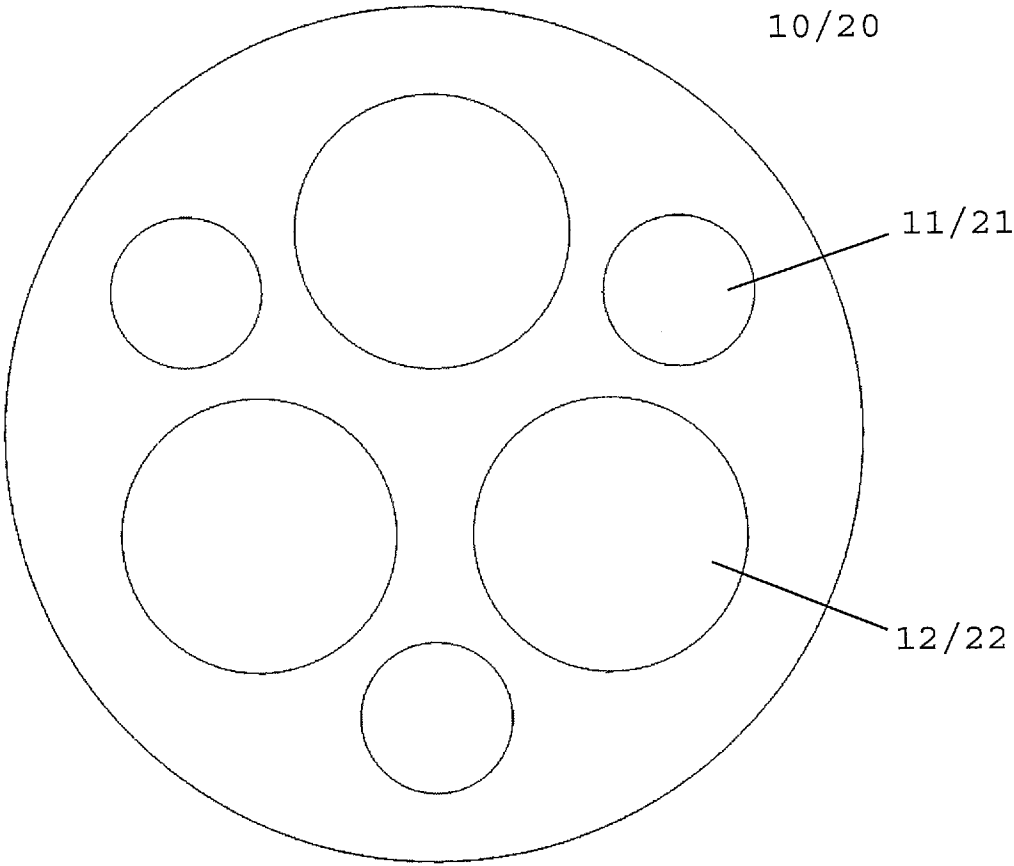


FIGURE 57

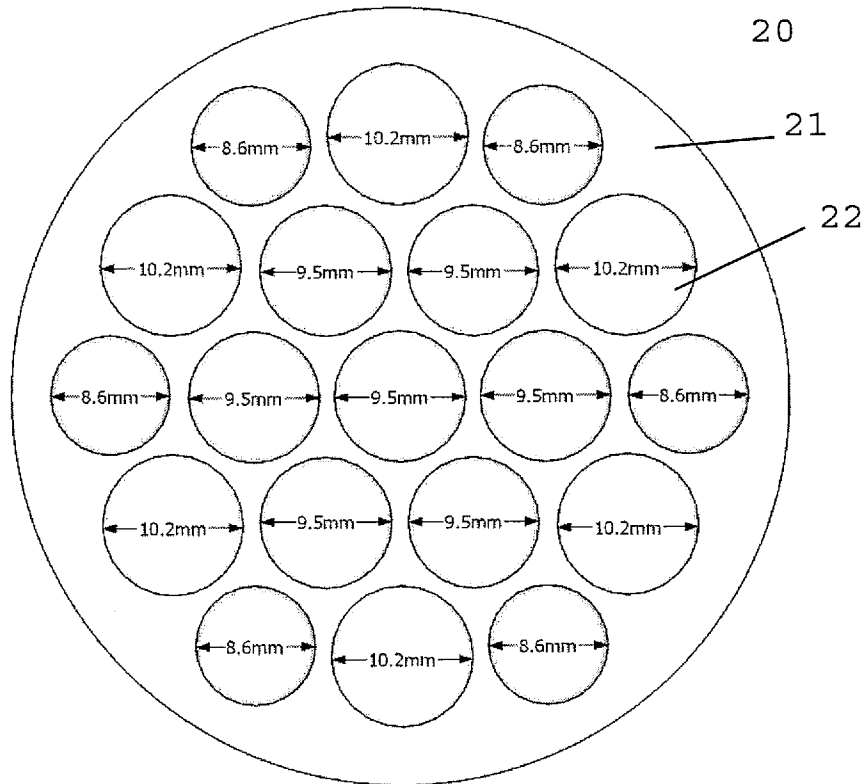


FIGURE 58

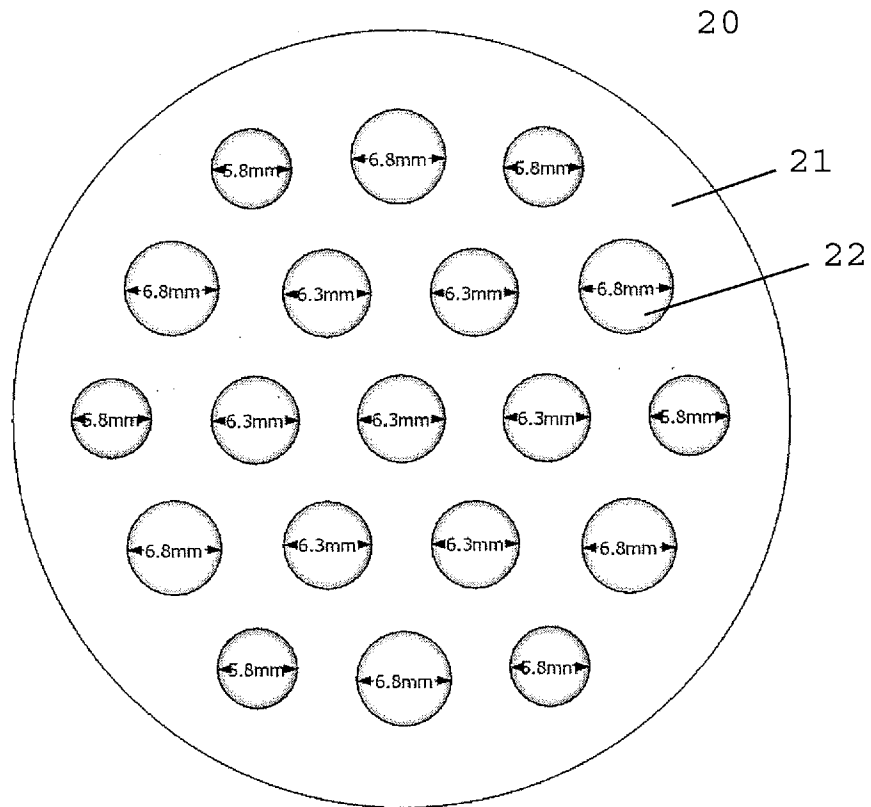


FIGURE 59

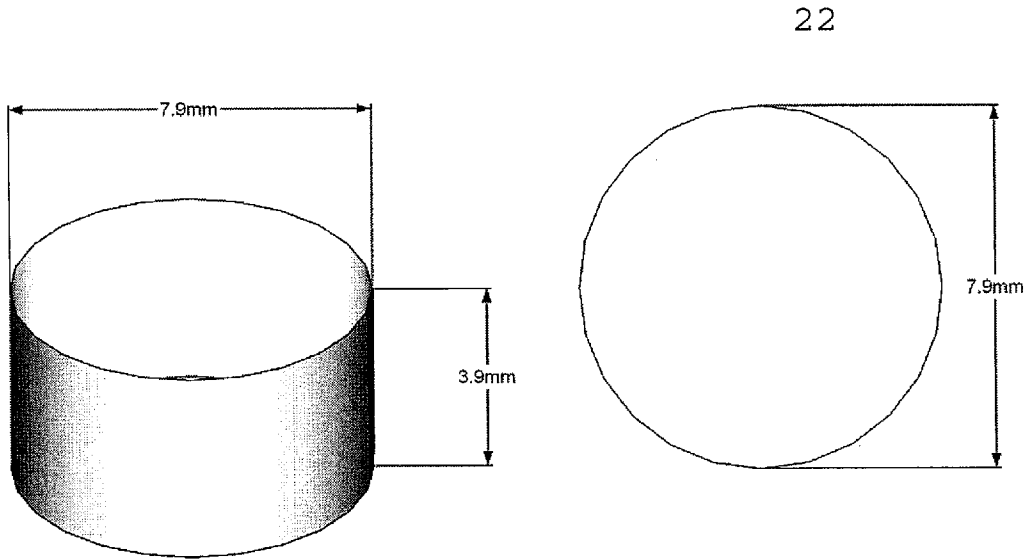


FIGURE 60

