US 20140219701A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2014/0219701 A1**

(43) **Pub. Date: Aug. 7, 2014**

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(54) **COSMETIC DEVICE WITH ACTIVE TEMPERATURE MODULATION**

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(21) Appl. No.: **13/759,966**

(22) Filed: **Feb. 5, 2013**

Publication Classification

(51) **Int. Cl.**

A45D 34/04 (2006.01)

A45D 40/26 (2006.01)

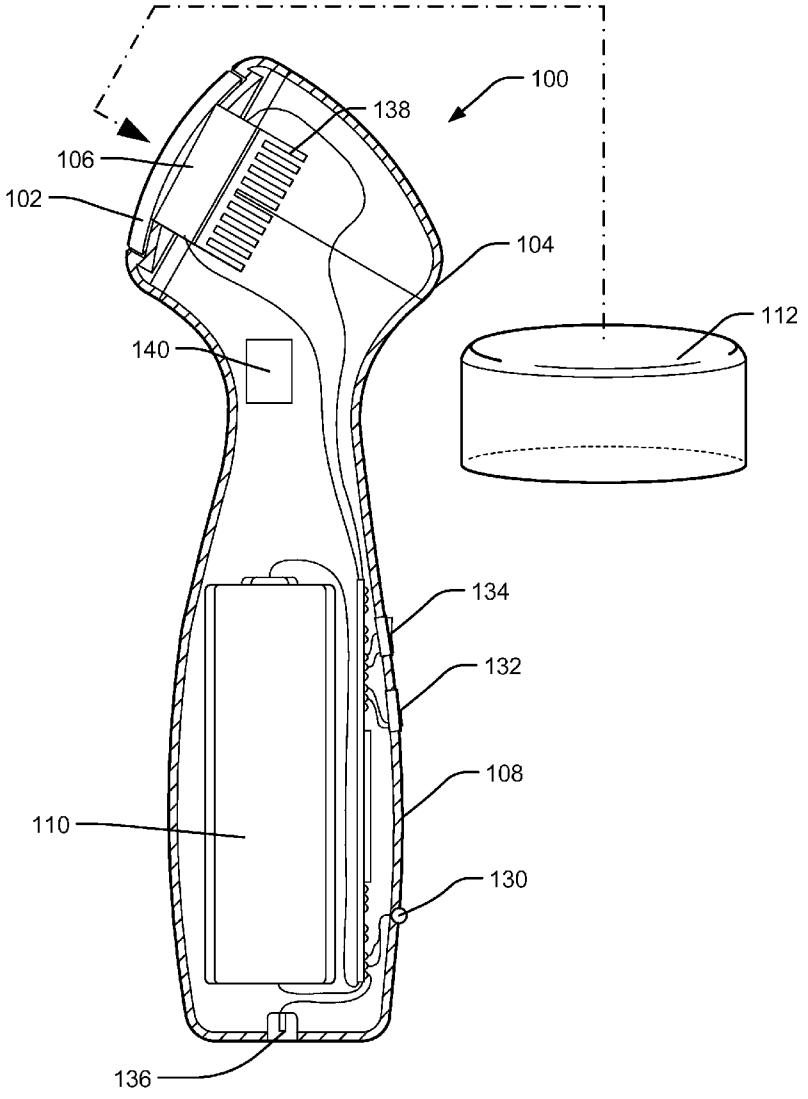
(52) **U.S. Cl.**

CPC ***A45D 34/04*** (2013.01); ***A45D 40/26*** (2013.01)

USPC **401/2**; 401/195

(57) **ABSTRACT**

An active temperature modulating device for applying cosmetic or medicinal products to surfaces. The device has an applicator which includes a temperature modulating element disposed in the tip. Moreover, the temperature modulating element is controlled via an electrical source. The applicator comprises a material that is capable of storing, retaining, and/or transferring thermal energy during application of the product.



