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(54) Title: SKIN CARE SYSTEM

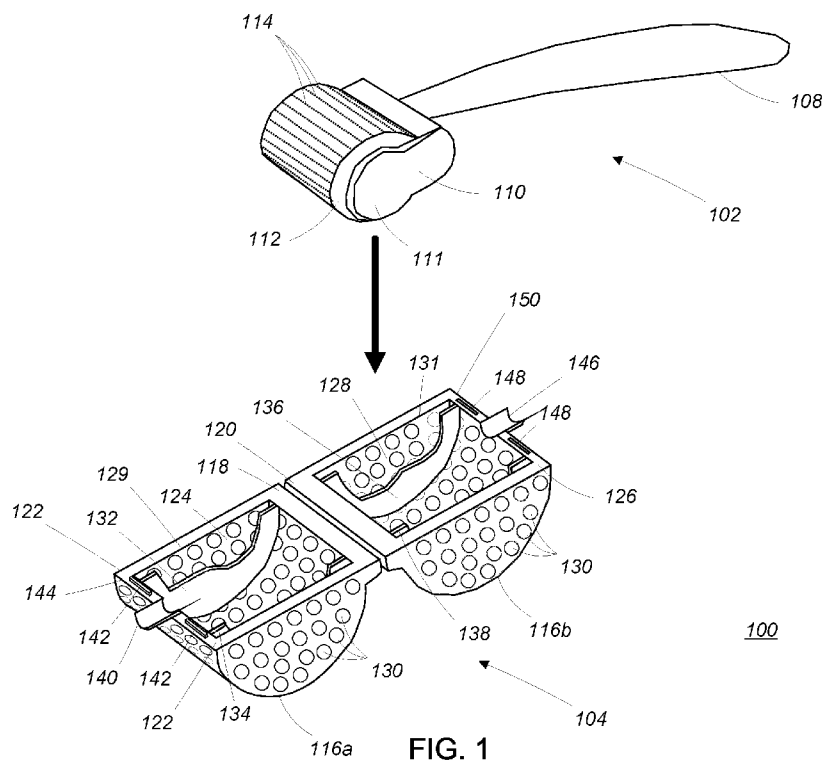


FIG. 1

[Continued on next page]



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(57) Abstract: The present invention features a skin care system that includes a dermal treatment device from which microneedles protrude and a container configured to surround at least a portion of the device and thereby protect the microneedles, particularly during sterilization.

SKIN CARE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[001] This application claims the benefit of the filing date of U.S. provisional application No. 62/173,678, filed June 10, 2015. The content of this earlier-filed provisional application is hereby incorporated by reference herein in its entirety.

FIELD OF THE INVENTION

[002] This invention relates to skin care systems and more particularly to a dermal roller that is encased to minimize damage when the dermal roller is not in use (*e.g.*, during storage, sterilization, disinfection, or the like).

BACKGROUND OF THE INVENTION

[003] The health and beauty industry continually strives to provide products and therapies that reduce or conceal imperfections in human skin. Examples of such perceived imperfections include wrinkles, sagging skin, scars (*e.g.*, scars caused by acne), stretch marks, and others. One such therapy is collagen induction therapy (CIT), which is an aesthetic medical procedure in which a subject's skin is repeatedly punctured with tiny needles (sometimes referred to as microneedles) in order to induce endogenous production of cutaneous collagen. With increased production of cutaneous collagen, the appearance of imperfections in the subject's skin is reduced or, in some cases, eliminated.

[004] One device commonly used for CIT is a rolling device referred to as a "microroller" or "dermaroller."

SUMMARY OF THE INVENTION

[005] It is important to the functionality of a dermal treatment device that the microneedles of the device are not damaged (*e.g.*, bent, blunted, or otherwise damaged). However, there are a number of activities such as storage of the device, transportation of the device, and sterilization of the device during which it can potentially become damaged even if one is being careful. Aspects of the skin care systems described herein include features that address this problem (among other problems) by minimizing or even

preventing damage to the microneedles over a wide range of activities, including but not limited to storage of the device, transportation of the device, and sterilization of the device.

[006] The present invention features skin care systems that include: (a) a dermal treatment device comprising a handle having a mounting element disposed at one end and a substantially cylindrical roller rotatably mounted in the mounting element, the roller having a surface with a plurality of needles protruding radially therefrom; and (b) a container configured to surround at least a portion of the dermal treatment device, wherein the container comprises (i) a plurality of walls forming an inner chamber, a first wall of the plurality comprising a first through hole for receiving a portion of the handle of the device and a second wall of the plurality comprising a second through hole for permitting passage of a fluid into and out of the inner chamber and (ii) a support member extending into the inner chamber from one of the walls and configured to engage the mounting element of the dermal treatment device such that the cylindrical roller is held in the inner chamber with the needles being spaced apart from the walls.

[007] The second wall can include a plurality of through holes for permitting passage of a fluid into and out of the inner chamber, and each hole in the plurality can have substantially the same shape and diameter. For example, the through holes can be circular and have a diameter in the range of about 1.5-8.0 mm (*e.g.*, 2-7.5 mm; 3-6 mm; or 4-5 mm). By “about” we mean $\pm 10\%$. Thus, a through hole having a diameter of about 1.5 mm has a diameter from 1.35-1.65 mm. The distance separating the periphery of one through hole from another can be in the range of about 0.6-3.0 mm, and the density of the holes in the plurality of through holes can be 5-113 holes per square inch. In other embodiments, the second wall comprises a plurality of through holes, at least one of which varies independently from the others in shape and diameter.

[008] The system can further comprise a sterilization chamber configured to receive the container with the dermal treatment device disposed therein.

[009] The container can be formed by a first container portion attached to a second container portion. For example, the first and second container portions can be attached to one another with a latching mechanism. The first and second container portions can be connected by a hinge. Each container portion can include a support member of the one or more support members.

[010] One or more of the handle, the mounting element, the roller, and the container can be made of a plastic material or a metal.

[011] In another aspect, the invention features a kit that includes a system as described herein and instructions for use. The kit can further include a sterilization chamber configured to receive the container with the dermal treatment device disposed therein and/or a sterilization solution. The kit, in any embodiment, can also include a preparation (*e.g.*, a cream or gel) that reduces the sensation in the skin (*e.g.*, a preparation of lidocaine or other topical anesthetic) and/or that moisturizes or otherwise treats, nourishes, cleans, or protects the skin.