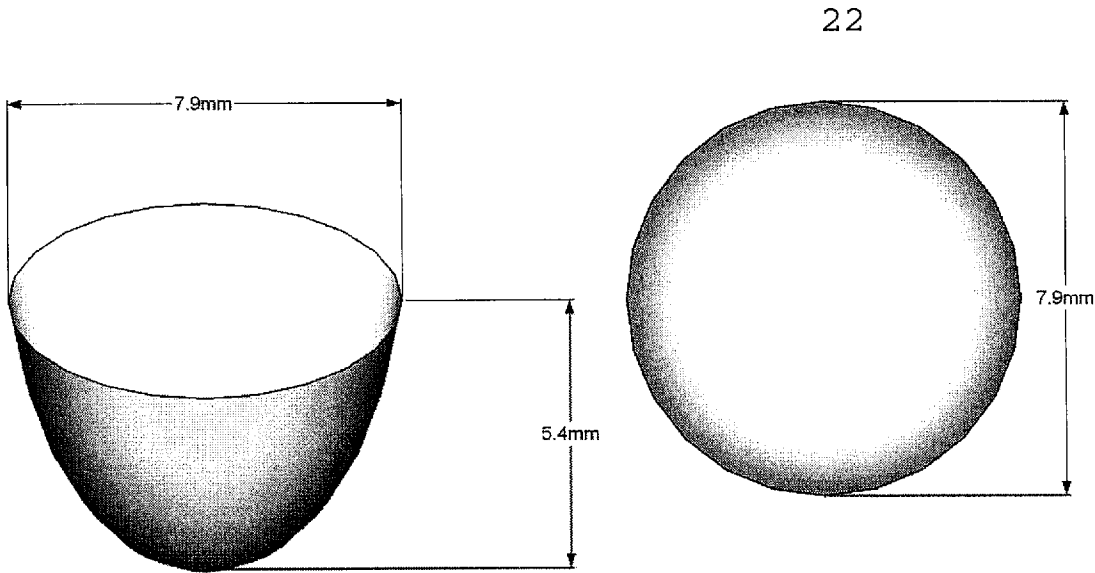


FIGURE 61

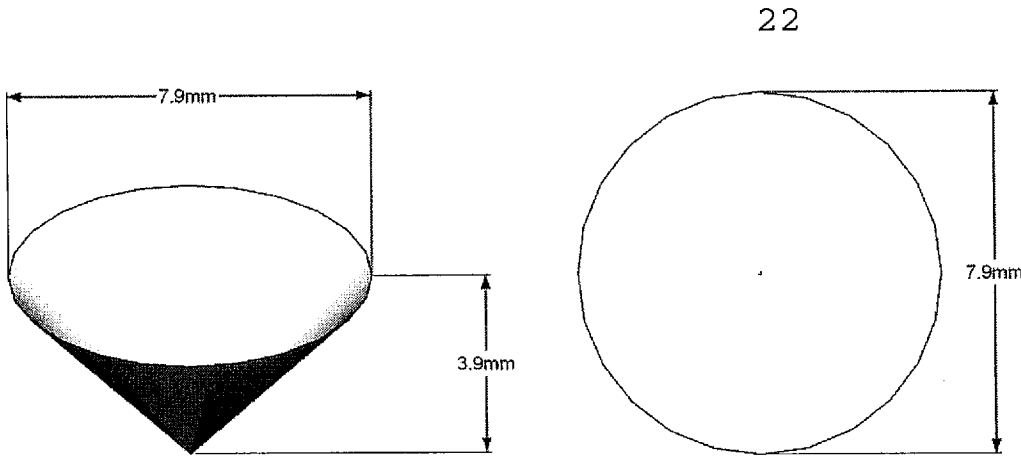


FIGURE 62

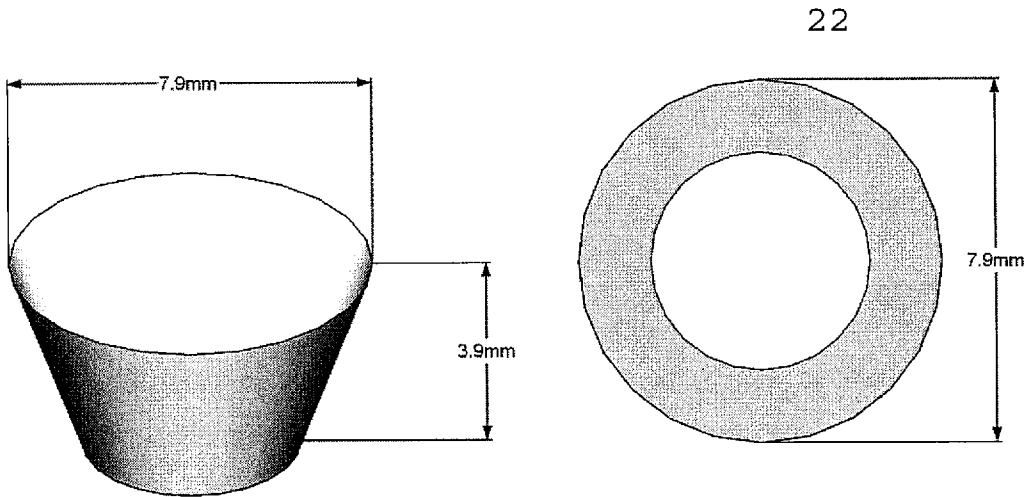


FIGURE 63

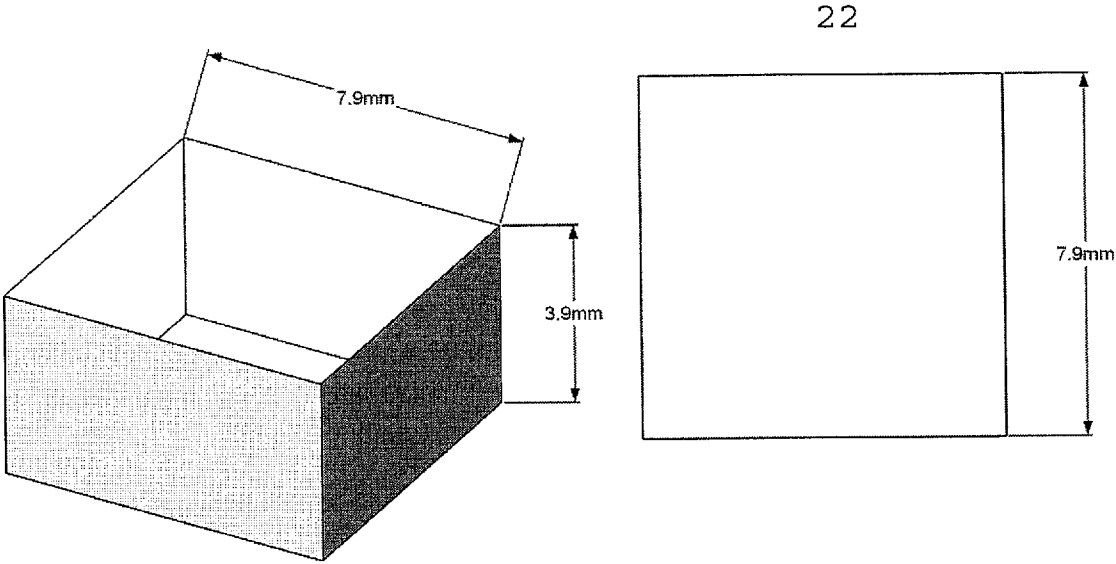


FIGURE 64

