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(54) **A shaving machine**

(57) A shaving machine (100) having a thicker grid (110) than standard machines, that protect the skin from damage and ensure the keeping of religious practices related to shaving. The thicker grid is achieved by either replacing a basic grid of the machine or mounting an additional grid (119) thereupon. The invention further pro-

vides kits of grids in different thicknesses to allow a user personalize the performance of the shaving machine. The invention further provides kits of mountable grids to be added to the basic grid, in different thicknesses to allow a user personalize the performance of the shaving machine.

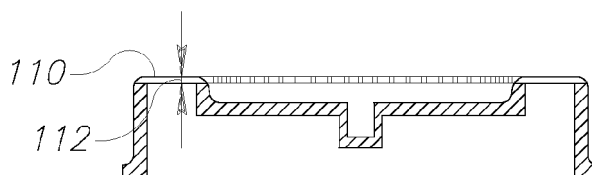


Figure 1D

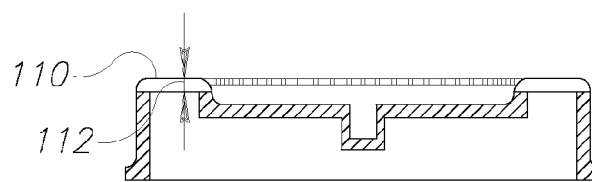


Figure 1E

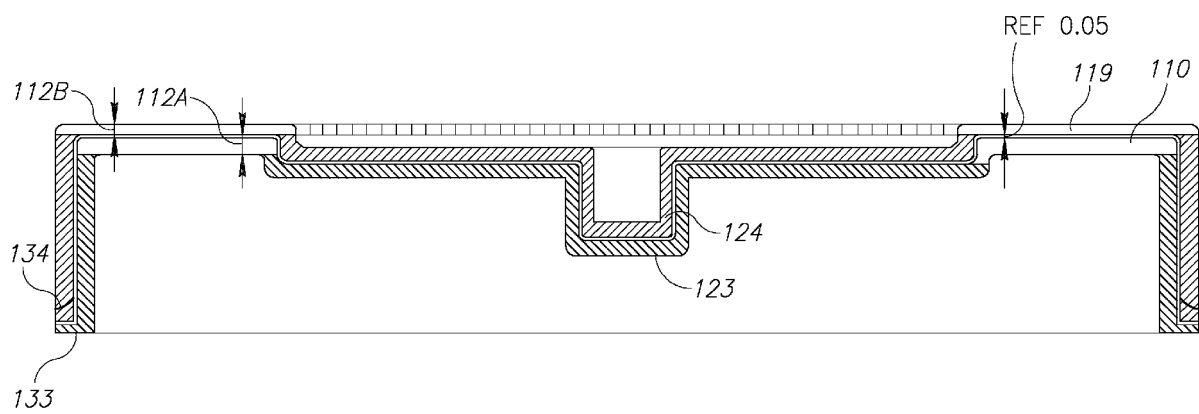


Figure 3G

Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Israeli Patent Application 210887 filed on January 26 2011, which is incorporated herein by reference.

BACKGROUND

1. TECHNICAL FIELD

[0002] The present invention relates to the field of shaving machines, and more particularly, to a skin safe shaving machine.

2. DISCUSSION OF RELATED ART

[0003] Shaving machines (illustrated in prior art **Figures 1A**, and **4A-4C**) are in continuous development towards achieving an ever smoother shave. However, a smooth shave is accompanied by some skin injury, or at least a risk of skin injury. Due to this damage risk, for some users a smooth shave is disadvantageous, for example users suffering from skin problems, ingrown hairs, or reverse hair growth, or users keeping religious practices that prohibit damaging the skin.

[0004] Trimmers are designed to cut hair to bristles, but trimmer cut bristles are quite rough and long, and trimmers are not designed for shaving a face.

[0005] The following patents and patent applications are incorporated herein by reference in their entirety: British Patent Document No. 2063752, U.S. Patent Publication No. 2008134513 and U.S. Patents Nos. 6032365 and 4336650, and Chinese Patent Documents Nos. 200945636, 2544911, 2712565 and 1169351, which discloses various types of shavers.

BRIEF SUMMARY

[0006] Embodiments of the present invention provide a shaving machine having a cutting element positioned below a grid having a specified thickness and specified pore sizes and distances, the cutting element arranged to cut hairs that enter through the grid, the shaving machine **characterized in that** the specified thickness is selected such as to cut the hairs at a predefined distance from the skin, to completely avoid a risk of damaging the skin, the complete avoidance of skin damage being useable for protecting the skin and for keeping religious practices.

[0007] These, additional, and/or other aspects and/or advantages of the present invention are: set forth in the detailed description which follows; possibly inferable from the detailed description; and/or learnable by practice of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The present invention will be more readily understood from the detailed description of embodiments thereof made in conjunction with the accompanying drawings of which:

Figures **1B-1H** are schematic illustrations of a shaving machine of the rotary type, and mountable grids of different thicknesses and configurations, according to some embodiments of the invention;

Figures 2A-2F are schematic illustrations of additional grids of varying thickness mountable upon and above a basic grid, and included in a kit for a shaving machine of the rotary type, according to some embodiments of the invention;

Figures 3A-3G are schematic illustrations of additional grids of varying thickness mountable upon and below a basic grid, and included in a kit for a shaving machine of the rotary type, according to some embodiments of the invention;

Figures 4A-4C are illustrations of traditional shaving machines according to the prior art;

Figures 5A and **5B** are schematic illustrations of an additional grid mountable on a basic grid of a shaving machine of the foil type, according to some embodiments of the invention;

Figures 6A and **6B** are schematic diagrams illustrating the avoidance of skin damage, according to some embodiments of the invention;

Figure 7 is a schematic flowchart illustration of a method, according to some embodiments of the invention;

Figure 8 is a schematic flowchart illustration of a cap for a rotary shaving machine, according to some embodiments of the invention; and

Figure 9 illustrates a shaving machine according to embodiments of the present invention.

DETAILED DESCRIPTION

[0009] Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is applicable to other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting.

[0010] For a better understanding of the invention, the usages of the following terms in the present disclosure are defined in a non-limiting manner:

[0011] The term "pores" as used herein in this application, is defined as spaces in a grid of a shaving machine, including slots, holes, slits and other types of openings (triangular, squares, rectangles and the like).

[0012] The term "basic grid" as used herein in this application, is defined as a grid in the shaving machine that is either supplied as an original grid with the shaving machine or replaces such an original grid. The basic grid can have a thickness between 0.10-0.42 mm.

[0013] **Figures 1B-1H, 2A-2F, 3A-3G, 5A and 5B** illustrate shaving machines **100** according to embodiments of the present invention. Shaving machine **100** has a cutting element **90** such as a moveable razorblade arranged to cut hairs **95** that enter through grid **110**, and positioned below a grid **110** with pores **120**. Grid **110** has a specified thickness **112** and pores **120** have specified pore sizes **114**, specified distances **115** between pores **120** and specified geometric characteristics, e.g. inclination angle **126** of elongated pores **120** in Figure **1F**. In one exemplary embodiment, the pores may have a 'V shape' cross section that facilitates the cutting process by accumulating hair from an area larger than the respective cutting area. In another exemplary embodiment, the grid may be made from a plastic material with specified properties that provide both hard structure and comfort feel for the face.

[0014] Specified thickness **112** is selected such as to cut hairs **95** at a predefined distance **116** from skin **80**, to completely avoid a risk of damaging skin **80**. **Figures 6A and 6B** are schematic diagrams illustrating the avoidance of skin damage, according to some embodiments of the invention.

[0015] Specified thickness **112** is larger than useable for achieving a smooth shave and is selected to cut hairs **95** to bristles **96** in a predefined length range **118**. Cutting hairs **90** at specified distance **118** prevents various skin injuries such as direct injuries and hair growth injuries such as ingrown hairs and razor bumps.

[0016] The invention allows a user regulate thickness **112** of grid **110** to achieve a desired bristle length. The regulation of thickness **112** is carried out according to one of three basic principles: (i) replacement of the existing grid, (ii) adding one additional grid, and (iii) adding several additional grids to achieve an over-all required thickness. Adding additional grids may be carried out on top or beneath the existing grid, and in any case, pore characteristics (specified sizes **114**, specified distances **115**, specified geometric characteristics such as form and inclination angle **126**) are the same in the add-ons as in the basic grid, and the add-ons are congruent to the existing grid.

[0017] The existing grid has notches or protrusions **123**. The added grid or grids have corresponding protrusions or notches **124** that fit notches or protrusions **123** (respectively). In case (iii) of adding multiple additional grids, protrusions or notches **124** are arranged to connect them in a stable manner to grid **110**. Particularly, protrusions or notches **124** are arranged to ensure congruency of pores **120** in the added grid(s) to pores **120** in the existing grid **110**.

[0018] As examples, the following relates to two types of popular shaving machines: a rotary type- an electric

shaver with rotary heads (**Figures 1B-1H, 2A-2F, 3A-3G**), and a foil type (**Figures 5A and 5B**). The invention is not limited to these types. **Figures 1B-1H** are schematic illustrations of shaving machine **100** of the rotary type, and grids **110** of different thicknesses **112**, according to some embodiments of the invention. The rotary type has razorblade **90** arranged to move circularly beneath grid **110** with elongated, substantially parallel pores **120**. The inventors have long experimented to find the optimal parameters of grid **110**, and have found them to be: pore diameter **114** between 0.2 and 0.35 mm, interspaced by between 0.15 and 0.3 mm, and thickness **112** of grid **110** between 0.12 and 0.48 mm.