[012] Various aspects of the system described herein may have one or more of the following advantages. The microroller case that forms a part of the present system protects the delicate needles of the microroller from being bent, blunted, or otherwise damaged during storage and transport and particularly when the needles are exposed to any sort of cleaning, disinfecting, or sterilizing solution; the microroller case allows for cleaning, disinfecting, and sterilization without having to remove the microroller from the case. The needles of the microroller therefore remain protected throughout the sterilization process. Other features and advantages of the invention may be apparent from the following description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[013] FIG. 1 illustrates a skin care system including a microroller and a microroller case.

[014] FIG. 2 illustrates the skin care system of FIG. 1 with the microroller secured in the microroller case.

[015] FIG. 3 is a cross-sectional view of the microroller in the microroller case.

[016] FIG. 4 illustrates the microroller in the microroller case prior to immersion in a contained sterilization or disinfection fluid.

[017] FIG. 5 shows the microroller in the microroller case immersed in the sterilization or disinfection fluid.

[018] FIG. 6 shows the microroller in the microroller case after removal from the sterilization or disinfection fluid.

[019] FIG. 7 is a perspective view of an embodiment of the microroller case having alternatively shaped through holes.

[020] FIG. 8 is a side view of an embodiment of the microroller case with multiple through holes of varying shape.

DETAILED DESCRIPTION

1 Skin Care System

[021] Referring to FIG. 1, a skin care system **100** includes a microroller **102** and a microroller case **104**. Very generally, the microroller case **104** is configured to receive a portion of the microroller **102** in such a way that the portion of the microroller **102** is protected from unintended contact that may damage to the microroller **102** and in particular the needles **114** protruding therefrom. This allows the microroller **102** to be easily cleaned (*e.g.*, sterilized) without requiring removal of the microroller from the microroller case **104** protecting it.

1.1 Microroller

[022] The microroller **102** is a skin care device for performing collagen induction therapy (CIT) on a subject's skin. In some embodiments, the microroller **102** includes a handle **108** including a mounting element **110** in which a substantially cylindrical roller **112** is rotatably mounted. In some embodiments, the mounting element **110** includes an axle (not shown) that extends through a hole in the cylindrical roller **112**. The cylindrical roller **112** is free to rotate about the axle.

[023] A number of tiny needles **114** (sometimes referred to as microneedles) extend from an outer surface of the cylindrical roller **112** in a radially outward direction. In some embodiments, the tiny needles **114** are arranged in rows on the outer surface of the cylindrical roller **112**. In other embodiments, the tiny needles **114** may be arranged in patterns other than a row pattern, including patterns that are regular or irregular and in which the microneedles are placed equidistant from one another or at non-equal distances from one another. Although the invention is not so limited, the microneedles may protrude or extend from the surface of the cylindrical roller by about 0.1-2.5 mm (*e.g.*, by about 0.5, 1.0, 1.5, or 2.0 mm).

[024] To use the microroller **102**, a subject or a technician grasps the handle **108** of the microroller **102** with their hand, positions the cylindrical roller **112** on an area of skin to be treated, and moves their hand in a back and forth motion such that the cylindrical roller **112** rolls back and forth over the area of skin to be treated. Accordingly, the handle can be dimensioned for use by a human hand and can include features that improve hand control (or “grip”), such as grooves, indentations, and curves proportioned for or corresponding to the thumb and fingers or fingertips. One or more of the regions of the handle intended to be gripped can include a textured surface. As the cylindrical roller **112** rolls back and forth over the area of skin, the tiny needles **114** repeatedly puncture the subject’s skin. Endogenous production of cutaneous collagen is induced at and around the puncture sites.

1.2 Microroller Case

[025] The microroller case **104** is configured to receive and secure a portion of the microroller **102** including the mounting element **110** and the cylindrical roller **112**. As is noted above, while secured in the microroller case **104**, the delicate, tiny needles **114** of the cylindrical roller **112** are protected from unintended contact with any item or surface that may damage them. Furthermore, the microroller case **104** enables one to partially or fully submerge the microroller **102** in a liquid (*e.g.*, a sterilizing fluid) without risking damage to the microroller **102**.

[026] In some embodiments, the microroller case **104** includes a first half **116a** and a second half **116b**. A first end **118** of the first half **116a** and a first end **120** of the second half **116b** are coupled to one another using, for example, a hinge (not shown).

[027] The first half **116a** includes a first body **122**, a first support member **132**, a second support member **134**, a first handle receiving portion **140**, and one or more latching protrusions **142**.

[028] The first body **122** defines a first hollow interior space **124** in the first half **116a** of the microroller case **104** and includes a first opening **129** through which a portion of the microroller **102** can be inserted into the first hollow interior space **124**. The first body **122** also includes a number of holes **130** extending therethrough. We may refer to such holes as “through holes.” In some embodiments, one or more and up to all of the holes **130** has/have a circular shape. The shape and diameter of the holes **130** can vary independently from one another and the diameter can be in a range of about 1.5-8.0 mm. In some examples, the

holes **130** are spaced apart from one another by a distance in a range of about 0.6 mm and 3.0 mm. In some embodiments, there are approximately 5-113 holes per square inch in the body **122**.

[029] In some embodiments, both the first support member **132** and the second support member **134** are formed as a rib extending into the first hollow interior space **124** from the first body **122**. In some embodiments, both the first support member **132** and the second support member **134** have a shape that conforms to a shape of a portion of the mounting element **110** of the microroller **102**. For example, each of the support members **132**, **134** may have a shape conforming to a respective end portion **111** of the mounting element **110**. Alternatively, the support members **132**, **134** may have a shape conforming to the axle (not shown) of the mounting element **110**. In all cases, the support members **132**, **134** are sized and shaped such that, when the portion of the microroller **102** is received in the first half **116a** of the microroller case **104**, the cylindrical roller **112** and the tiny needles **114** are held in a position with the tiny needles **114** spaced apart from the first body **122**.