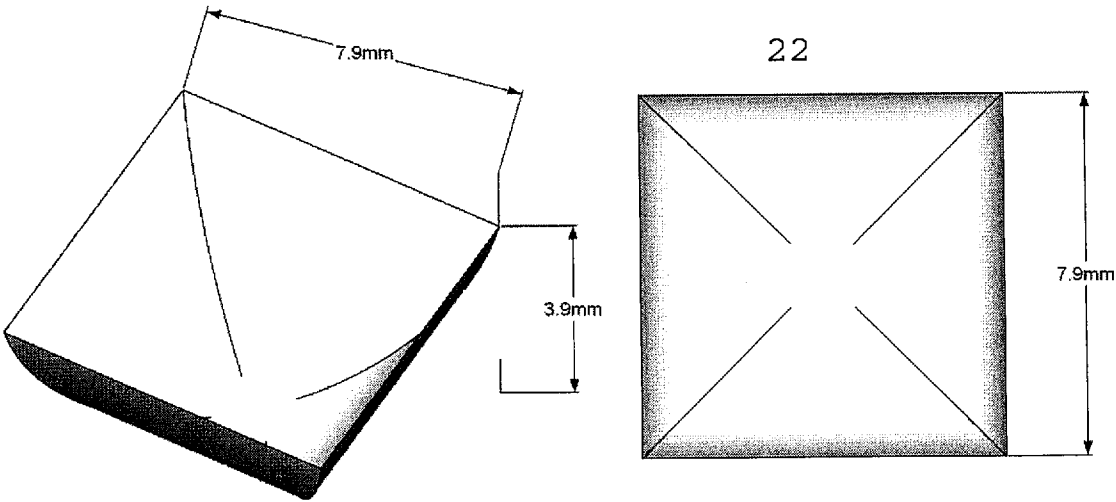


FIGURE 65

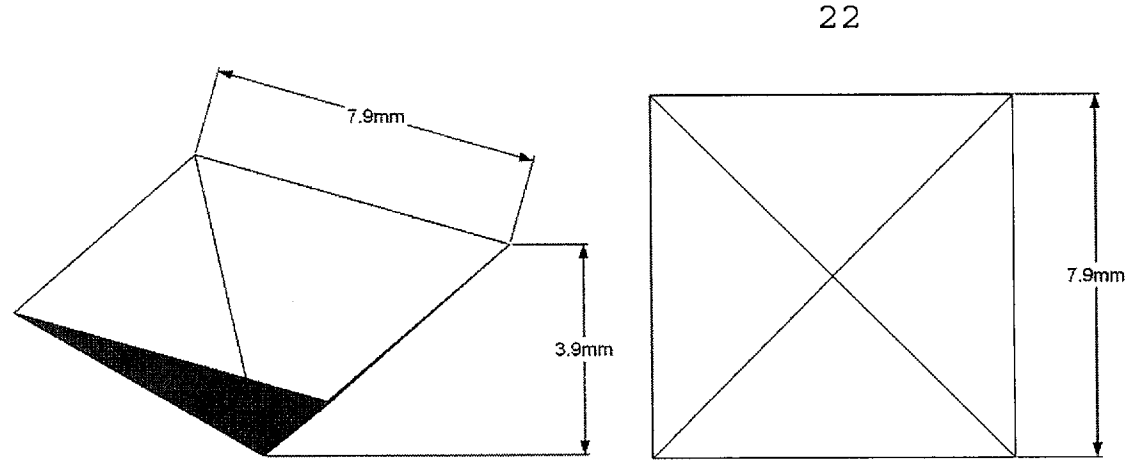


FIGURE 66

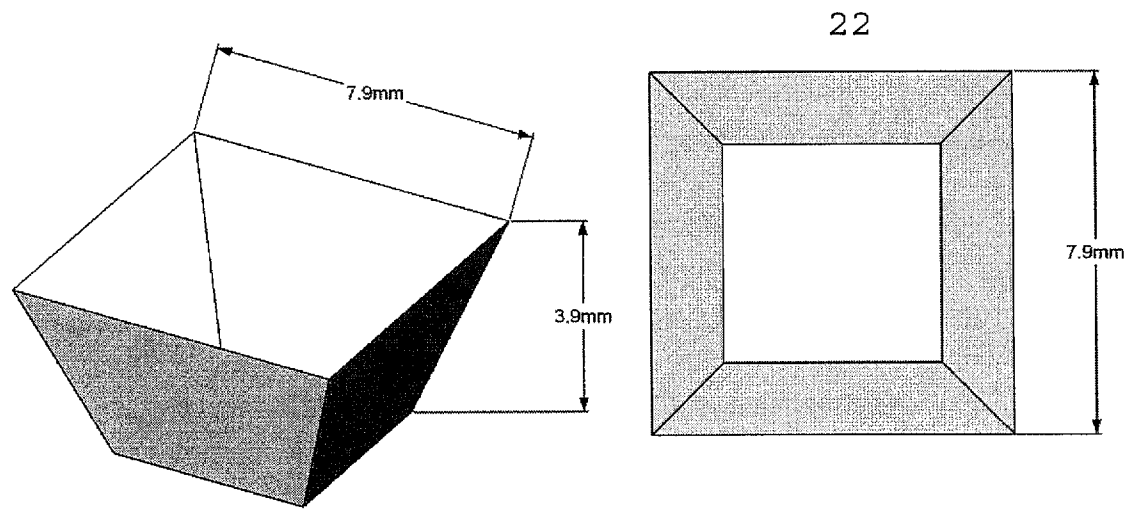


FIGURE 67

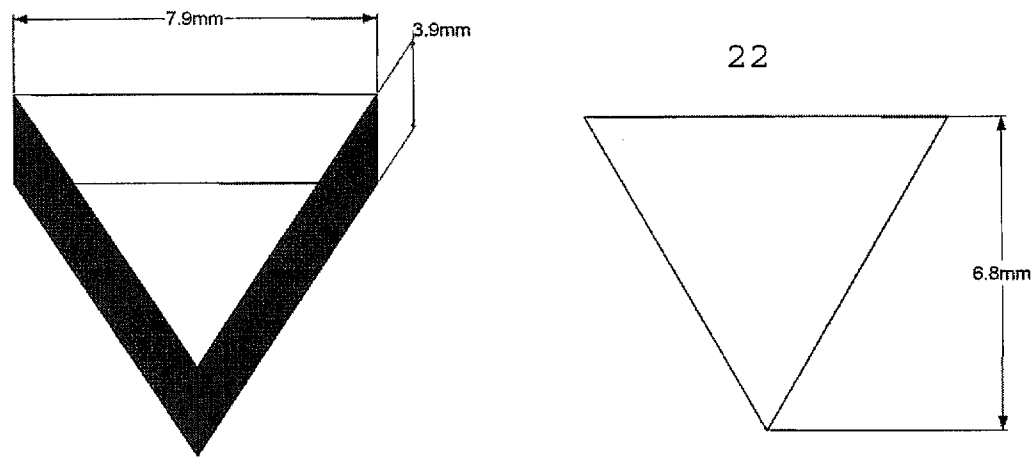


FIGURE 68

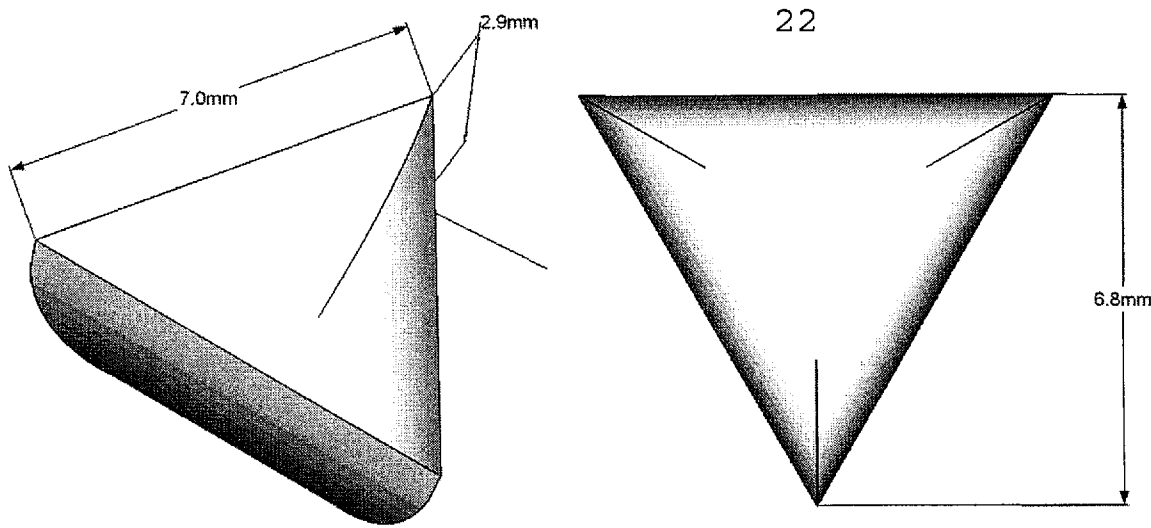