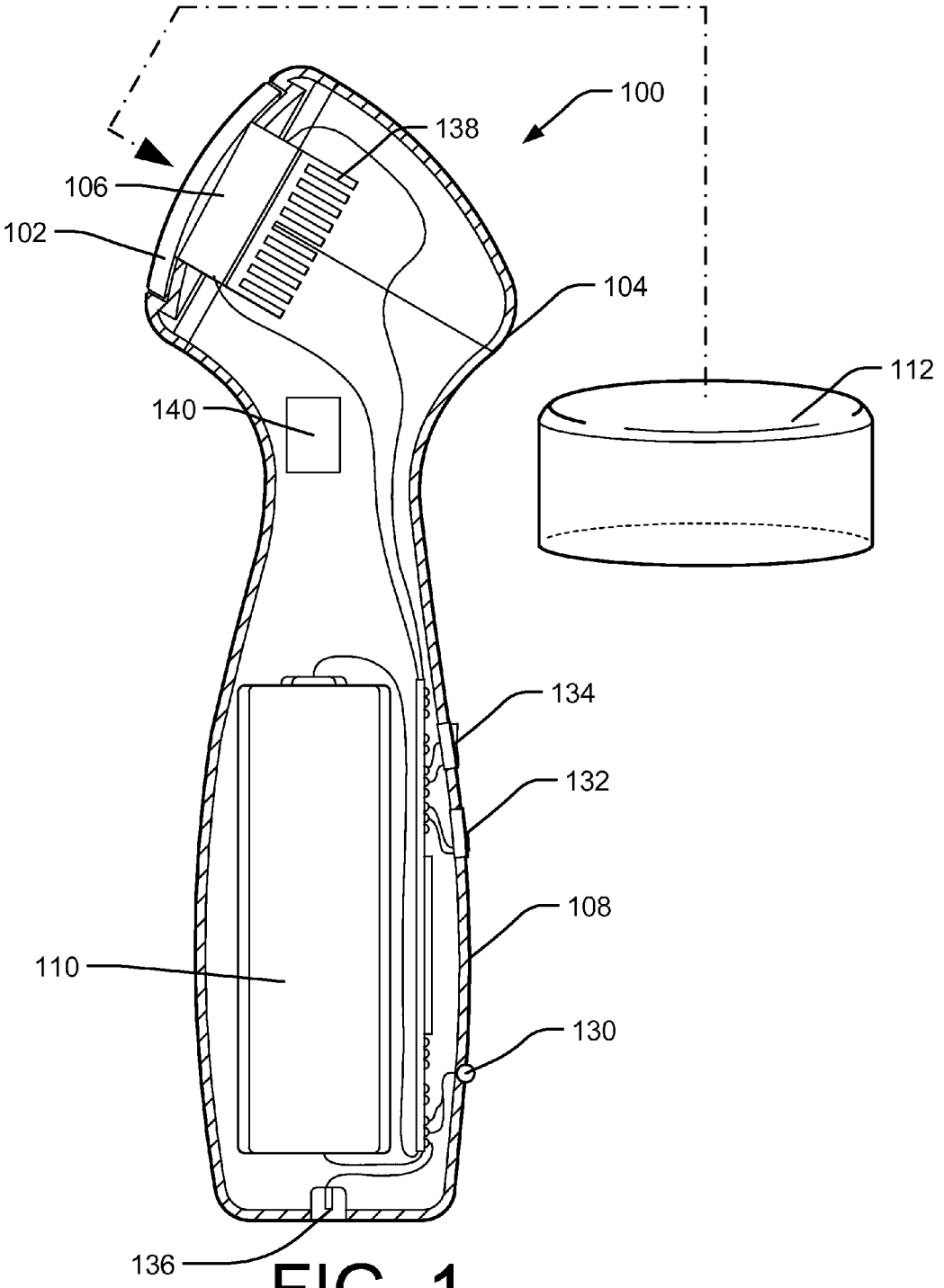


FIG. 1