[0019] **Figures 2A-2E** are schematic illustrations of additional grids **119** of varying thickness **112B-E** mountable upon and above basic grid **110** with **112A** thickness, and included in a kit for shaving machine **100** of the rotary type, according to some embodiments of the invention. Embodiments of the invention comprise a kit for shaving machine **100** comprising a plurality of additional grids **119**, each characterized by specified thickness **112B-F** and specified pore sizes **114** and distances **115**. Any of additional grids **119** may be mounted in shaving machine **100** to allow a user adjust bristle length and skin damage avoidance to the user's facial characteristics. Additional grids **119** may be mounted singly or group-wise, to allow the user reach exactly the proffered overall grid thickness that fits the user's needs. Additional grids **119** may have notches or protrusions **134** that secure additional grids **119** to each other and to a protrusion or a notch (respectively) **133** of basic grid **110** as exemplified **Figure 2F**. Sides and edges of additional grids **119** are also arranged to fit upon each other and upon basic grid **110**.

[0020] Additional grids **119** may differ in their thicknesses **112B-112E** and radii **122B-122E**, allowing adjustment by the user to different skin characteristics and sensibilities, as well as for achieving different bristle length. For example, each additional grid **119** may have thicknesses **112B-112E** between 0.05-0.08 mm and radii **122B-122E** between 2.2 and 2.0 mm.

[0021] **Figures 3A-3G** are schematic illustrations of additional grids **119** of varying thickness **112B-E** mountable upon and beneath basic grid **110** with **112A** thickness, and included in a kit for shaving machine **100** of the rotary type, according to some embodiments of the invention. Embodiments of the invention comprise a kit for shaving machine **100** comprising a plurality of additional grids **119**, each characterized by specified thickness **112B-F** and specified pore sizes **114** and distances **115**. Any of additional grids **119** may be mounted in shaving machine **100** to allow a user adjust bristle length and skin damage avoidance to the user's facial characteristics. Additional grids **119** may be mounted singly or group-wise, to allow the user reach exactly the preferred overall grid thickness that fits the user's needs. Additional grids **119** may have notches or protrusions **134** that secure additional grids **119** to each other and to a protrusion or a notch (respectively) **133** of basic grid **110**, as exem-

plified **Figure 3G**. Sides and edges of additional grids **119** are also arranged to fit upon each other and upon basic grid **110**.

[0022] Additional grids **119** may differ in their thicknesses **112B-112E** and radii **122B-122E**, allowing adjustment by the user to different skin characteristics and sensibilities, as well as for achieving different bristle length. For example, each additional grid **119** may have thicknesses **112B-112E** between 0.05-0.08 mm and radii **122B-122E** between 2.2 and 2.0 mm. Alternative basic grids **110** may have thicknesses between 0.15-0.4 mm, e.g. 0.12, 0.18, 0.24, 0.30, 0.42, 0.46, 0.47 and 0.48 mm.

[0023] The fitting of additional grid **119** upon basic grid **110** may leave a very small space between them (e.g. a space denoted by REF 0.05mm in **Figures 2F, 3G**), that allows dismounting and releasing additional grid **119** from basic grid **110**.

[0024] **Figures 4A-4C** are illustrations of traditional shaving machines according to the prior art.

[0025] **Figures 5A** and **5B** are schematic illustrations of a shaving machine of the foil type, according to some embodiments of the invention. The foil shaver has razorblade **90** arranged to move back and forth below grid **110** with pores **120**. Pores **120** may be round, rhomboid, or have any other form. The inventors have long experimented to find the optimal parameters of grid **110**, and have found them to be: pore diameter **114** between 0.2 and 0.3 mm, and thickness **112** of grid **110** between 0.18 and 0.35 mm. Thickness **112** may be achieved either by replaceable grids **110** that may be provided separately or as a kit with grids **110** of varying thickness, or by a kit of additional grids **119**, each with a specified thickness, allowing a user to reach exactly the proffered overall grid thickness that fits the user's needs. Additional grids **119** in variable number mountable singly or group-wise on a foil shaver may be constructed and supplied in similar manner of additional grids **119** as for the rotary shaver. Additional grids **119** may be mounted upon basic grid **110** on the internal side of basic grid **110** as illustrated in **Figure 5B**, or on its external side, utilizing the respective protrusion or notches **123** to stabilize additional grids **119** upon basic grid **110**.

[0026] Embodiments of the invention comprise a kit for shaving machine **100** comprising a plurality of additional grids **119**, each characterized by specified thickness **113**. Any of grids **119** may be mounted on basic grid **110** in shaving machine **100** to allow a user adjust bristle length and skin damage avoidance to the user's facial characteristics. Grids **119** have the same pore sizes **114** and distances **115** as basic grid **110**. Basic grid **110** in the foil type may be thinner than 0.10 mm, alternative basic grid **110** may have thicknesses between 0.18-0.35 mm. Additional grids **119** may have thicknesses between 0.04 mm and 0.07 mm.

[0027] Basic grid **110** and or grids **119** may be adjusted to allow their mutual attachment by attachment means, for example basic grid **110** may have additional notches or protrusions **123**, to fit corresponding protrusions or

notches **124** (respectively) in grids **119**. The attachment means on basic grid **110** are arranged to receive mountable additional grid **119** and allow cooperation of grid **119** with grid **110** to adjust bristle length and skin damage avoidance.

[0028] **Figure 7** is a schematic flowchart illustration of a method **150**, according to some embodiments of the invention. Method **150** comprises thickening a grid in a shaving machine (stage **155**) to cut the hairs at a predefined distance from the skin thereby completely avoiding a risk of damaging the skin. Thickening **155** may be achieved by replacing a basic grid of the shaving machine (stage **160**), or by mounting on a basic grid of the shaving machine an additional grid with predefined thickness (stage **165**). Method **150** may further comprise collecting cut hairs by suction (stage **170**). Cutting hair may be carried out by either a rotary or linear razorblade or by a laser. Advantageously, by using laser, the challenge of cutting hair with a grid of a thickness above the values that are currently in use is met more easily.

[0029] **Figure 8** is a perspective view of a rotary shaving machine, according to some embodiments of the invention. Cap **800** incorporates a grid **810** having different types and sizes of pores **820A-820D** in one operative assembly for the rotary shaving machine. Other grids having different thickness may be used for achieving different values for cutting the hair. As shown below cap **800** a rotary laser source **830** may replace standard cutting means so that laser beam **840** may be configured, by rotating either clockwise or counterclockwise, to cut the hair on the plane just below grid **820** at the desired and predefined height.

[0030] To summarize, **Figures 1D** and **1E** illustrate principle (i) replacement of basic grid **110** by grid **110** of a different thickness. **Figures 1G, 1H, 2F, 3F, 3G, 5A** and **5B** illustrate principle (ii) adding one additional grid **119** above or below basic grid to allow the user to adjust the overall thickness. **Figures 2A-2E** and **3A-3E** illustrate principle (iii) adding several additional grids **119** above or below basic grid **110**, to achieve an over-all required thickness, wherein additional grids **119** are connectable to each other in different combination to achieve an exact required over-all thickness.

[0031] The described invention achieves a bristle length of between 0.12 and 0.48 mm. This is longer than possible by ordinary shaving machines (maximal bristle length possible 0.06-0.1 mm) and shorter than possible by using a conventional trimmer (minimal bristle length possible 0.5-0.8 mm). This length of bristles is exactly the range needed for users that require a shave without injuring their skin.

[0032] From a point of view of Jewish religious practices, an assurance of avoiding skin injury and damage is crucial for users to be able to use shaving machines.

[0033] Thicknesses **112** are determined according to medical indication. For example, according to the inventor's experimentation and experience, thickness **112** between 0.15 and 0.18 mm may be appropriate to prevent

skin sensitivity reaction of users with a dark skin, thickness **112** between 0.18 and 0.21 mm may be appropriate to prevent skin sensitivity reaction of users with a light skin, thickness **112** between 0.21 and 0.23 mm may be appropriate to prevent skin sensitivity reaction at neck regions, thickness **112** between 0.23 and 0.25 mm may be appropriate to prevent hairs from penetrating the skin, thickness **112** between 0.26 and 0.29 mm may be appropriate to prevent recurrent hair growth, thickness **112** between 0.27 and 0.30 mm may be appropriate to prevent seborrhea, thickness **112** between 0.30 and 0.32 mm may be appropriate to prevent mycosis, thickness **112** between 0.32 and 0.38 mm may be appropriate to allow shaving according to Jewish religious practices, thickness **112** between 0.38 and 0.41 mm may be appropriate to prevent mild acne problems, thickness **112** between 0.41 and 0.44 mm may be appropriate to prevent severe acne problems, and thickness **112** between 0.44 and 0.48 mm may be appropriate to prevent severe recurring growth problems. Beyond these indications, thickness **112** between 0.32 and 0.44 mm may be appropriate to produce a fashionable bristled look.

[0034] The invention in its various embodiments is arranged to provide a user select bristle length by selecting thickness **112**. The described kits, either of replaceable grids **110** or as additional grids **119**, are arranged to provide any part of the range of thickness **112** between 0.12 and 0.48 mm.

[0035] Figure 9 illustrates shaving machine **100** according to embodiments of the present invention. Shaving machine **100** has a cutting element **90** such as a laser beam **92** generated by a laser source **91** rotatably mounted on an axis **94** connected to a rotary motor **93**. Laser beam **92** is arranged to cut hairs **95** that enter through grid **110**, and positioned below a grid **110** with pores **120**. Grid **110** has a specified thickness **112** and pores **120** have specified pore sizes **114**, specified distances **115** between pores **120** and specified geometric characteristics.

[0036] Rotary motor **93** and laser source **91** are powered by a battery **137** or an external power source **141** connected via socket **139** to shaving machine **100**.