FIGURE 69

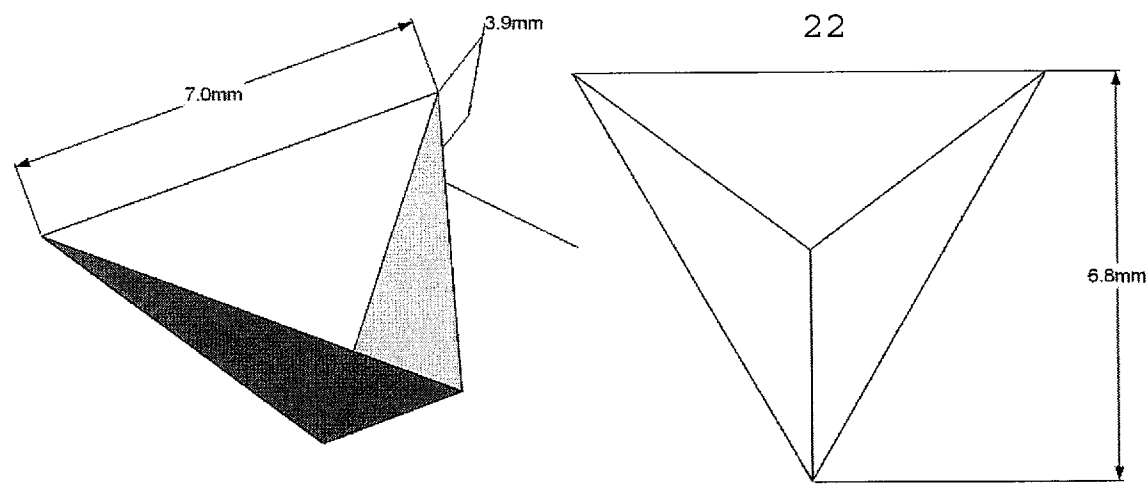


FIGURE 70

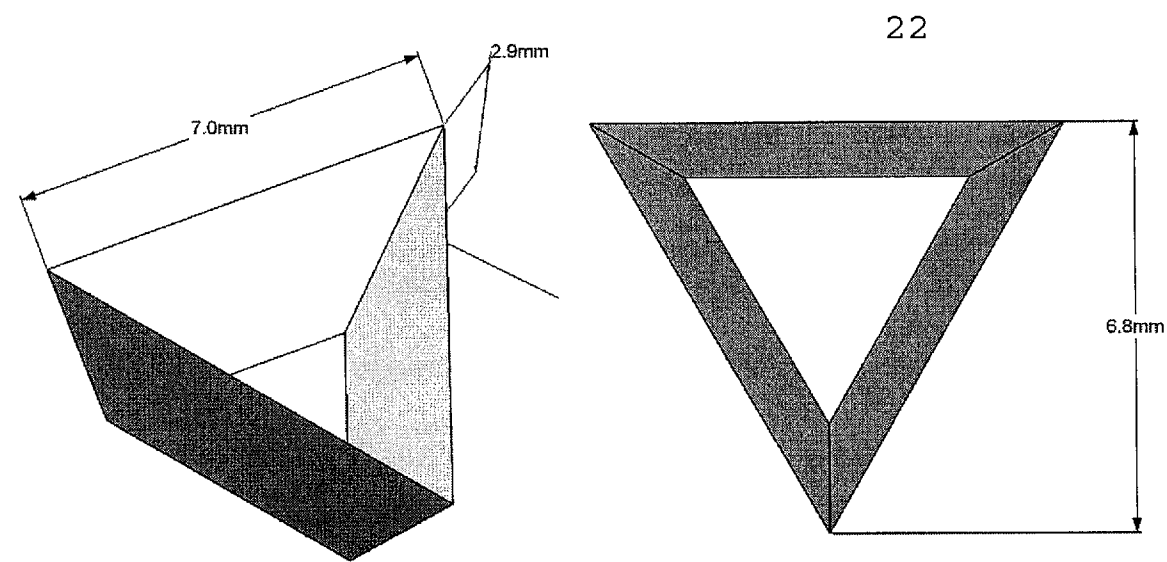


FIGURE 71

22

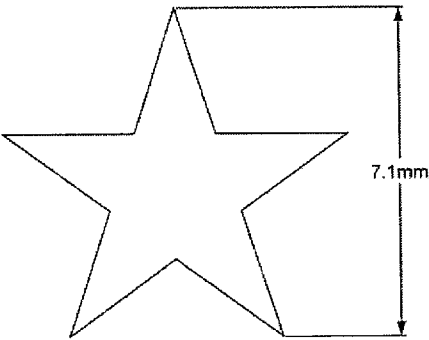
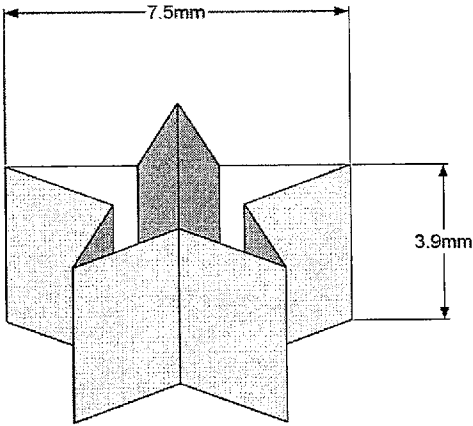