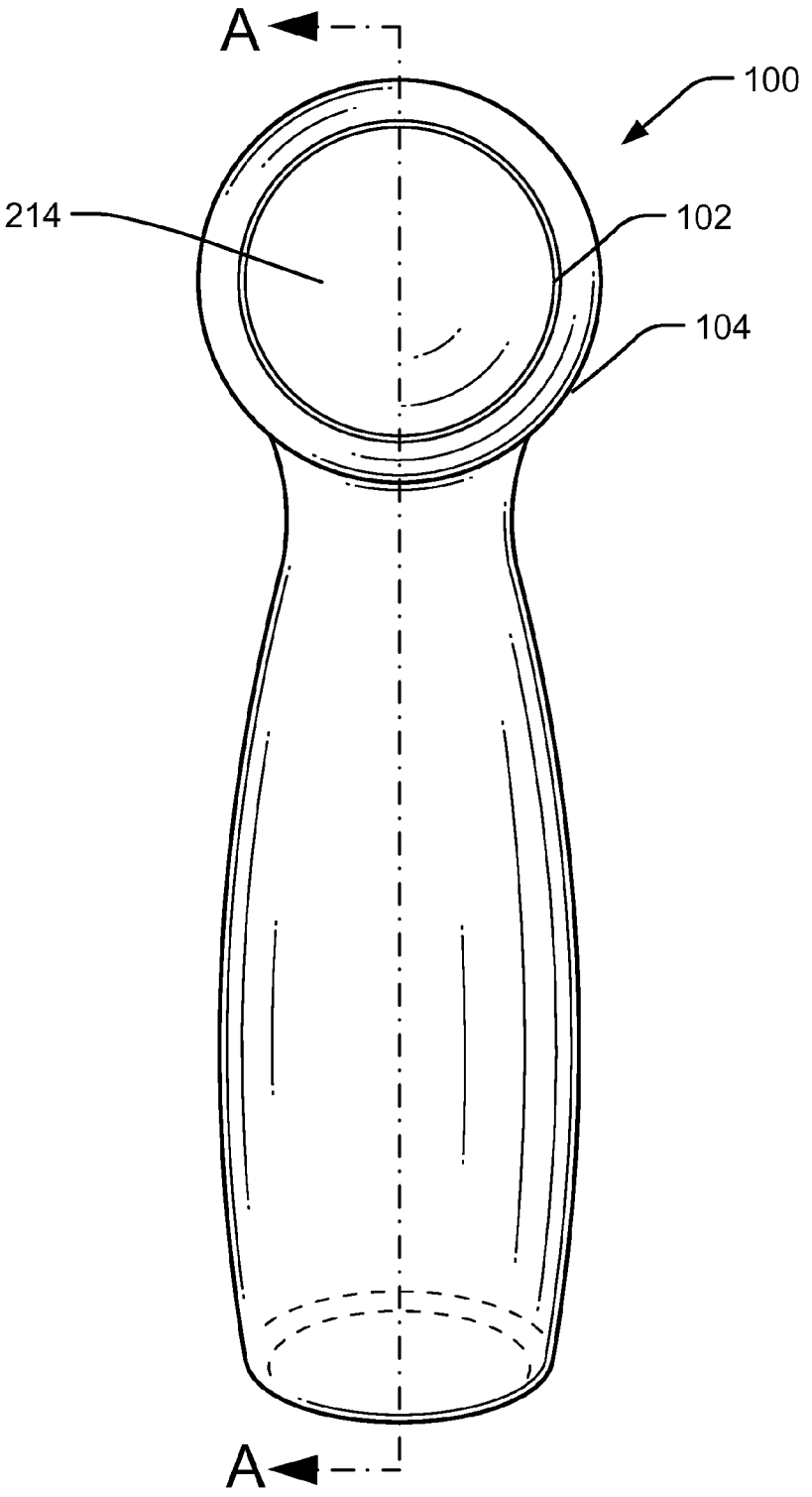


FIG. 2