[0037] Shaving machine **100** may further comprise a hair collection unit **130** arranged to collect bits of cut hair **97** drawn in through a suction area **133** such as a small spout, connected via ducts **132** to hair collection unit **130**, such as a small container. Hair collection unit **130** may also be powered by battery **137** or external power source **141**.

[0038] In the above description, an embodiment is an example or implementation of the invention. The various appearances of "one embodiment", "an embodiment" or "some embodiments" do not necessarily all refer to the same embodiments.

[0039] Although various features of the invention may be described in the context of a single embodiment, the features may also be provided separately or in any suitable combination. Conversely, although the invention

may be described herein in the context of separate embodiments for clarity, the invention may also be implemented in a single embodiment.

[0040] Furthermore, it is to be understood that the invention can be carried out or practiced in various ways and that the invention can be implemented in embodiments other than the ones outlined in the description above.

[0041] The invention is not limited to those diagrams or to the corresponding descriptions. For example, flow need not move through each illustrated box or state, or in exactly the same order as illustrated and described.

[0042] Meanings of technical and scientific terms used herein are to be commonly understood as by one of ordinary skill in the art to which the invention belongs, unless otherwise defined.

[0043] While the invention has been described with respect to a limited number of embodiments, these should not be construed as limitations on the scope of the invention, but rather as exemplifications of some of the preferred embodiments. Other possible variations, modifications, and applications are also within the scope of the invention. Accordingly, the scope of the invention should not be limited by what has thus far been described, but by the appended claims and their legal equivalents.

Claims

1. A shaving machine having a cutting element positioned below a grid having a specified thickness and specified pore sizes, distances and geometric characteristics, the cutting element arranged to cut hairs that enter through the grid, the shaving machine **characterized in that** the specified thickness is selected such as to cut the hairs at a predefined distance from the skin, to completely avoid a risk of damaging the skin, the complete avoidance of skin damage being useable for protecting the skin and for keeping religious practices.
2. The shaving machine of claim 1, wherein the specified thickness is larger than useable for achieving a smooth shave and is selected to cut the hairs to bristles in a predefined length range.
3. The shaving machine of claim 1, wherein the grid comprises a single grid of a user selected thickness.
4. A kit for the shaving machine of claim 3, the kit comprising a plurality of grids, each **characterized by** a specified thickness different from the other grids, and specified pore sizes, distances and geometrical characteristics, the grids being replaceably mountable in the shaving machine to allow a user adjust bristle length and skin damage avoidance to the user's facial characteristics.

5. The shaving machine of claim 1, wherein the grid comprises an additional grid mounted congruently upon a basic grid, such that the pores in the additional grids are congruent to the pores in the basic grid.
6. A kit for the shaving machine of claim 5, the kit comprising a plurality of additional grids, each **characterized by** a specified thickness different from the other grids, each of the grids being additionally mountable on the basic grid in the shaving machine and have the same pore sizes, distances and geometrical characteristics as the basic grid, to allow a user adjust bristle length and skin damage avoidance to the user's facial characteristics.
7. The shaving machine of claim 1, wherein the grid comprises a plurality of additional grids mounted congruently upon a basic grid, such that the pores in the additional grids are congruent to the pores in the basic grid.
8. A kit for the shaving machine of claim 7, the kit comprising a plurality of additional grids, each **characterized by** a specified thickness, the additional grids being groupwise mountable on the basic grid in the shaving machine and have the same pore sizes, distances and geometrical characteristics as the basic grid, to allow a user adjust bristle length and skin damage avoidance to the user's facial characteristics by selecting a group of additional grids and mounting the group onto the basic grid to achieve an exactly fitting grid thickness.
9. The kits of claims 6 or 8, wherein the thicknesses of the additional grids are selected to allow the user achieve an overall grid thickness in any one of the following thickness ranges: 0.12-0.18mm, 0.18-0.21mm, 0.21-0.23mm, 0.23-0.25mm, 0.26-0.29 mm, 0.27-0.30mm, 0.30-0.32mm, 0.32-0.38mm, 0.38-0.41mm, 0.41-0.44mm, 0.44-0.48mm, and 0.32-0.44mm.
10. The kits of claims 6 or 8, wherein the additional grids are mounted on the basic grid from below.
11. The shaving machine of claim 1, wherein the cutting element is a razorblade arranged to move back and forth, the grid pores are round and have a diameter between 0.2 and 0.3 mm, and the grid is between 0.12 and 0.48 mm thick.
12. The shaving machine of claim 1, wherein the cutting element is a razorblade arranged to move circularly, the grid pores are elongated, parallel, interspaced by between 0.3 and 0.35 mm, and are between 0.3 and 0.35 mm wide, and the grid is between 0.12 and 0.48 mm thick.
13. The shaving machine of claim 1, wherein the grid is arranged to achieve a bristle length between 0.12 and 0.48 mm.
14. The shaving machine of claim 1, wherein the grid further comprises attachment means to receive a mountable additional grid arranged to cooperate with the grid to adjust bristle length and skin damage avoidance.
15. The shaving machine of claim 1, wherein the cutting element is a laser beam.

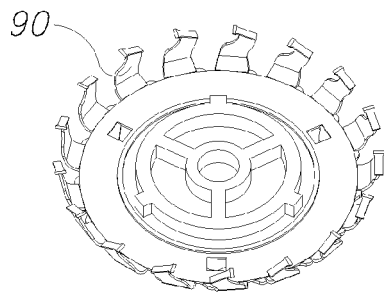
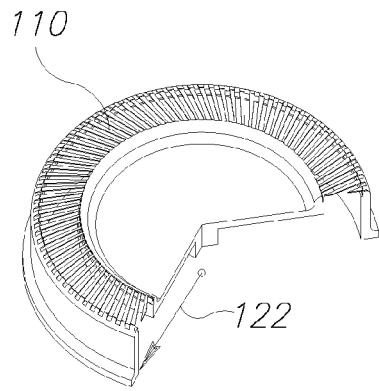


Figure 1B

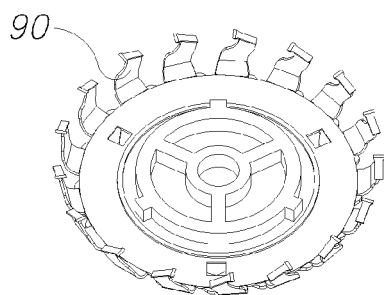
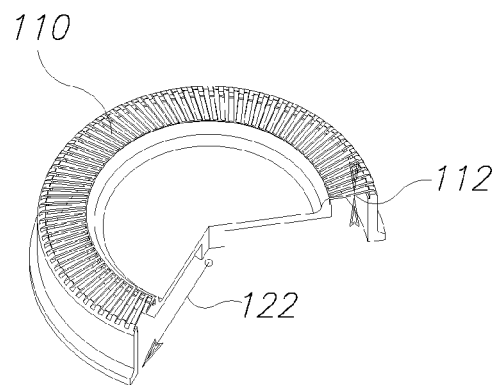