FIGURE 72

22

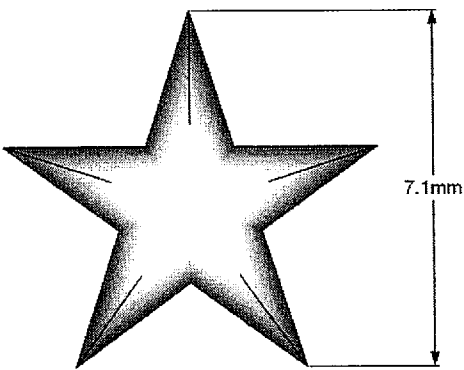
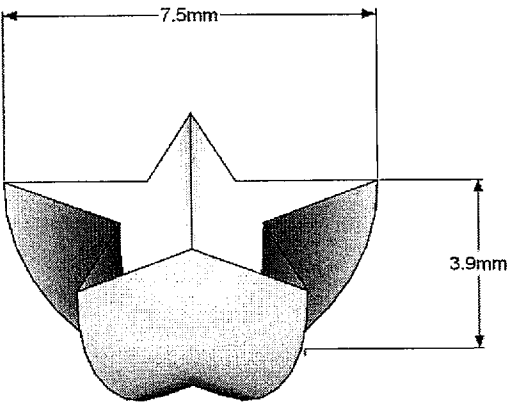