[030] In some embodiments, the first handle receiving portion **140** extends from a second end **144** of the first half **116a** of the microroller **102** and has a substantially semi-cylindrical shape. The first handle receiving portion **140** is configured to receive a portion (*e.g.*, half of) the handle **108** of the microroller **102**.

[031] In some embodiments, the one or more latching protrusions **142** are disposed at the second end **144** of the first half **116** of the microroller **102** and are configured to interact with one or more latching recesses (described below) on the second half **116b** of the microroller case **104** to latch the two halves **116a**, **116b** together.

[032] The second half **116b** of the microroller case **104** includes a second body **126**, a third support member **136**, a fourth support member **138**, a second handle receiving portion **146**, and one or more latching recesses **148**. The second body **126** defines a second hollow interior space **128** in the second half **116b** of the microroller case **104** and includes a second opening **131** through which a portion of the microroller **102** can be inserted into the second hollow interior space **128**. The second body **126** also includes a number of holes **130** extending therethrough. As with the first body, each of the holes **130** of the second body **126** can be circular in shape with a diameter independently selected within a range of about 1.5-8.0 mm. The holes **130** can be spaced apart from one another by a distance in the range

of about 0.6 mm and 3.0 mm, and there can be approximately 5-113 holes per square inch in the second body **126**.

[033] In some embodiments, both the third support member **136** and the fourth support member **138** are formed as a rib extending into the second hollow interior space **128** from the second body **126**. In some embodiments, both the third support member **136** and the fourth support member **138** have a shape which conforms to a shape of a portion of the mounting element **110** of the microroller **102**. For example, each of the support members **136**, **138** may have a shape conforming to a respective end portion **111** of the mounting element **110**. Alternatively, the support members **136**, **138** may have a shape conforming to the axle (not shown) of the mounting element **110**. In all cases, the support members **136**, **138** are sized and shaped such that, when the portion of the microroller **102** is received in the second half **116b** of the microroller case **104**, the cylindrical roller and the tiny needles **114** are held in a position with the tiny needles **114** spaced apart from the second body **126**.

[034] In some examples, the second handle receiving portion **146** extends from a second end **150** of the second half **116b** of the microroller **102** and has a substantially semi-cylindrical shape. The second handle receiving portion **146** is configured to receive a portion (*e.g.*, half of) the handle **108** of the microroller **102**.

[035] In some embodiments, the one or more latching recesses **148** are disposed at the second end **150** of the second half **116b** and are configured to interact with the one or more latching protrusions **142** (described above) on the first half **116a** of the microroller case **104** to latch the two halves **116a**, **116b** together.

2 Placement of Microroller into the Microroller Case

[036] In some examples, to secure the microroller **102** in the microroller case **104**, a first portion of the mounting element **110** of the microroller **102** is first inserted into the hollow interior space **128** of the second half **116b** of the microroller case **104** such that it rests on the support members **136**, **138** of the second half **116b**. With the first portion of the mounting element **110** resting in the support members **136**, **138** of the second half **116b**, a first portion of the handle **108** of the microroller **102** rests in the second handle receiving portion **146**.

[037] The first half **116a** of the microroller case **104** is then rotated about the hinge until a second portion of the mounting element **110** of the microroller **102** enters the hollow

interior space **124** of the first half **116b** of the microroller case **104** until the second portion of the mounting element **110** engages the support members **132**, **134** of the first half **116a**. With the second portion of the mounting element **110** engaged with the support members **132**, **134** of the first half **116a**, a second portion of the handle **108** of the microroller **102** rests in the first handle receiving portion **140**.

[038] Finally, when the first half **116a** reaches the end of its rotational range of motion, the latching protrusions **142** of the first half **116a** engage the latching recesses **148** of the second half **116b**, latching the two halves **116a**, **116b** into a closed position with a portion of the microroller **102**, including the cylindrical roller **112**, the mounting element **110**, and a portion of the handle **108** held inside.

[039] Note that, while in the above example the portion of the microroller **102** is first inserted into the second half **116b** and the first half **116a** is then rotated to close the microroller case **104** around the portion of the microroller **102**, in other examples, the order can be reversed. That is, in other examples the portion of the microroller **102** is first inserted into the first half **116a** and the second half **116b** is then rotated to close the microroller case **104** around the portion of the microroller **102**. Indeed, in some examples, the first half **116a** and the second half **116b** of the microroller case **104** are substantially mirror symmetrical (*i.e.*, they are mirror images of one another) with the exception of the latching features.

[040] Referring to FIG. 2, the microroller case **104** is shown in its closed position with a portion of the microroller **102** including the mounting element **110**, the cylindrical roller **112**, and its tiny needles **114** secured inside. In FIG. 2, the hinge **252** connecting the first half **116a** of the microroller case **104** to the second half **116b** of the microroller case **104** is visible. In the closed position, the support members **132**, **134**, **136**, **138** of the first and second halves **116a**, **116b** securely hold the mounting element **110** and the cylindrical roller **112** in place within the microroller case **104**.

[041] Referring to FIG. 3, a cross-sectional view of the microroller case **104** in its closed position with a portion of microroller **102** held inside shows that the tiny needles **114** of the cylindrical roller **112** are maintained at a safe distance from the bodies **122**, **126** of the first and second halves **116a**, **116b**. The distance between the bodies **122**, **126** and the tiny

needles **114** ensures that the delicate, tiny needles **114** are not damaged (*e.g.*, bent or blunted) by inadvertent contact with an object.

3 Sterilization Procedure

[042] Over the course of a microroller treatment, any portion of the microroller **102** may come into contact with and become contaminated by the subject's blood, skin, or other non-sterile matter. For this reason, it is desirable to sanitize the microroller **102**. Referring to FIG. 4, to sanitize the microroller **102**, the microroller **102** is first placed into the protective microroller case **104** (as is described above).

[043] Referring to FIG. 5, the microroller case **104** with the portion of the microroller **102** secured therein is immersed in a tub **554** of sterilization fluid **556**. Upon being immersed in the sanitation fluid, sanitation fluid flows through the holes **130** in the bodies **122**, **126** of the microroller case **104**, filling the interior space (*i.e.*, the first hollow interior space **124** of the first half **116a** and the second hollow interior space **128** of the second half **116b**) of the microroller case **104** and bathing the cylindrical roller **112**, the tiny needles **114**, and the mounting element **110** of the microroller **102**. Note that, due to the microroller **102** being secured in the microroller case **104** while in the tub **554** of sterilization fluid, damage to the tiny needles **114** due to inadvertent contact with, for example, the sides of the tub **554** is prevented.