Figure 1C

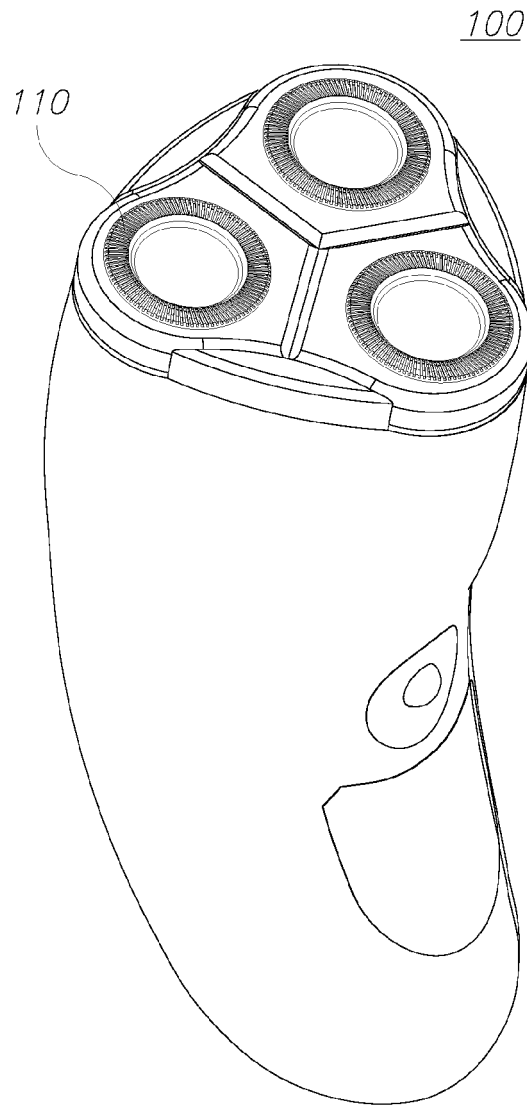


Figure 1A
PRIOR ART

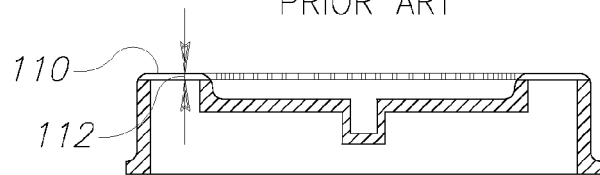


Figure 1D

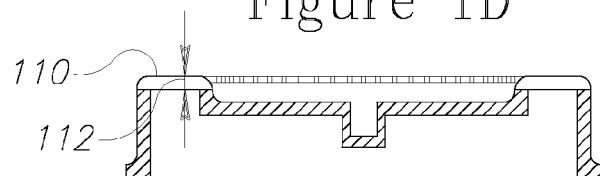


Figure 1E

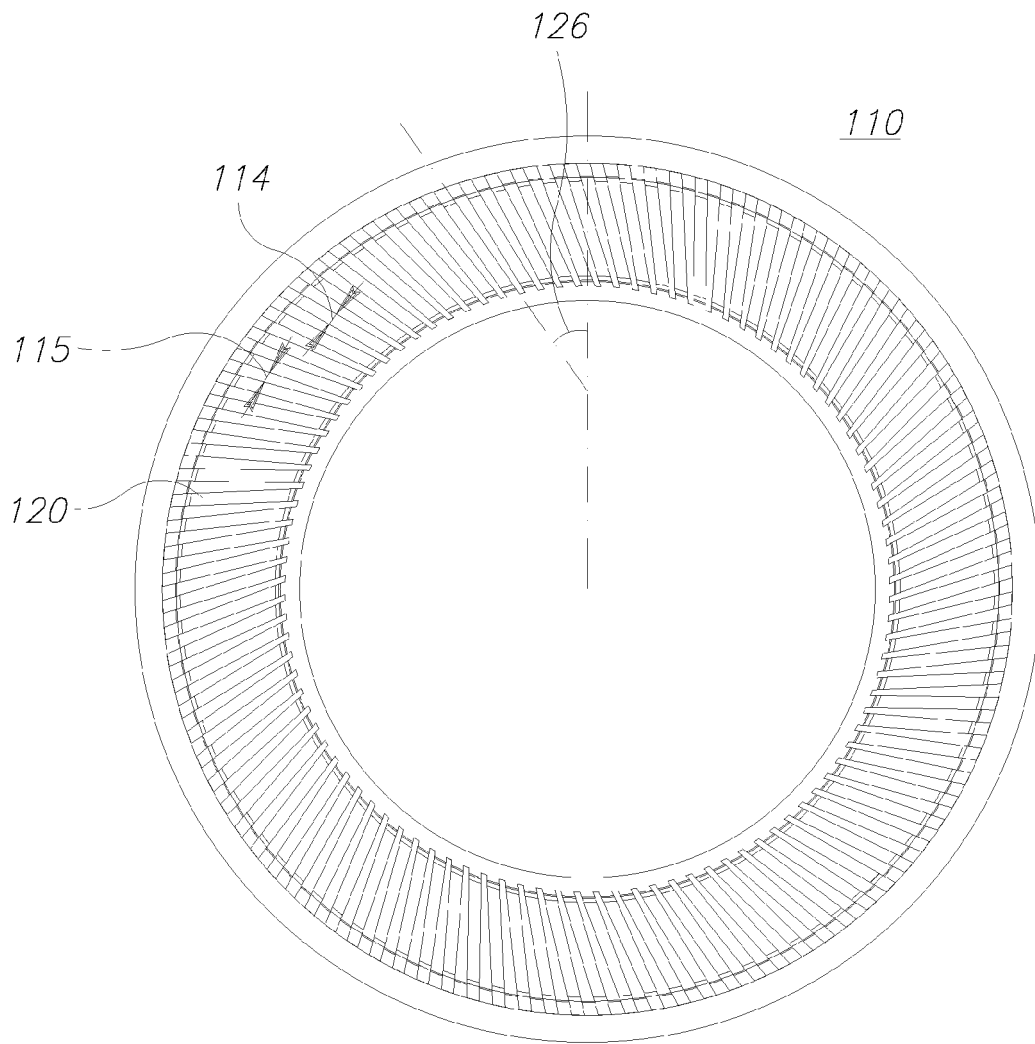


Figure 1F

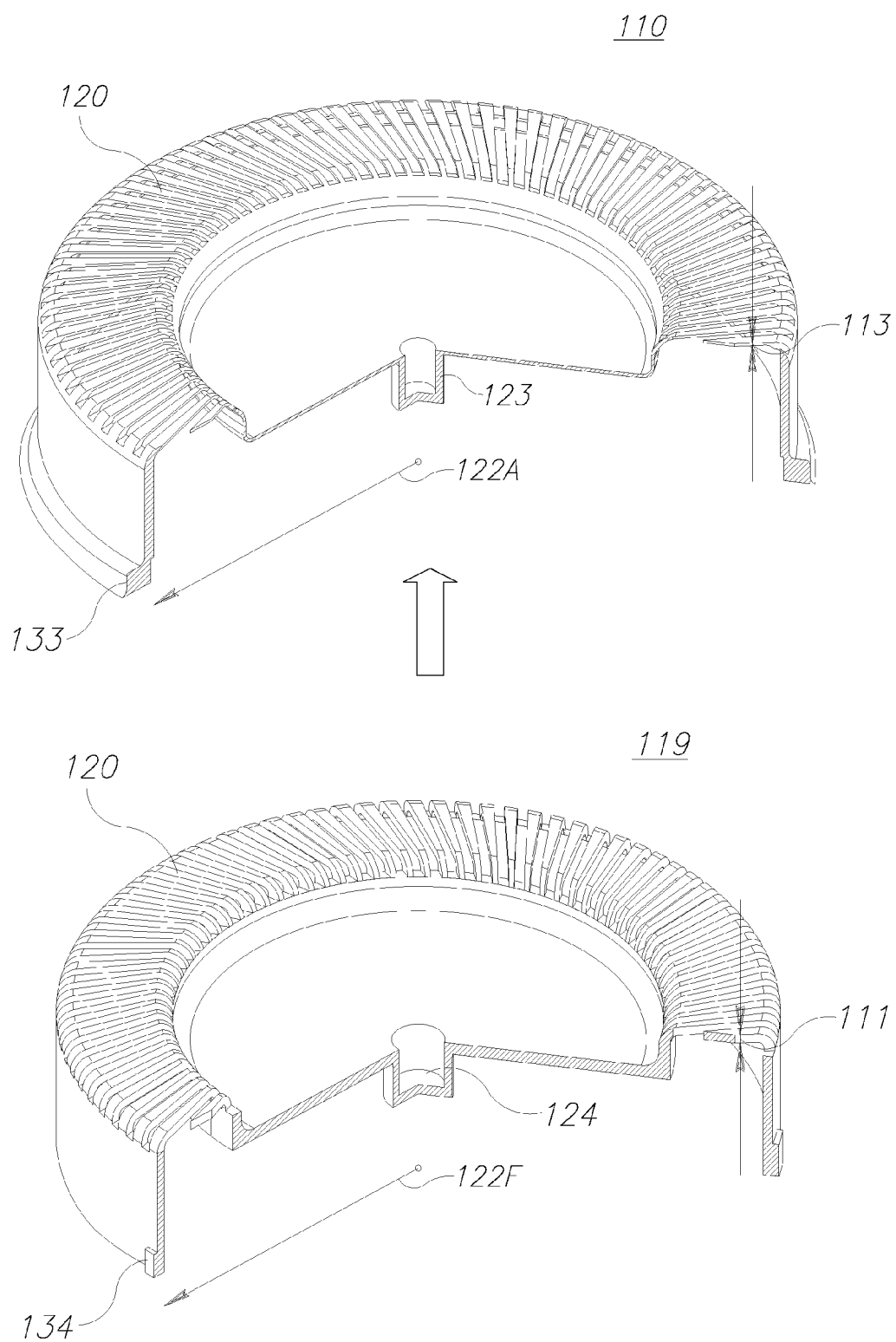


Figure 1G

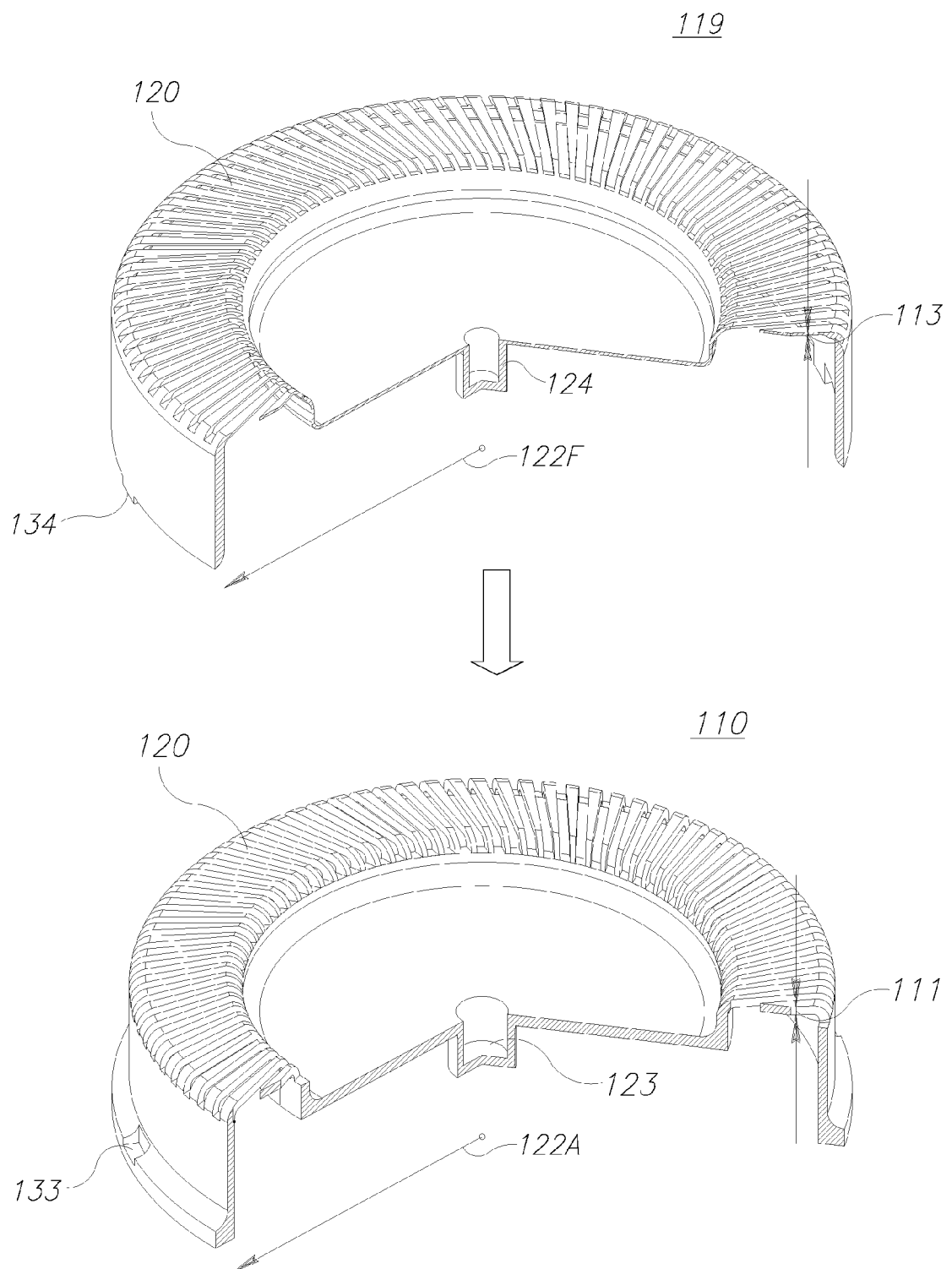


Figure 1H

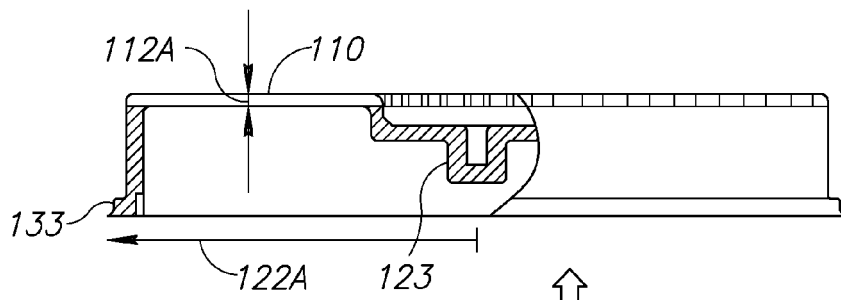


Figure 2A

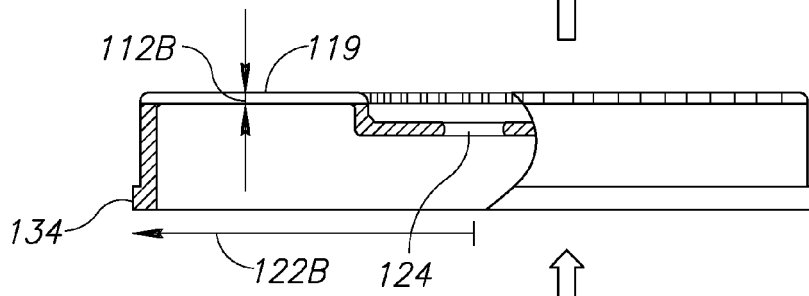


Figure 2B

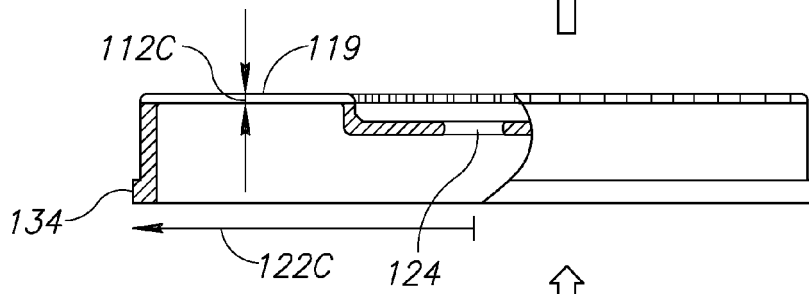