FIGURE 73

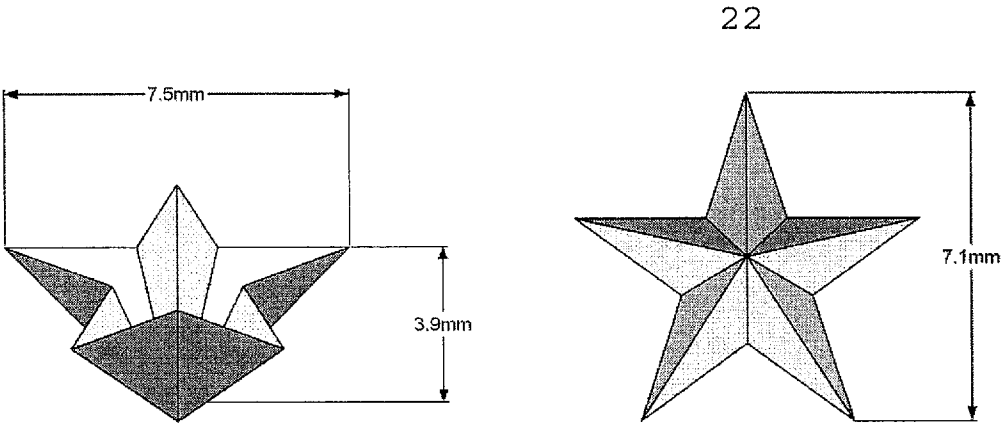


FIGURE 74

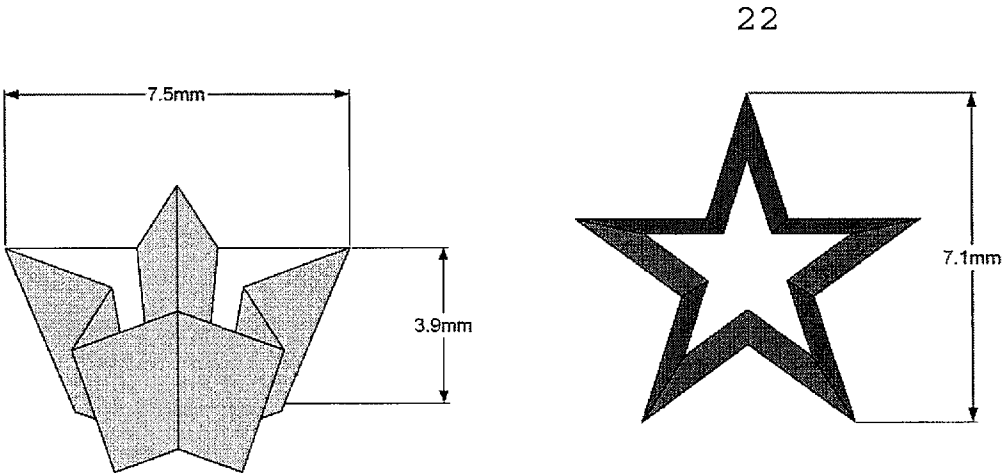


FIGURE 75

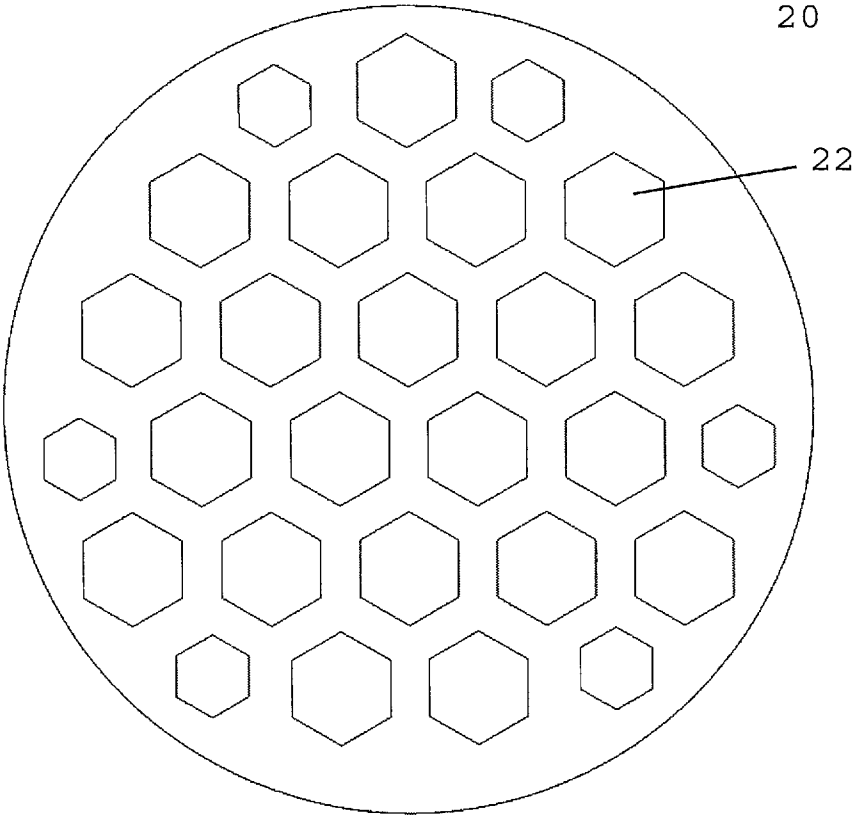


FIGURE 76

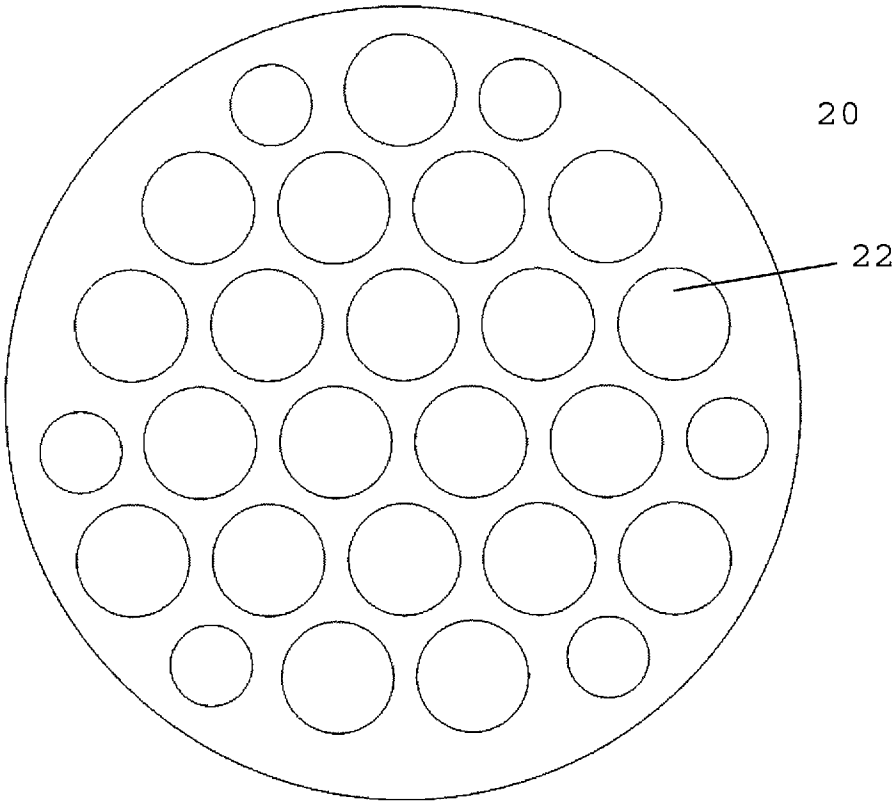


FIGURE 77

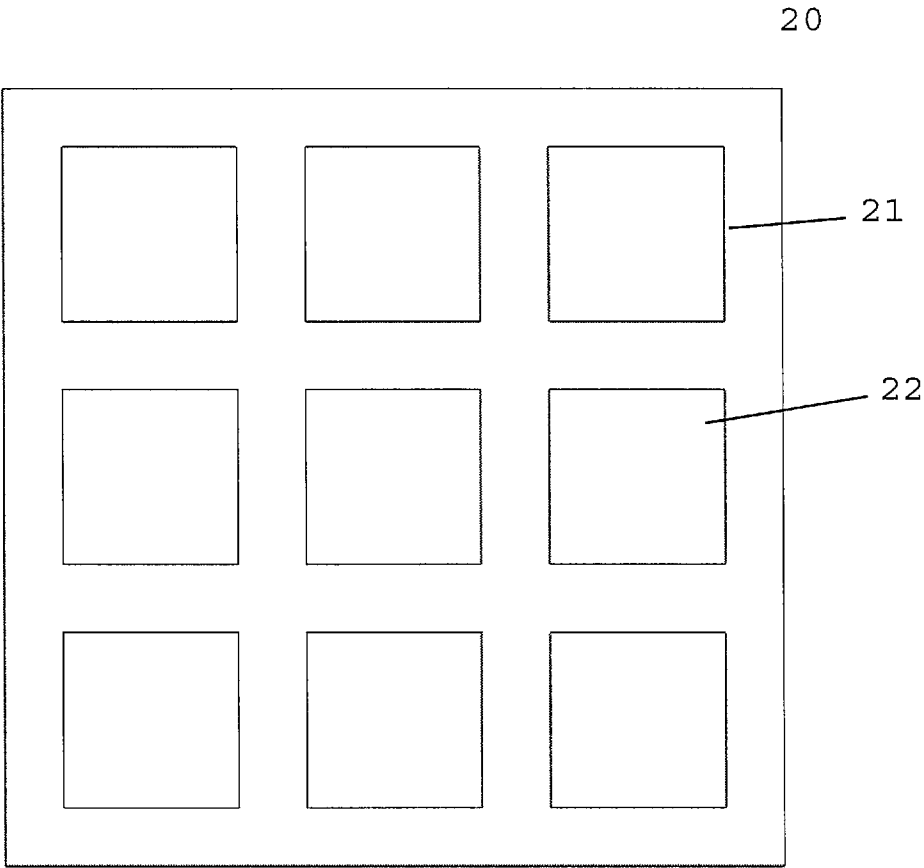