[044] Referring to FIG. 6, after a sufficient period of time has passed, the microroller **102** is considered to be sterile. At that time, the microroller case **104** with the portion of the microroller **102** secured therein is removed from the tub **554** of sterilization fluid **556**, at which time any sterilization fluid **556** present in the interior space of the microroller case **104** drains out of the interior space through the holes **130**. The microroller case **104** with the portion of the sterilized microroller **102** secured therein can then be safely stored and or transported.

[045] Referring to FIG. 7, in one embodiment, the microroller case **704** includes holes **730** with a rectangular, "slit-like" shape.

[046] Referring to FIG. 8, in one embodiment, the microroller case **804** includes a first type of hole **830a** with an elongated "slit-like" shape and a second type of hole **830b** with a circular shape.

4 Alternatives

[047] In several of the aspects described above, the holes in the microroller case are described as having a circular shape or a slit-like or irregular shape. However, other shapes can be chosen based on characteristics such as drain rate and fill rate. Suitable shapes include triangular, square, rectangular, polygonal, or curvilinear, which can be selected based on any number of design criteria (*e.g.*, drain rate, fill rate, aesthetic appearance, and so on). A variety of sizes and shapes can also be included, if desired, in a given system.

Although it may not provide the same level of protection to the microneedles, the case can include a single large hole or a limited number of large holes that allow for rapid filling and draining of sterilization fluid. In some embodiments, the single large hole may be formed by omitting an entire wall of the body of microroller case or a portion thereof, and alternatives for the wall shape are described further below.

[048] In the aspects described above, the microroller case is described as having a substantially cylindrical shape (including two semi-cylindrical “clam shell” shaped halves). However, in other examples, the microroller case can have any number of shapes. For example, the microroller case may have a cubic, more spherical, or irregular shape (*e.g.*, such as a sculpted shape). Thus, one or more of the walls of the container may or may not be congruent or even roughly congruent with the encased roller. For example, the walls may be cloche-shaped with the open bottom of the cloche providing for contact with a surface (*e.g.*, the bottom of a sterilization tub) while maintaining the long axis of the dermal treatment device perpendicular to the surface upon which the bottom of the cloche rests. In this embodiment, the open bottom of the cloche-shaped container can stabilize the dermal treatment device in an upright position such that the handle is not fully submerged in the sterilization tub. As in other embodiments described and illustrated herein, the cloche-shaped container can include first and second container portions that are attached to one another with a latching mechanism (*e.g.*, a hinge), and at least one of the container portions can include a support member that supports the mounting element.

[049] In the aspects described above, the support members are described as ribs that are spaced apart from the bodies of the halves of the microroller case. However, the support

members may be integrally formed as grooves or cut-outs in the bodies of the halves of the microroller case.

[050] Any sufficient type of latching mechanism (*e.g.*, snap latches, hook latches, and so on) can be used to hold the microroller case in its closed position.

[051] In some embodiments, the halves of the microroller case are not coupled by a hinge, but are instead two separate members. In such cases, the microroller case may include additional latching mechanisms such that the two halves can be held together.

[052] In general, the sterilization fluid can be a gas or a liquid. In some examples, the sterilization fluid can be any one of ethylene oxide, nitrogen dioxide, ozone, chlorine bleach, glutaraldehyde and formaldehyde, phthalaldehyde, hydrogen peroxide, paracetic acid, an alcohol, or any other suitable sterilization fluid. In some examples, rather than using a sterilization fluid, radiation (*e.g.*, non-ionizing radiation such as UV light) or heat can be used as a sterilant.

[053] In some embodiments, the tub included in the skin care systems for containing sterilization fluid can include an indentation (*e.g.*, a notch or groove) on an upper surface that is configured to accommodate a portion of the handle of the dermal treatment device such that the handle is not completely submerged in the sterilizing fluid. The tub can also include a lining (*e.g.*, an inner mesh basket) having a handle that remains above the level of the sterilizing fluid and can be used to lift the dermal treatment device, via the liner, out of the sterilization fluid. The size of the tub itself can also vary such that it is large enough for the entire dermal treatment device, including the entirety of the handle, to be submerged or small enough for only the encased roller-portion of the device and the portion of the handle most proximal to the roller to become submerged; the distal portion of the handle, which is gripped by the user, can then remain above the surface of the sterilizing or storage fluid.

[054] In some embodiments, the microroller case is made of a plastic material, which may be opaque or transparent. In other embodiments, the microroller case is made of a metallic material, such as stainless steel.

[055] It is to be understood that the foregoing description is intended to illustrate and not to limit the scope of the invention, which is defined by the scope of the appended claims. Other embodiments are within the scope of the following claims.

What is claimed is:

1. A skin care system comprising:

(a) a dermal treatment device comprising a handle having a mounting element disposed at one end and a substantially cylindrical roller rotatably mounted in the mounting element, the roller having a surface with a plurality of microneedles protruding radially therefrom; and

(b) a container configured to surround at least a portion of the dermal treatment device, wherein the container comprises (i) a plurality of walls forming an inner chamber, a first wall of the plurality comprising a first through hole for receiving a portion of the handle of the device and a second wall of the plurality comprising a second through hole for permitting passage of a fluid into and out of the inner chamber and (ii) a support member extending into the inner chamber from one of the walls and configured to engage the mounting element of the dermal treatment device such that the cylindrical roller is held in the inner chamber with the microneedles being spaced apart from the walls.

2. The system of claim 1, wherein the second wall comprises a plurality of through holes for permitting passage of a fluid into and out of the inner chamber.

3. The system of claim 2, wherein the second wall comprises a plurality of through holes, each having substantially the same shape and diameter.

4. The system of claim 3, wherein the shape is circular and the diameter is in the range of about 1.5-8.0 mm.

5. The system of claim 3, wherein the distance separating the periphery of one through hole from another is in the range of about 0.6-3.0 mm.

6. The system of claim 3, wherein the density of the holes in the plurality of through holes is 5-113 holes per square inch.