Figure 2C

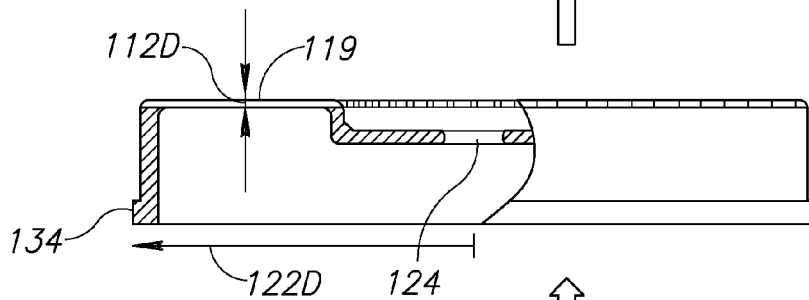


Figure 2D

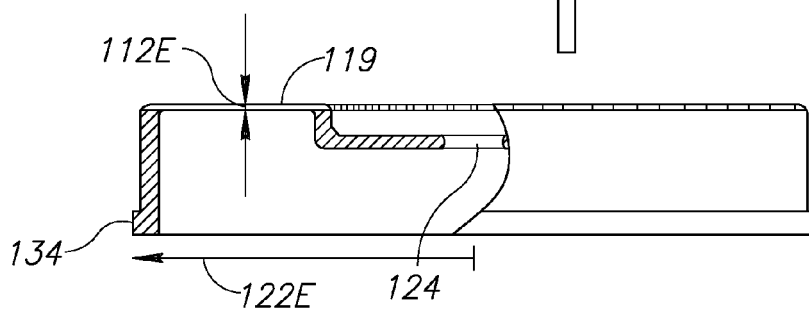


Figure 2E

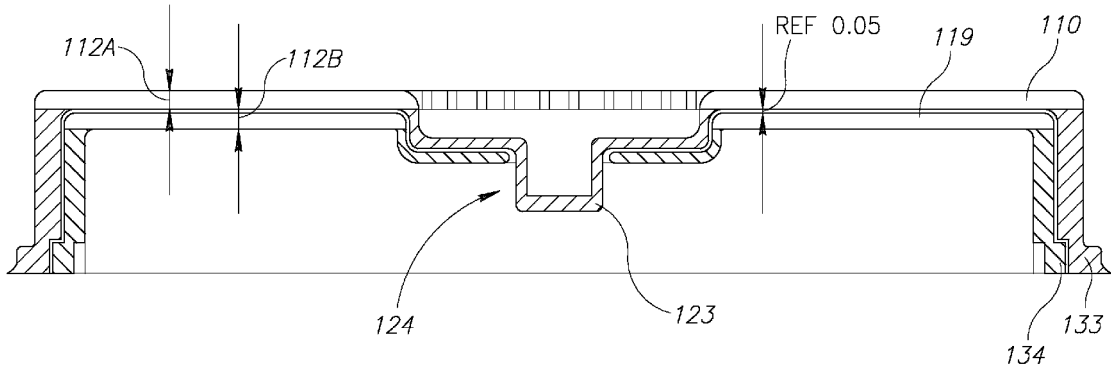


Figure 2F

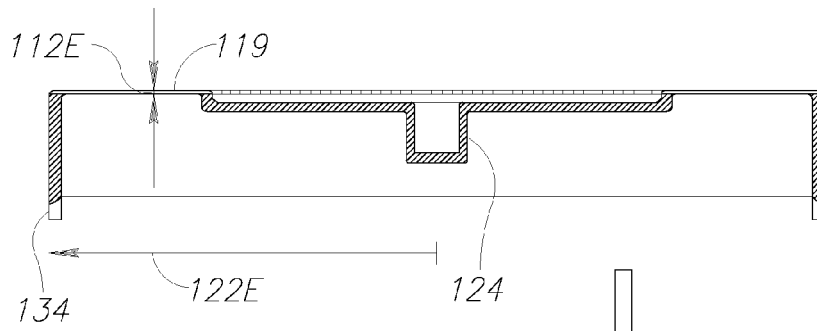


Figure 3A

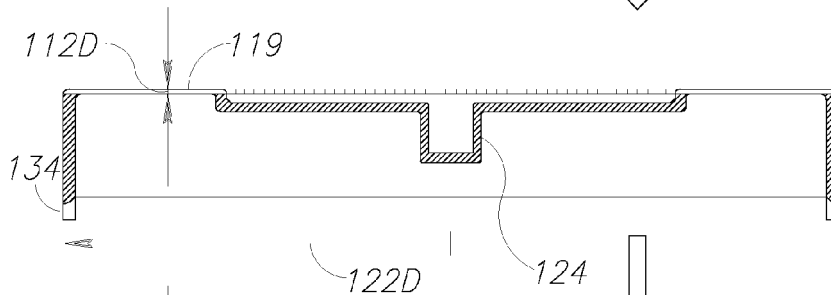


Figure 3B

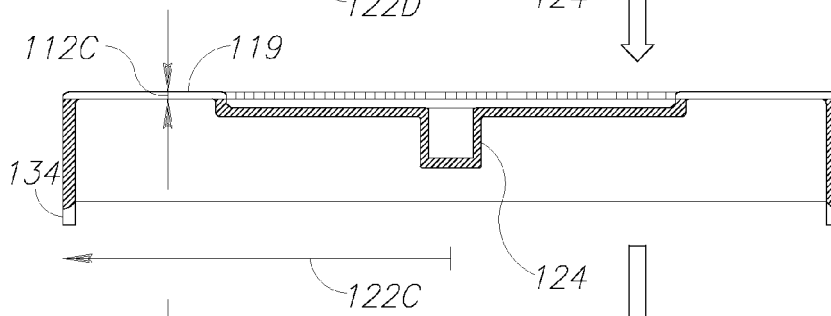


Figure 3C

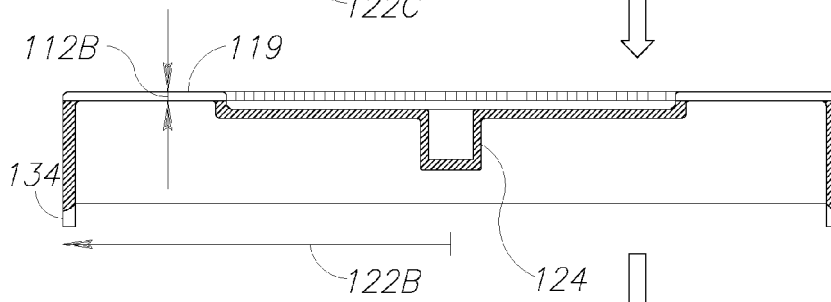


Figure 3D

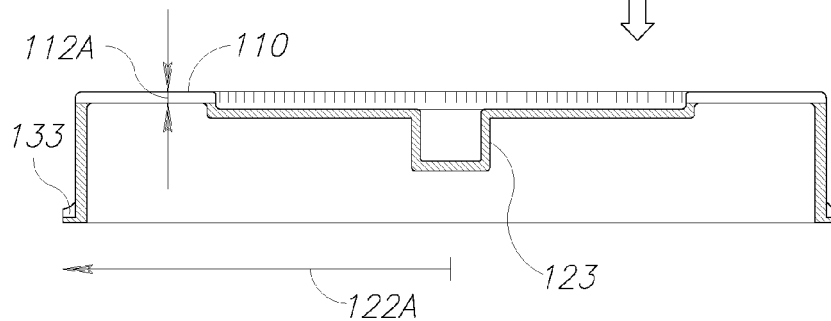


Figure 3E

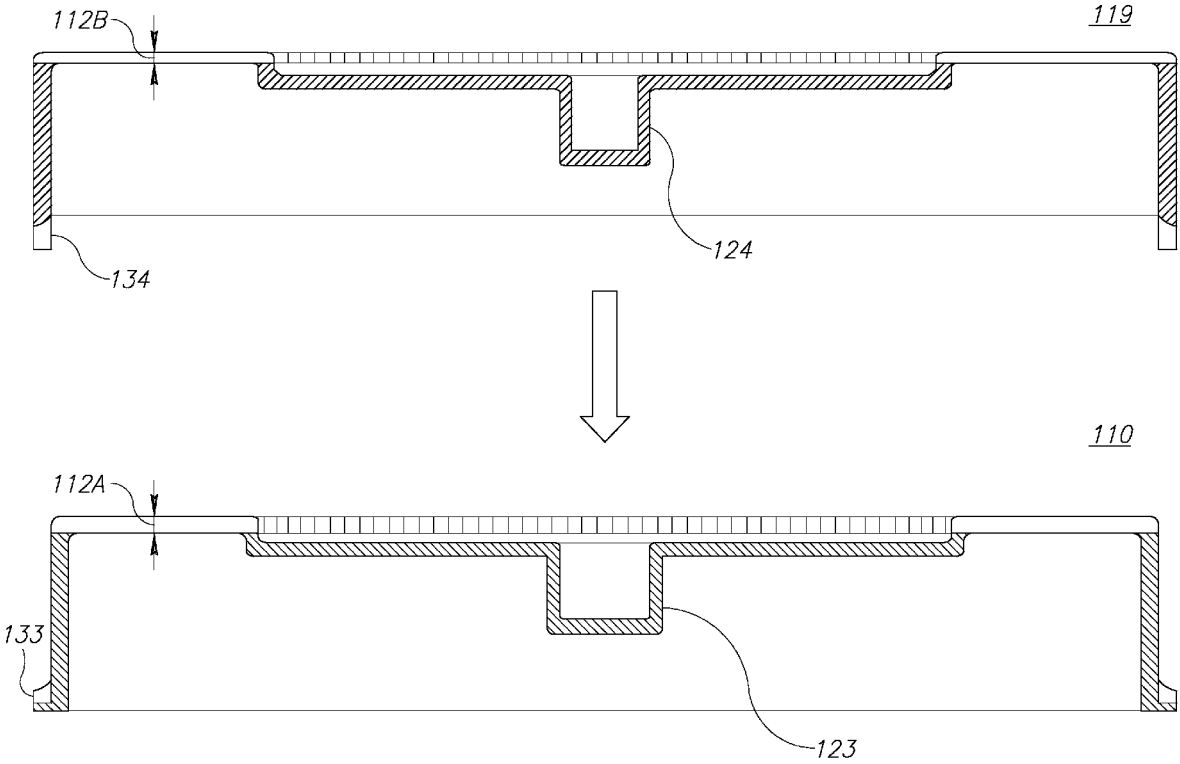