FIGURE 78

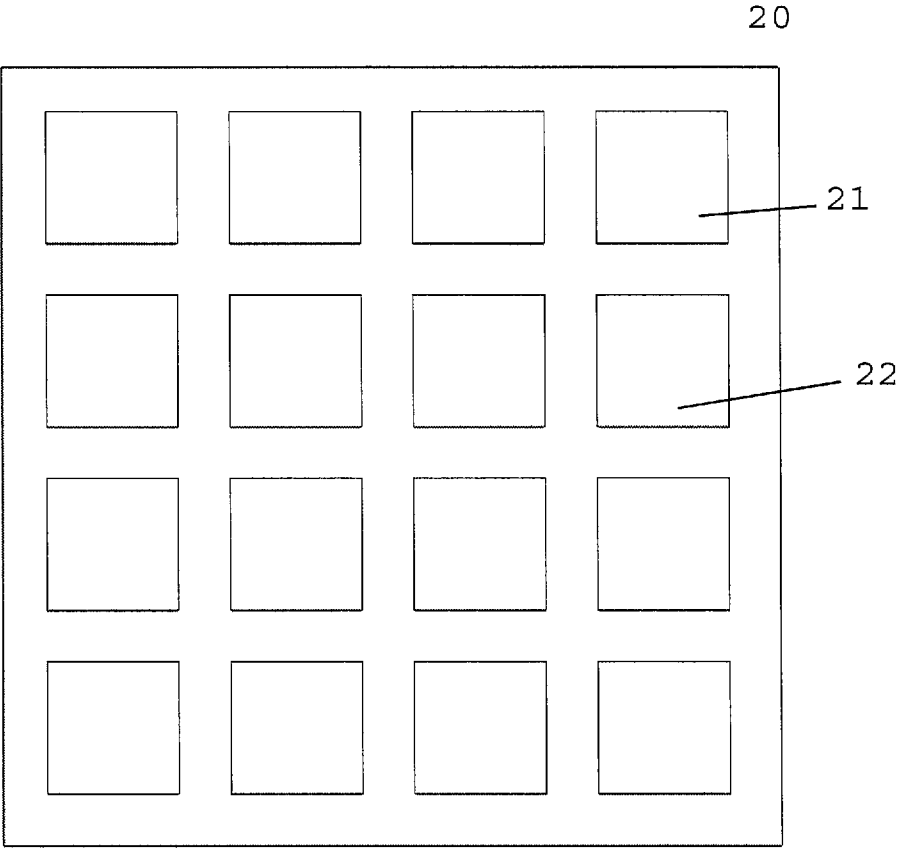


FIGURE 79

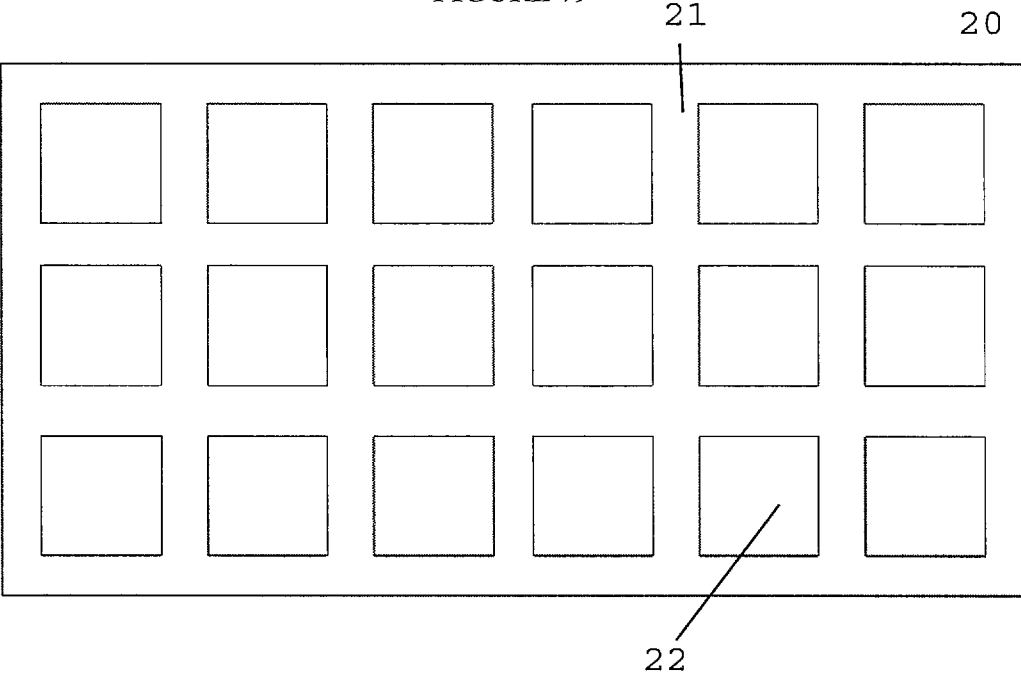


FIGURE 80

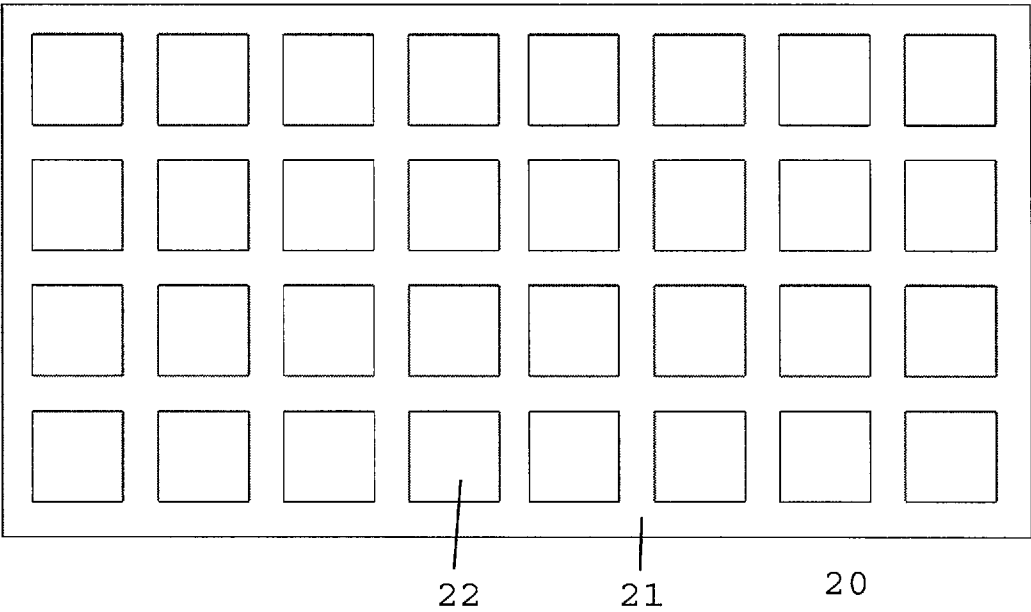


FIGURE 81

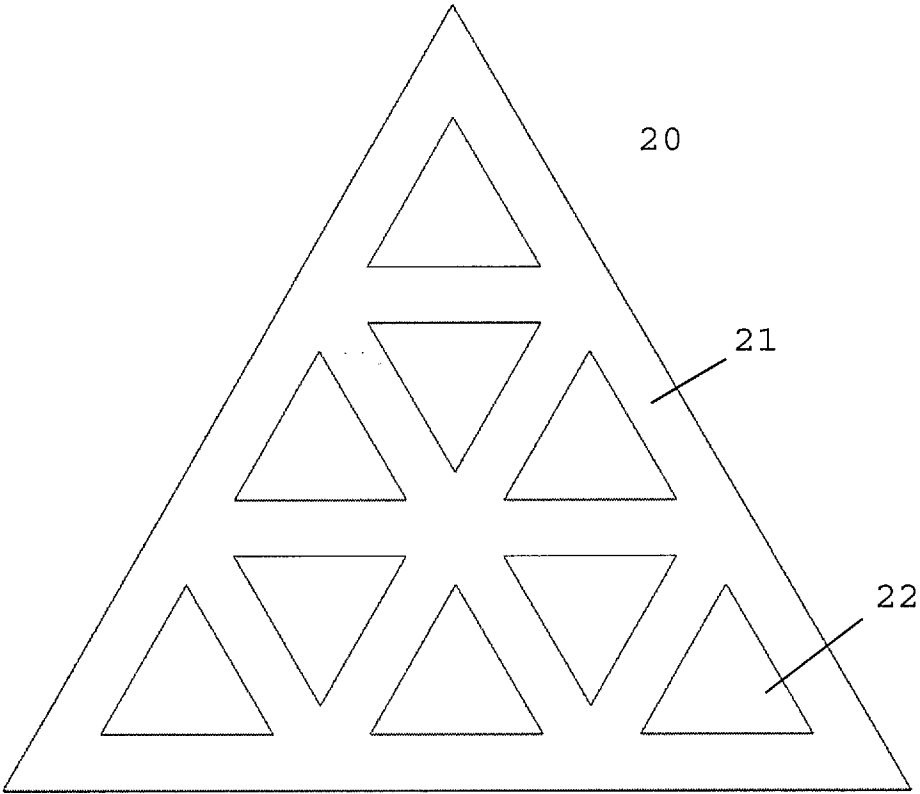
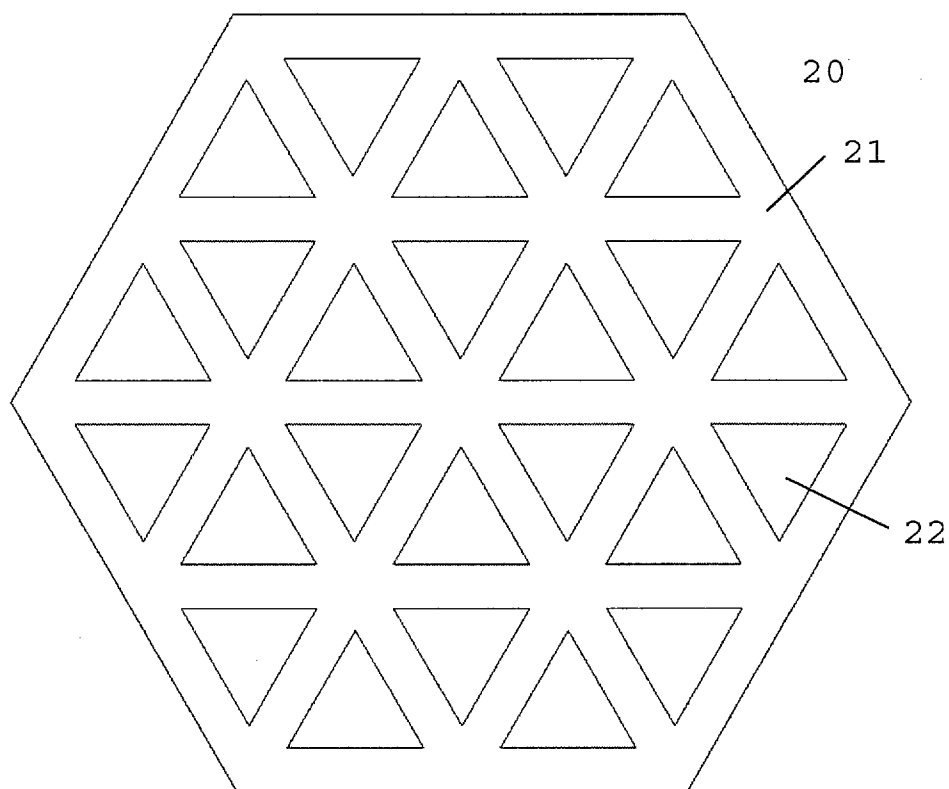