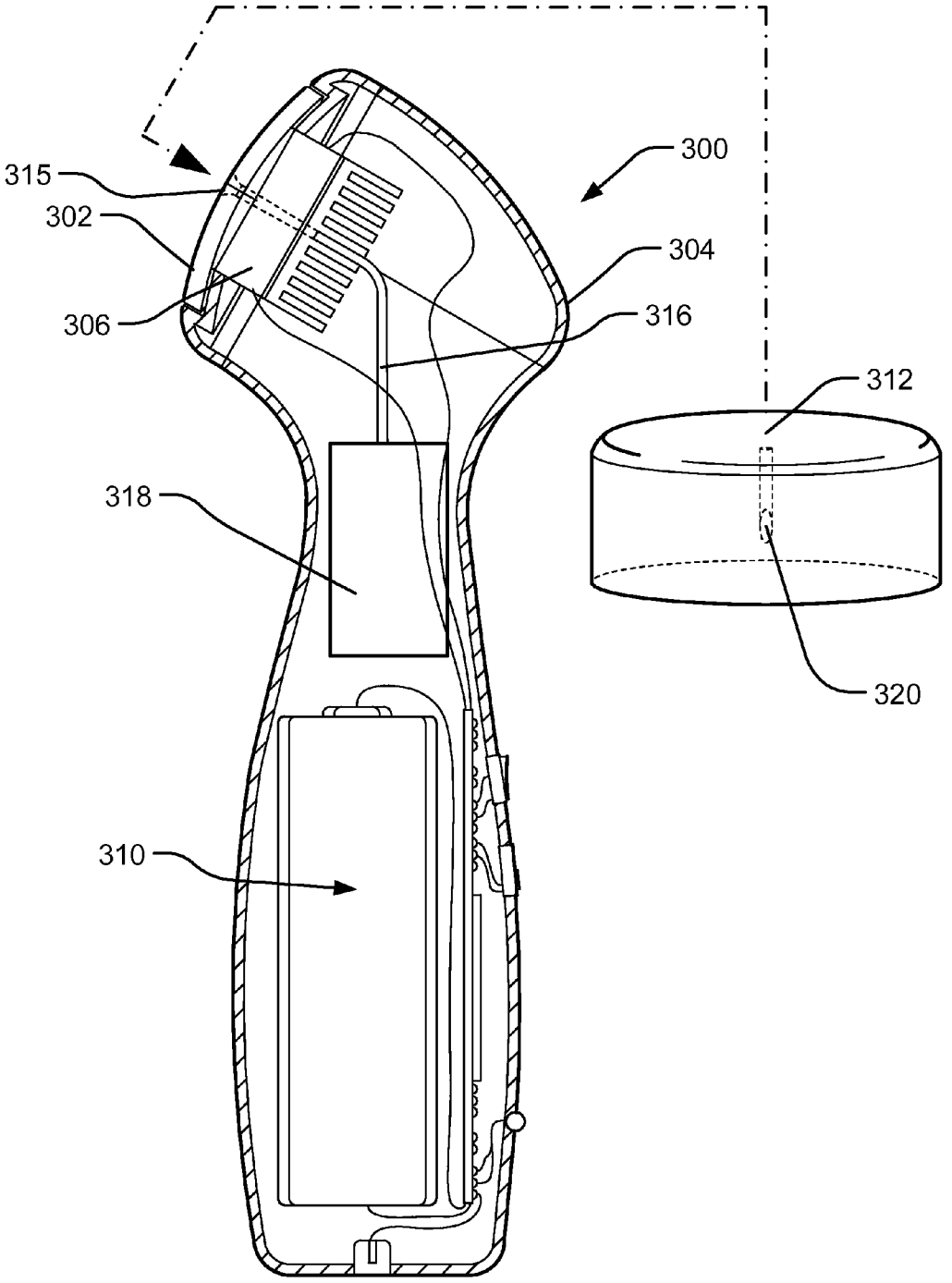


FIG. 3