Figure 3F

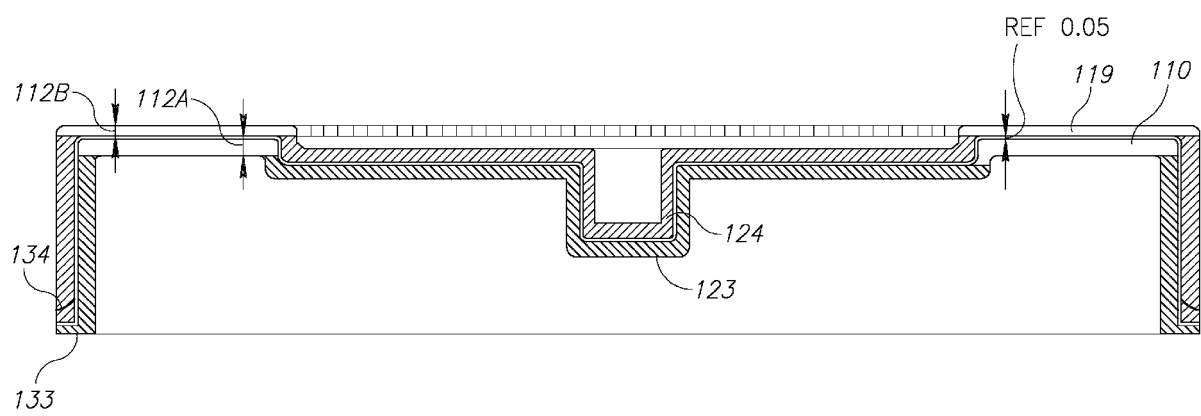


Figure 3G

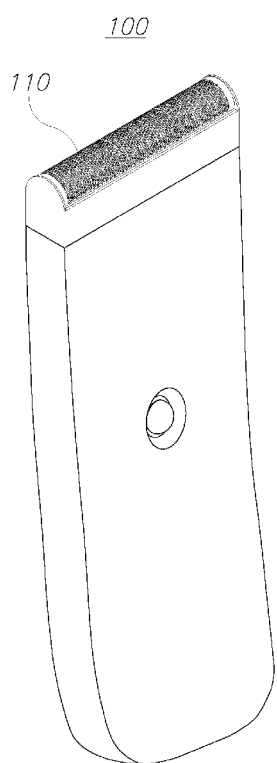


Figure 4A
PRIOR ART

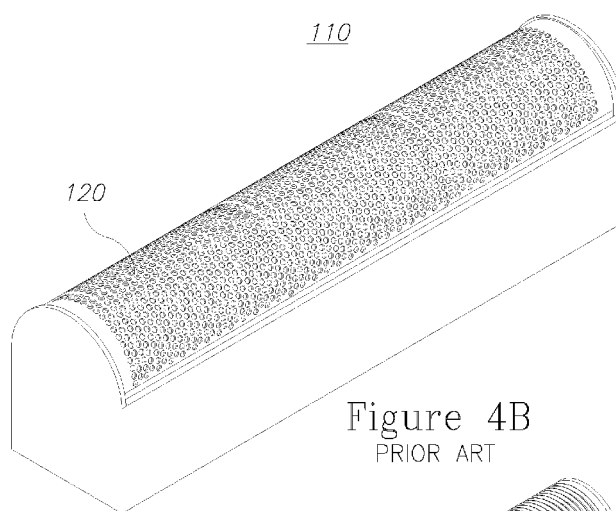


Figure 4B
PRIOR ART

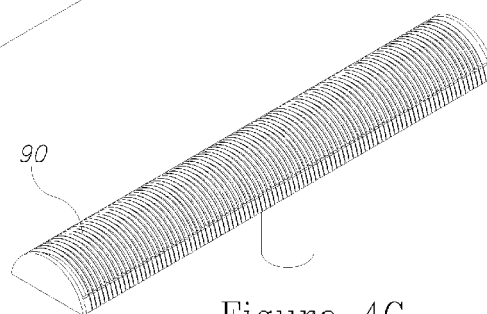


Figure 4C
PRIOR ART

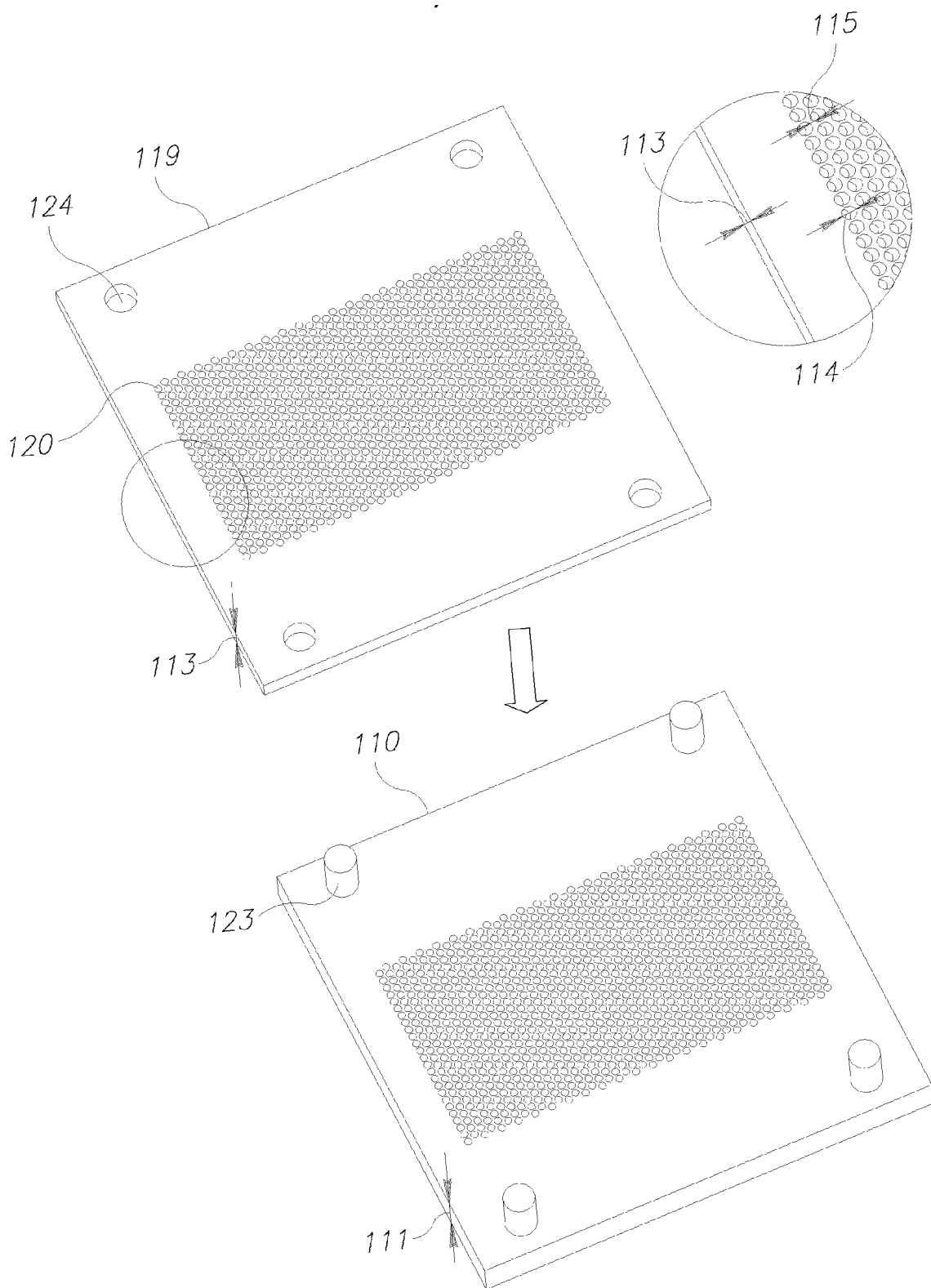


Figure 5A

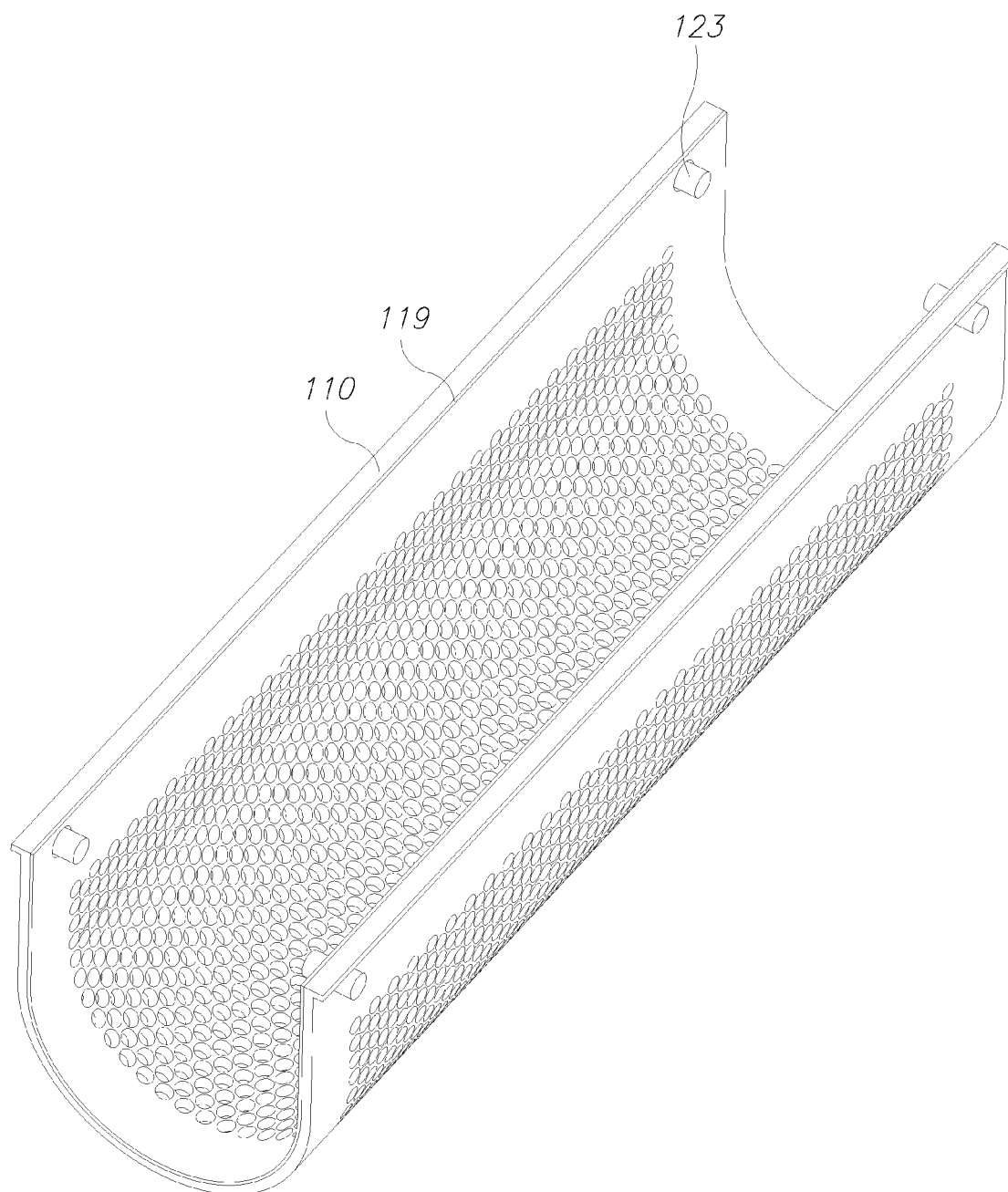


Figure 5B

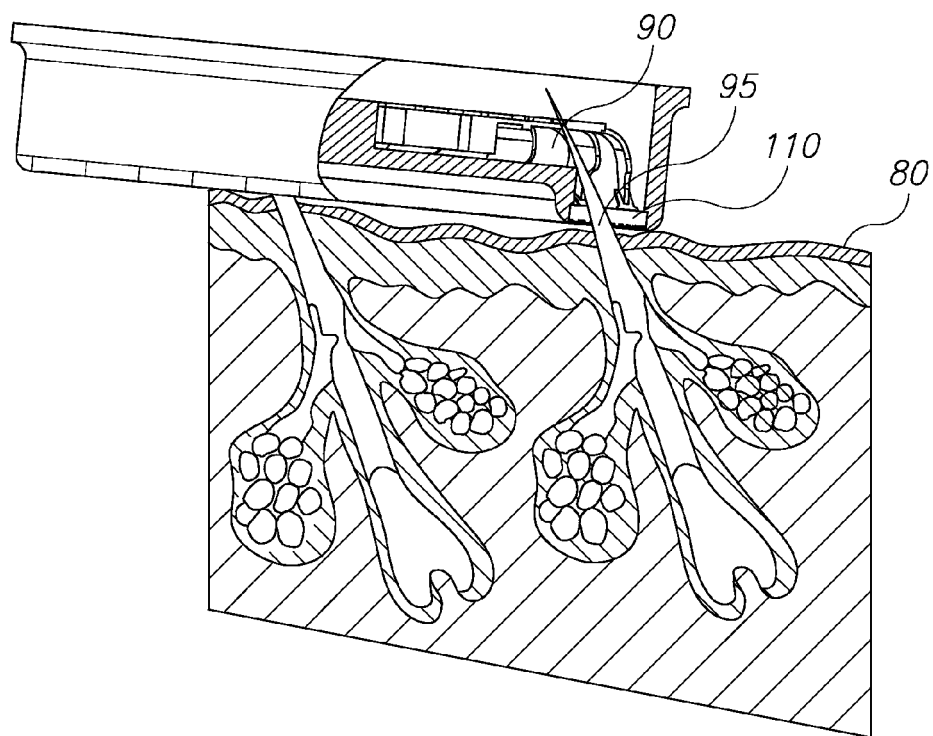


Figure 6A

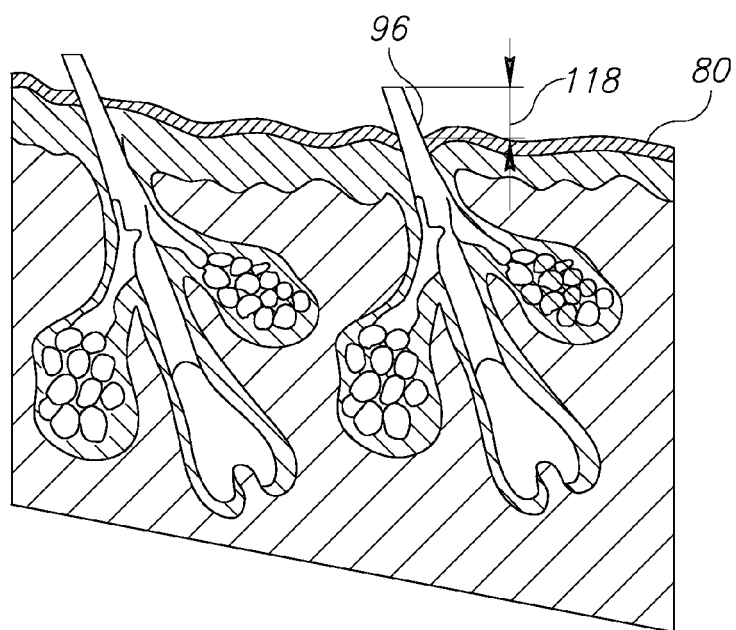


Figure 6B

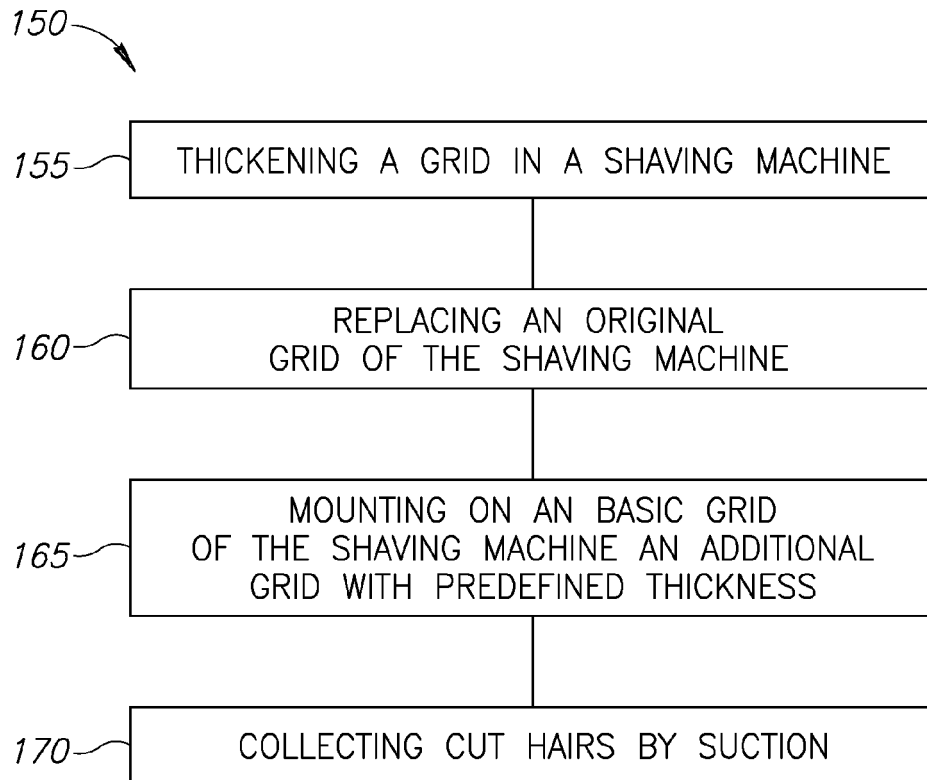