FIGURE 82



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/030250

A. CLASSIFICATION OF SUBJECT MATTER

INV. A23G1/00 A23G1/22 A23G1/54 A23G3/34 A23P1/12
A23G3/54 A23L1/00 A21D13/00

ADD.

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)

A23G A23P A23L A21D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data, BIOSIS, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 432 773 A (MARS INC [US]) 6 June 2007 (2007-06-06) * figures * page 1, line 19 - page 4, line 21 * example *	1,3-5
X	GB 2 219 724 A (FERRERO SPA [IT]) 20 December 1989 (1989-12-20) figures 1,2 pages 2-4 claims 1-8	1,3,5,6
X	WO 2011/027103 A1 (CADBURY UK LTD [GB]; PEARSON SARAH [AU]) 10 March 2011 (2011-03-10) figure 6	7
A	page 19, line 21 - page 20, line 2 ----- -/--	8-11



Further documents are listed in the continuation of Box C.



See patent family annex.

* 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

16 July 2013

Date of mailing of the international search report

29/07/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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Fax: (+31-70) 340-3016

Authorized officer

Barac, Dominika

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/030250

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/067097 A2 (OBSHESTVO S OGRANICHENNOY OTV [RU]; PESKIN ALEXANDR VLADIMIROVICH [RU]) 14 June 2007 (2007-06-14) figures 1-8 page 2 - page 5 * claims *	7
X	DE 10 2007 031369 A1 (MEDERER GMBH [DE]) 8 January 2009 (2009-01-08) figures 1-5 paragraphs [0012] - [0017] claims 1-14	7
X	WO 2009/135661 A1 (NESTEC SA [CH]; LEADBEATER JOHN MICHAEL [GB]; GOMES NICOLAS CHRISTIAN) 12 November 2009 (2009-11-12) page 7, line 23 - page 8, line 25 page 10, lines 5-16 * claims *	7-11
X	EP 1 797 767 A1 (AKUTAGAWA CONFECTIONERY [JP]) 20 June 2007 (2007-06-20)	7-10
A	paragraph [0008] - paragraph [0011] examples 1-6 * figures *	11
X	WO 2006/108306 A1 (BUEHLER AG [CH]; WEBER RAINER [DE]; WALGARTH DANIEL [DE]) 19 October 2006 (2006-10-19) claims 1-9 pages 2-5	7-11
A	EP 0 865 736 A2 (KMB PRODUKTIONS AG [CH]) 23 September 1998 (1998-09-23) figures 1-3 claims 1-10	1-11
A	DE 20 2005 002309 U1 (KMB PRODUKTIONS AG FELBEN [CH]) 25 May 2005 (2005-05-25) * figure *; the whole document	1-11
A	WO 94/02027 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]) 3 February 1994 (1994-02-03) figures 1-6	1-11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/030250

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.: 12
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:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
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 an 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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 12

Claim 12 refers back to independent claim 8 and reads that the fillings are distributed throughout the chocolate wafer. However, present claim 8 is not related to a chocolate wafer, which raises lack of clarity. Thus, it is not evident for which subject-matter protection is sought due to the current wording of said claim.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/030250

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2432773	A	06-06-2007	AU 2006321394 A1 CA 2631583 A1 CN 101431901 A EP 1956922 A1 GB 2432773 A WO 2007063338 A1	07-06-2007 07-06-2007 13-05-2009 20-08-2008 06-06-2007 07-06-2007
GB 2219724	A	20-12-1989	BE 1002168 A3 CA 1332310 C CH 676537 A5 FR 2632824 A1 GB 2219724 A HK 126793 A IE 62431 B1 IT 214332 Z2 LU 87539 A1 NL 8901451 A PT 90860 A US 4963379 A	28-08-1990 11-10-1994 15-02-1991 22-12-1989 20-12-1989 26-11-1993 08-02-1995 03-05-1990 26-10-1989 16-01-1990 29-12-1989 16-10-1990
WO 2011027103	A1	10-03-2011	EP 2473059 A1 US 2012164268 A1 WO 2011027103 A1	11-07-2012 28-06-2012 10-03-2011
WO 2007067097	A2	14-06-2007	AU 2006323298 A1 CA 2631519 A1 EA 200600142 A1 EP 1962609 A2 US 2008292757 A1 WO 2007067097 A2	14-06-2007 14-06-2007 27-10-2006 03-09-2008 27-11-2008 14-06-2007
DE 102007031369	A1	08-01-2009	AR 067451 A1 AT 531278 T AU 2008271621 A1 CA 2692617 A1 DE 102007031369 A1 DK 2166869 T3 EP 2166869 A1 ES 2376390 T3 JP 2010532160 A PE 05282009 A1 SI 2166869 T1 US 2010196548 A1 WO 2009003585 A1	14-10-2009 15-11-2011 08-01-2009 08-01-2009 08-01-2009 27-02-2012 31-03-2010 13-03-2012 07-10-2010 24-05-2009 30-03-2012 05-08-2010 08-01-2009
WO 2009135661	A1	12-11-2009	CN 102088865 A EP 2293681 A1 US 2011262598 A1 WO 2009135661 A1	08-06-2011 16-03-2011 27-10-2011 12-11-2009
EP 1797767	A1	20-06-2007	AU 2005290516 A1 CA 2582756 A1 EP 1797767 A1 JP 2006101744 A KR 20070063558 A US 2009104318 A1 WO 2006038580 A1	13-04-2006 13-04-2006 20-06-2007 20-04-2006 19-06-2007 23-04-2009 13-04-2006

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/030250

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006108306	A1	19-10-2006	CN 101160059 A 09-04-2008
			DE 102005017178 A1 19-10-2006
			DK 1868445 T3 09-11-2009
			EP 1868445 A1 26-12-2007
			ES 2330040 T3 03-12-2009
			JP 2008535502 A 04-09-2008
			PT 1868445 E 22-10-2009
			SI 1868445 T1 31-12-2009
			US 2009041913 A1 12-02-2009
			WO 2006108306 A1 19-10-2006
EP 0865736	A2	23-09-1998	NONE
DE 202005002309	U1	25-05-2005	NONE
WO 9402027	A1	03-02-1994	AU 4700393 A 14-02-1994
			WO 9402027 A1 03-02-1994