7. The system of claim 2, wherein the second wall comprises a plurality of through holes, at least one of which varies independently from the others in shape and diameter.

8. The system of claim 1, further comprising a sterilization chamber configured to receive the container with the dermal treatment device disposed therein.

9. The system of claim 1, wherein the container is formed by a first container portion attached to a second container portion.

10. The system of claim 9, wherein the first and second container portions are attached to one another with a latching mechanism.

11. The system of claim 9, wherein the first and second container portions are connected by a hinge.

12. The system of claim 1, wherein each container portion comprises a support member of the one or more support members.

13. The system of claim 1, wherein one or more of the handle, the mounting element, the roller, and the container are made of a plastic material.

14. A kit comprising the system of claim 1 and instructions for use.

15. The kit of claim 14, further comprising a sterilization chamber configured to receive the container with the dermal treatment device disposed therein.

16. The kit of claim 15, further comprising a sterilization solution.

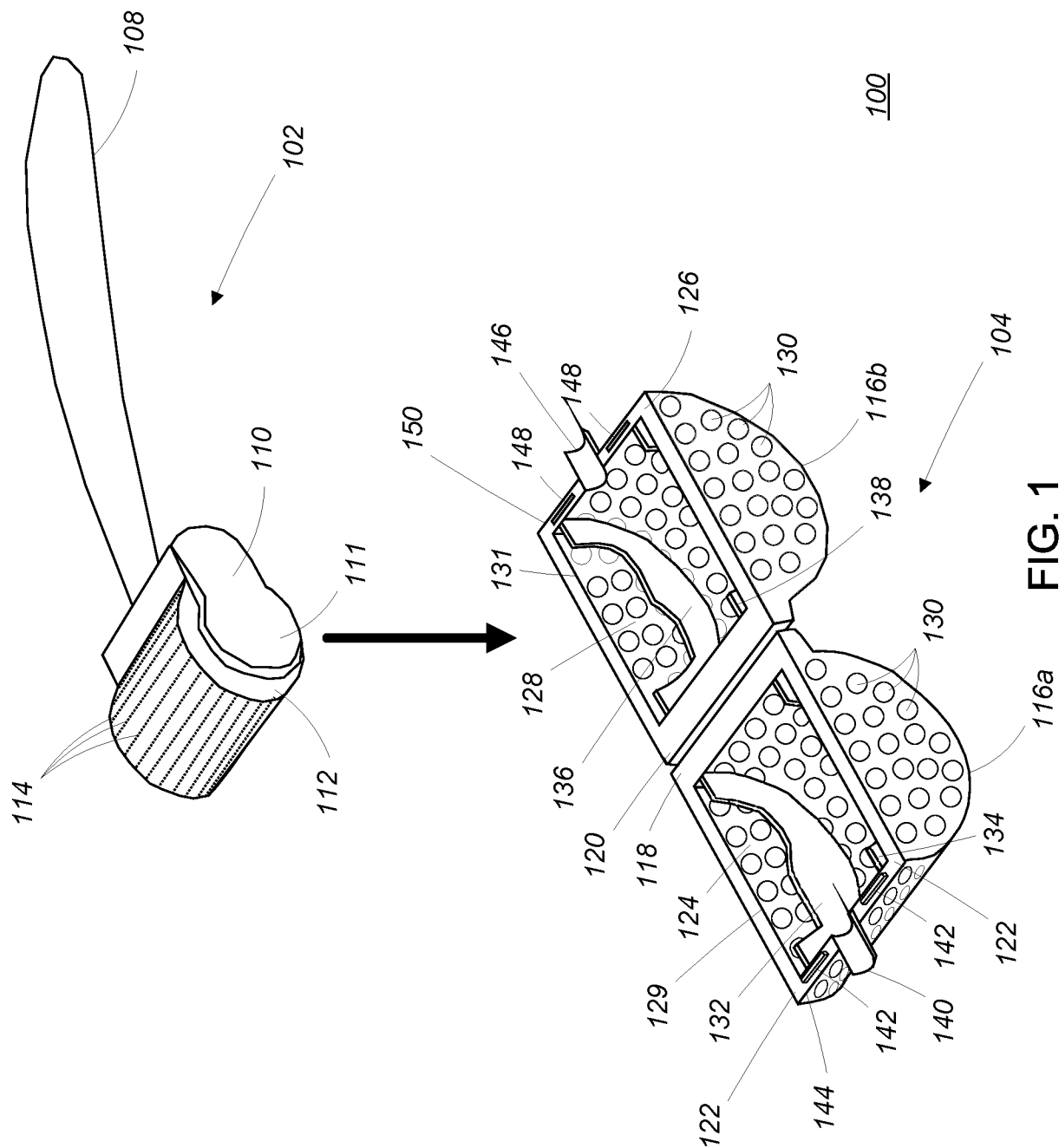


FIG. 1

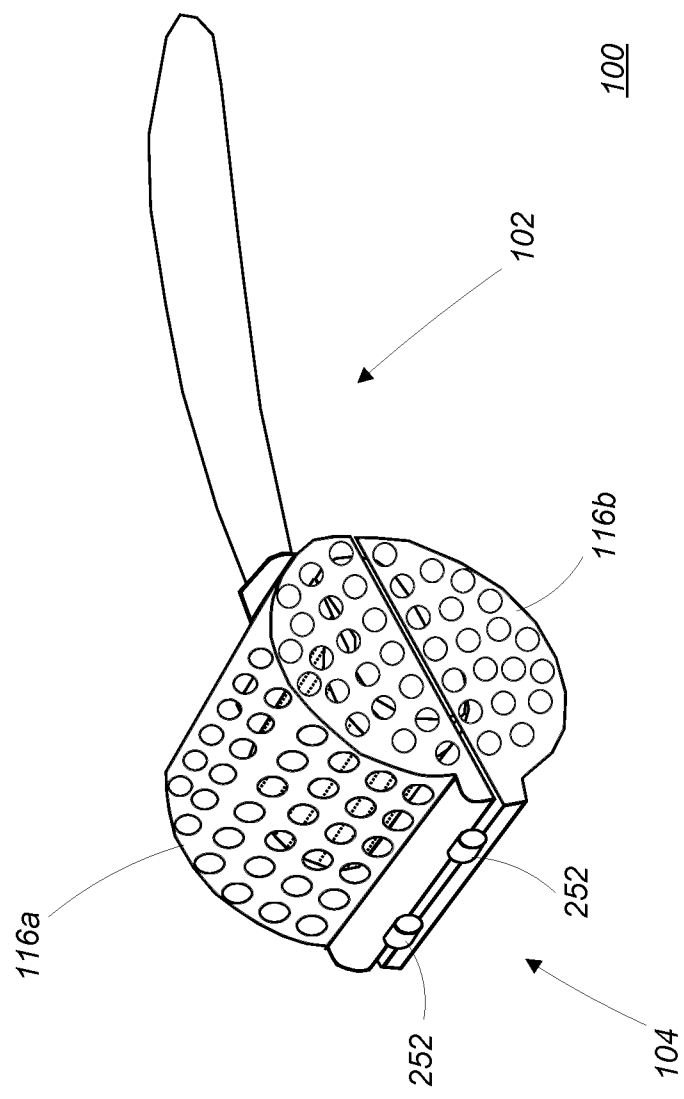


FIG. 2

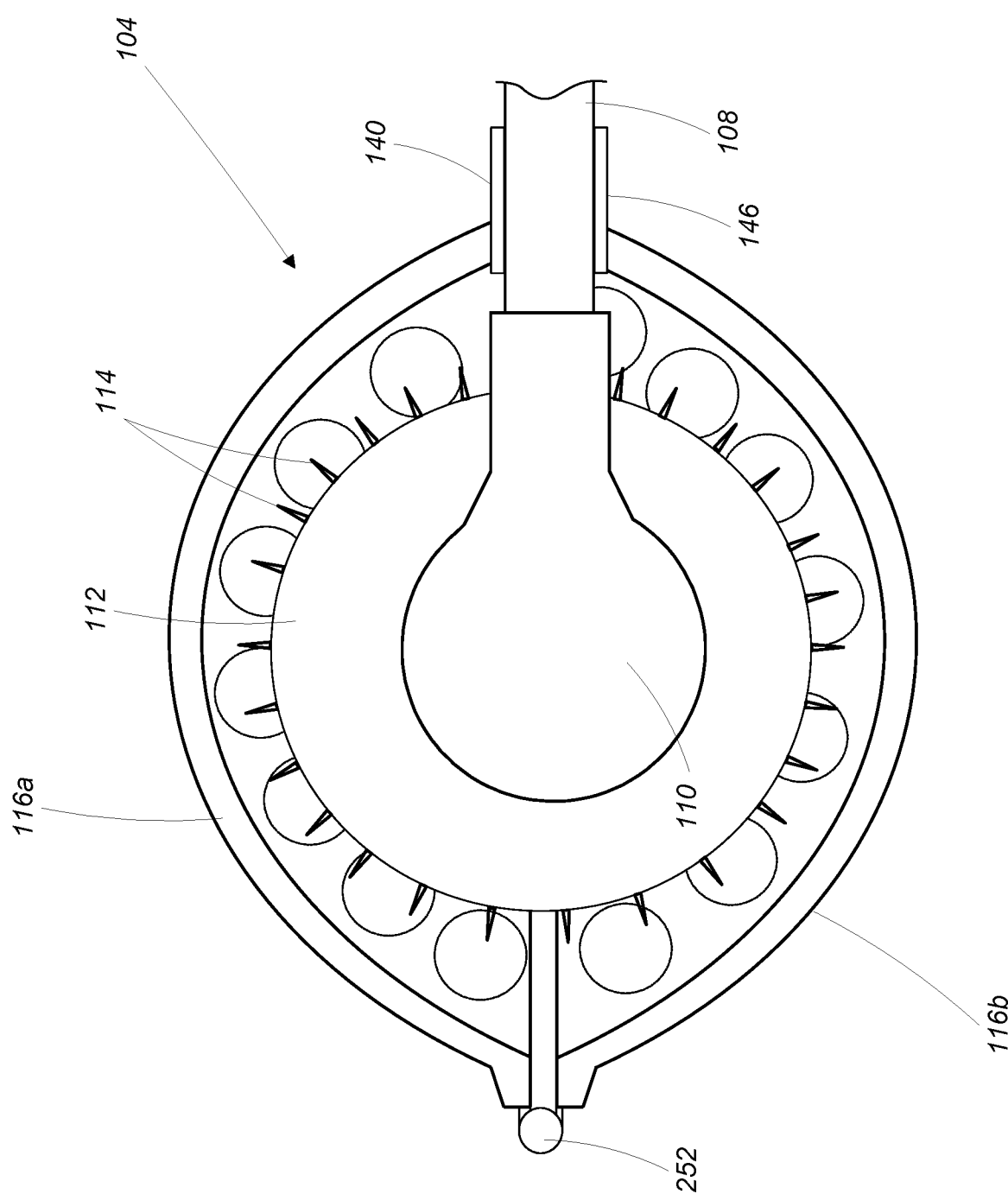


FIG. 3

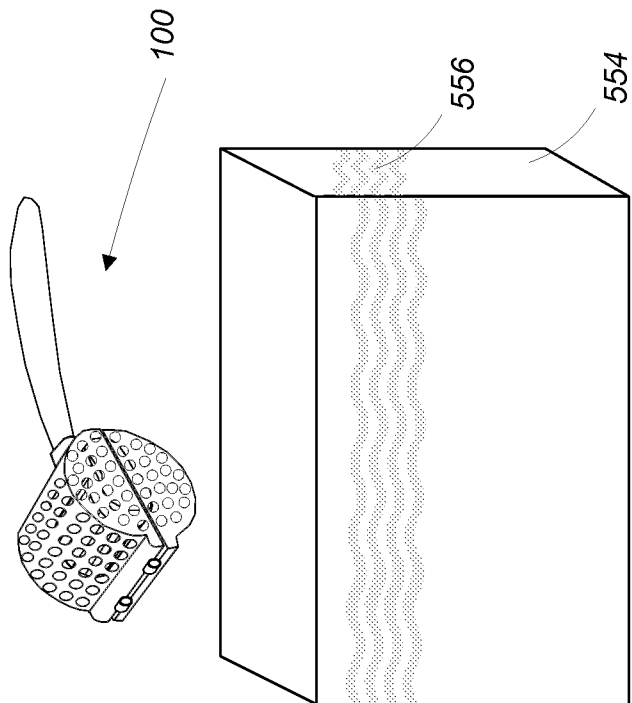


FIG. 4

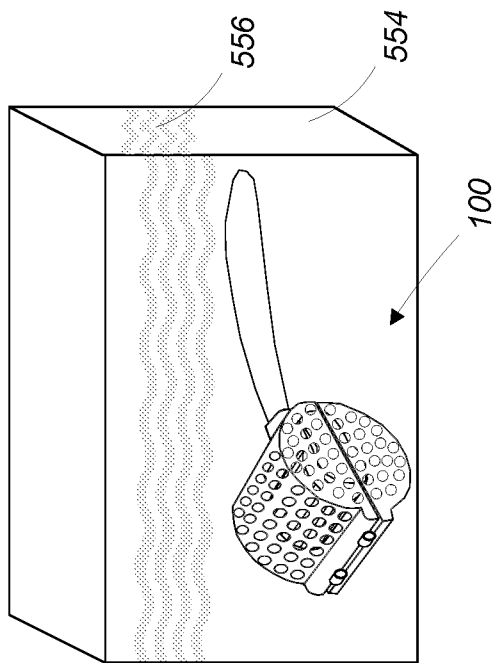


FIG. 5

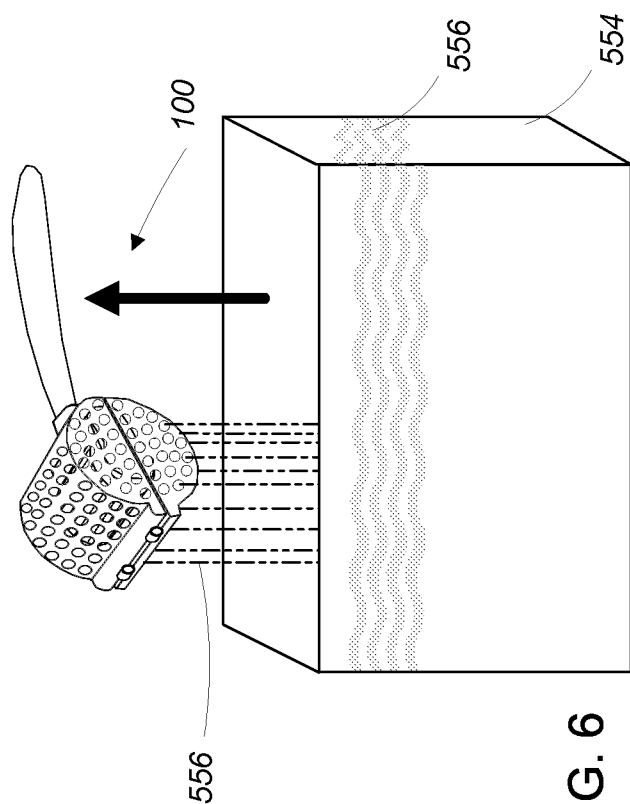