Figure 7

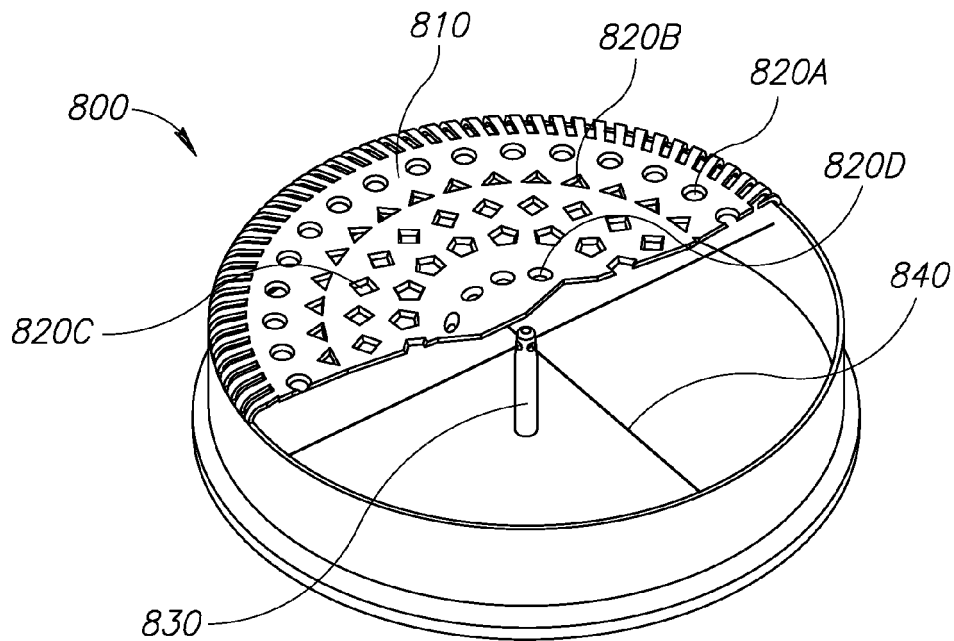


Figure 8

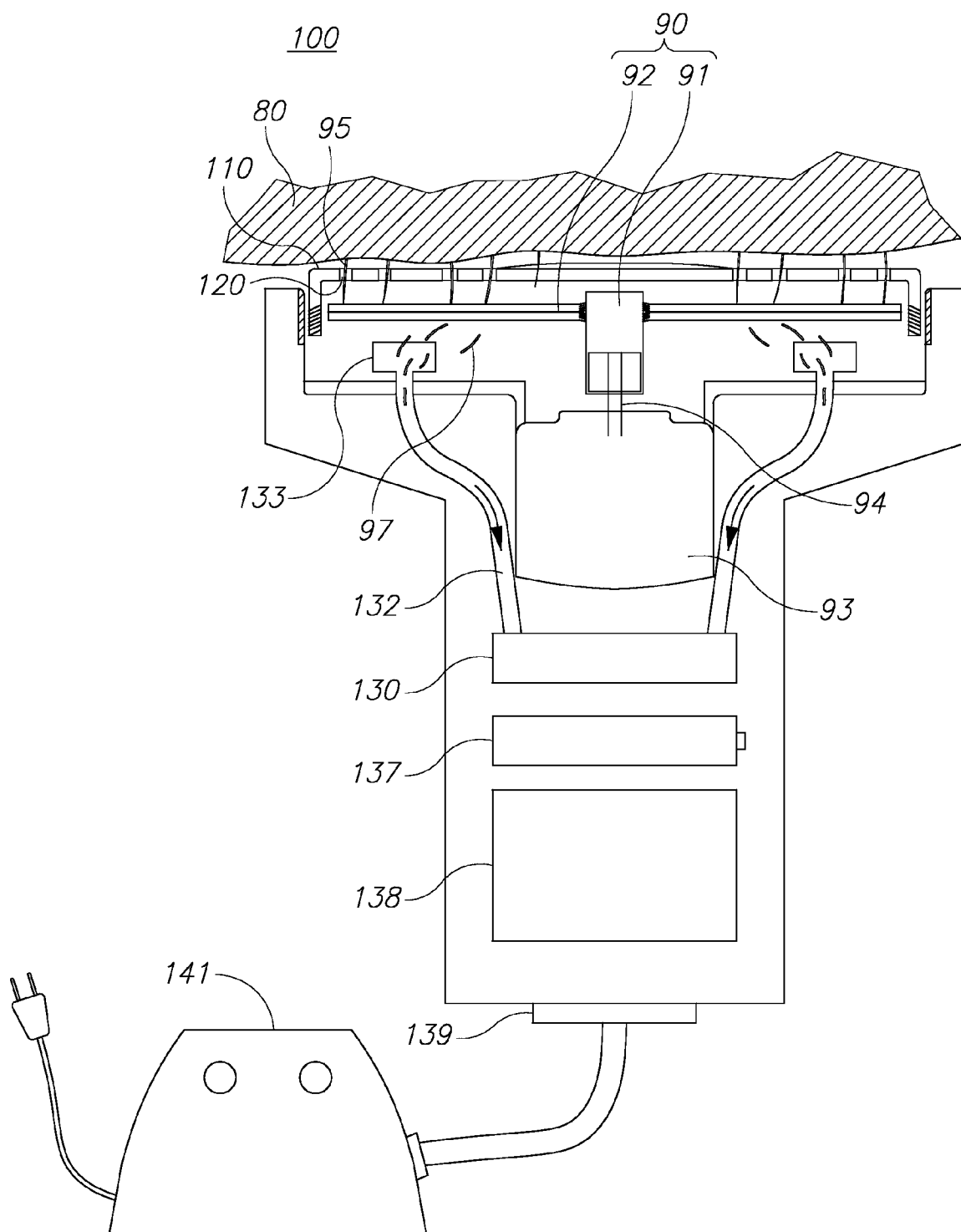


Figure 9



EUROPEAN SEARCH REPORT

 Application Number
 EP 12 15 2522

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	EP 1 231 034 A1 (WALLS P J DR [IE]) 14 August 2002 (2002-08-14) * paragraphs [0015], [0041], [0042]; figures 6,8,9 * -----	1-4	
Y		11	
Y	US 2008/313910 A1 (WALLS P J [IE] WALLS PATRICK JOSEPH [IE]) 25 December 2008 (2008-12-25) * paragraph [0023]; figures 3,4 * -----	11	
X	US 5 993 440 A (GHASSEMI FARAMARZ FRANK [US]) 30 November 1999 (1999-11-30) * column 4, line 52 - column 5, line 33; figures 1-3 * -----	1,15	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 April 2012	Examiner Rattenberger, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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The members are as contained in the European Patent Office EDP file on
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