FIG. 6

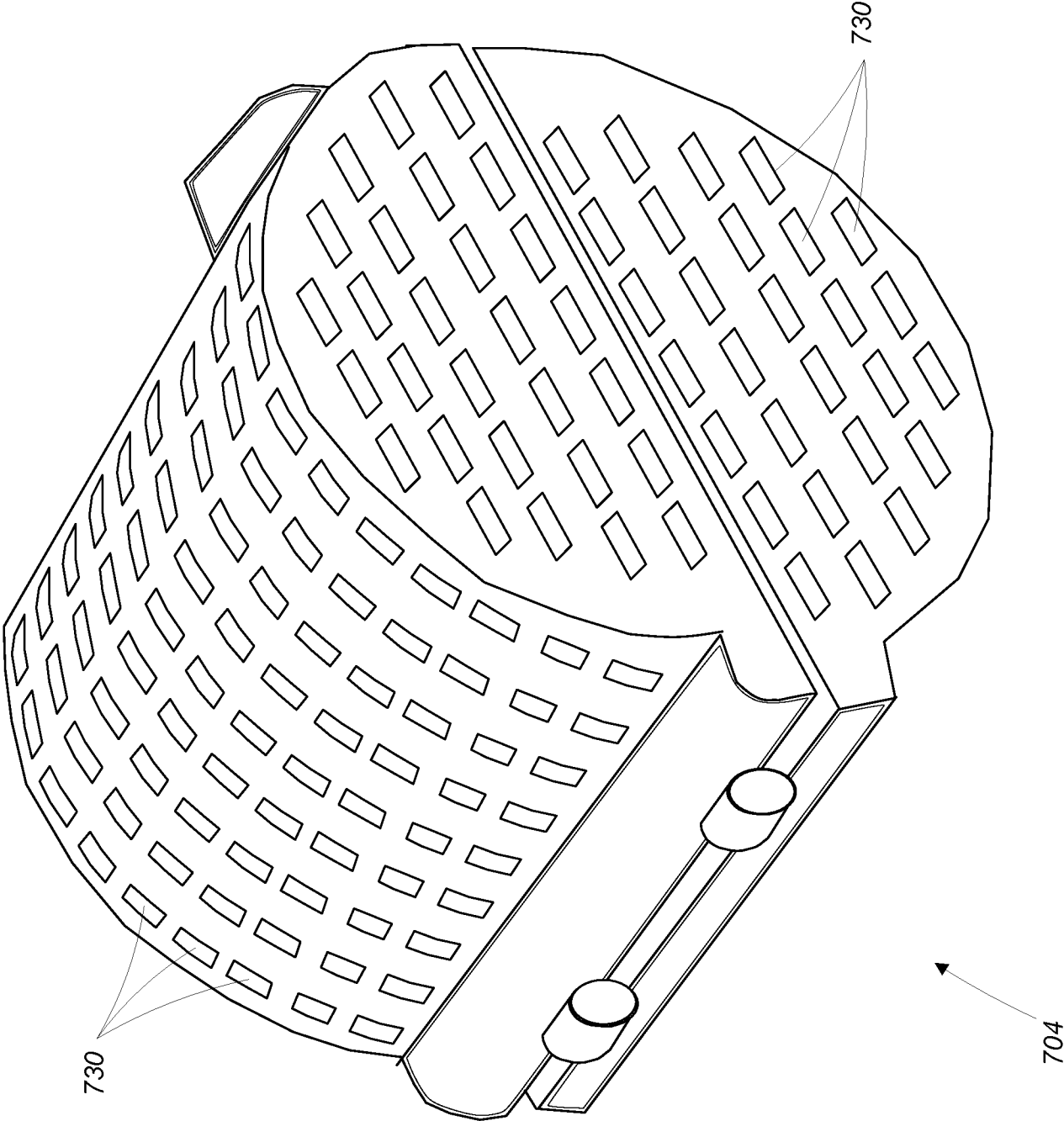
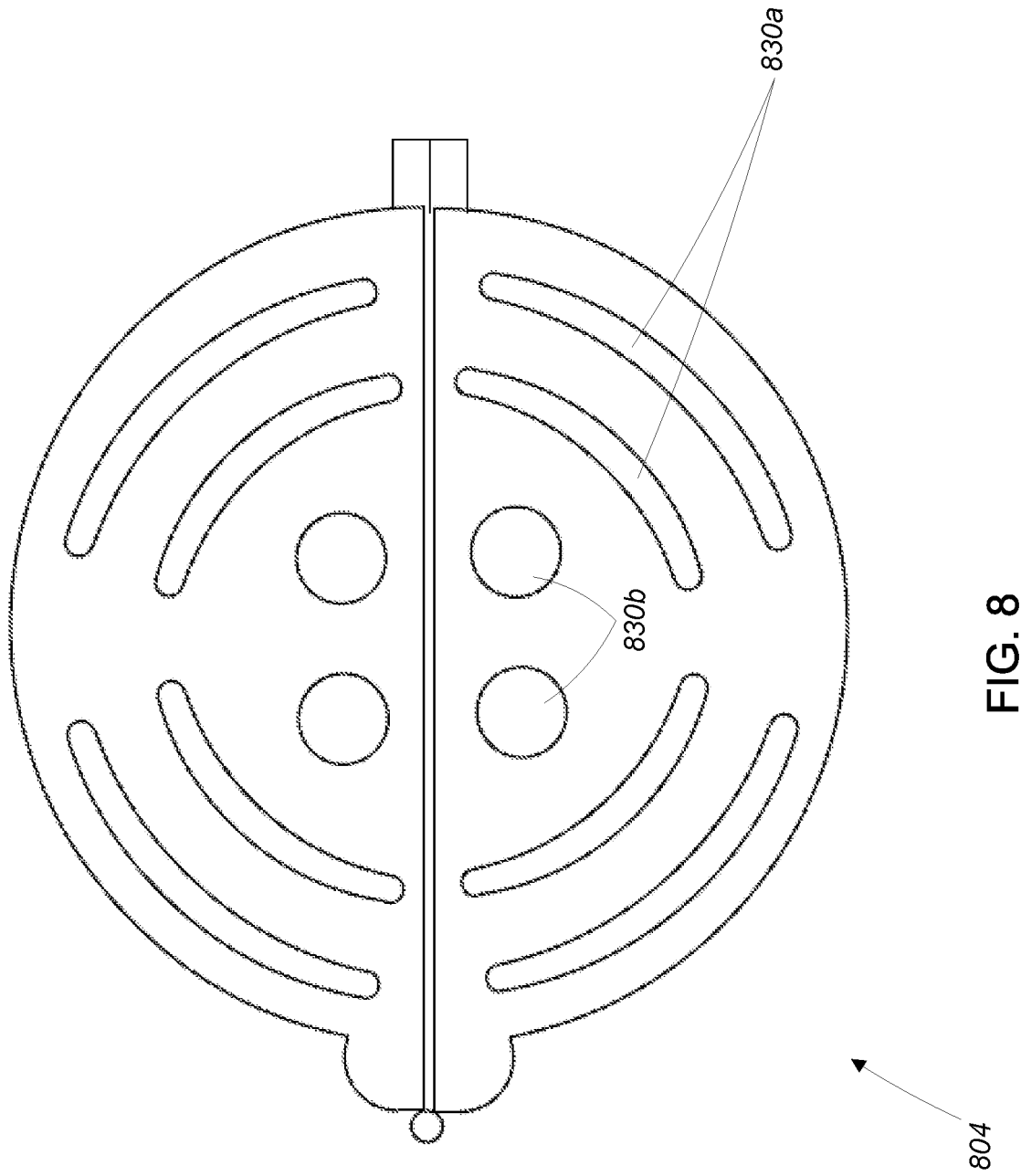


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2016/036918

A. CLASSIFICATION OF SUBJECT MATTER		
<i>A61H 15/00 (2006.01)</i> <i>A61L 2/26 (2006.01)</i> 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)		
A61H 7/00, 15/00, A61L 2/26, 2/16, 2/18, 2/20		
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)		
PatSearch (RUPTO internal), USPTO, PAJ, Esp@cenet, DWPI, EAPATIS, PATENTSCOPE		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2011/0009782 A1 (NAYA TOUCH, INC.) 13.01.2011, fig. 1-3, 5A, 15, 16, par. [0021], [0045], [0049], [0055], [0061], [0063]	1-16
Y	ZGTS Titanium [online] February 14, 2011. Retrieved from the Internet: <URL: http://www.homedermarolling.org/2011/02/derma-roller-review-zgts-titanium.html >, fig. 1, 4, p. 1	1-16
Y	US 6896149 B1 (CARR METAL PRODUCTS INC.) 24.05.2005, fig. 1 A, B, col. 2, lines 56-58	1-16
Y	US 2012/0195792 A1 (SYMMETRY MEDICAL MANUFACTURING, INC.) 02.08.2012, par. [0021]	8, 15
☐ 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 document 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		Date of mailing of the international search report
16 September 2016 (16.09.2016)		03 November 2016 (03.11.2016)
Name and mailing address of the ISA/RU: Federal Institute of Industrial Property, Berezhkovskaya nab., 30-1, Moscow, G-59, GSP-3, Russia, 125993 Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37		Authorized officer A. Demina Telephone No. 8-499-240-25-91