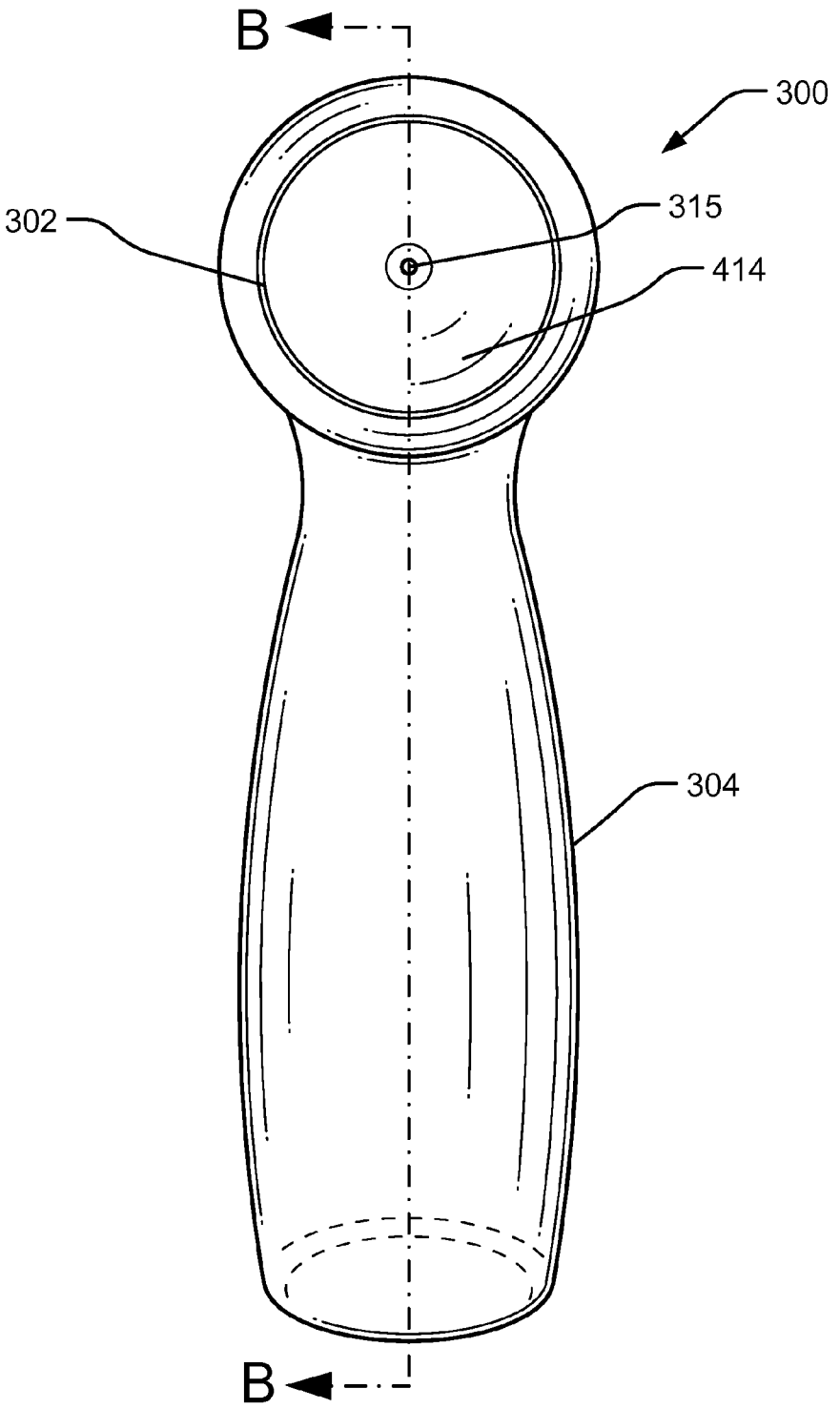


FIG. 4

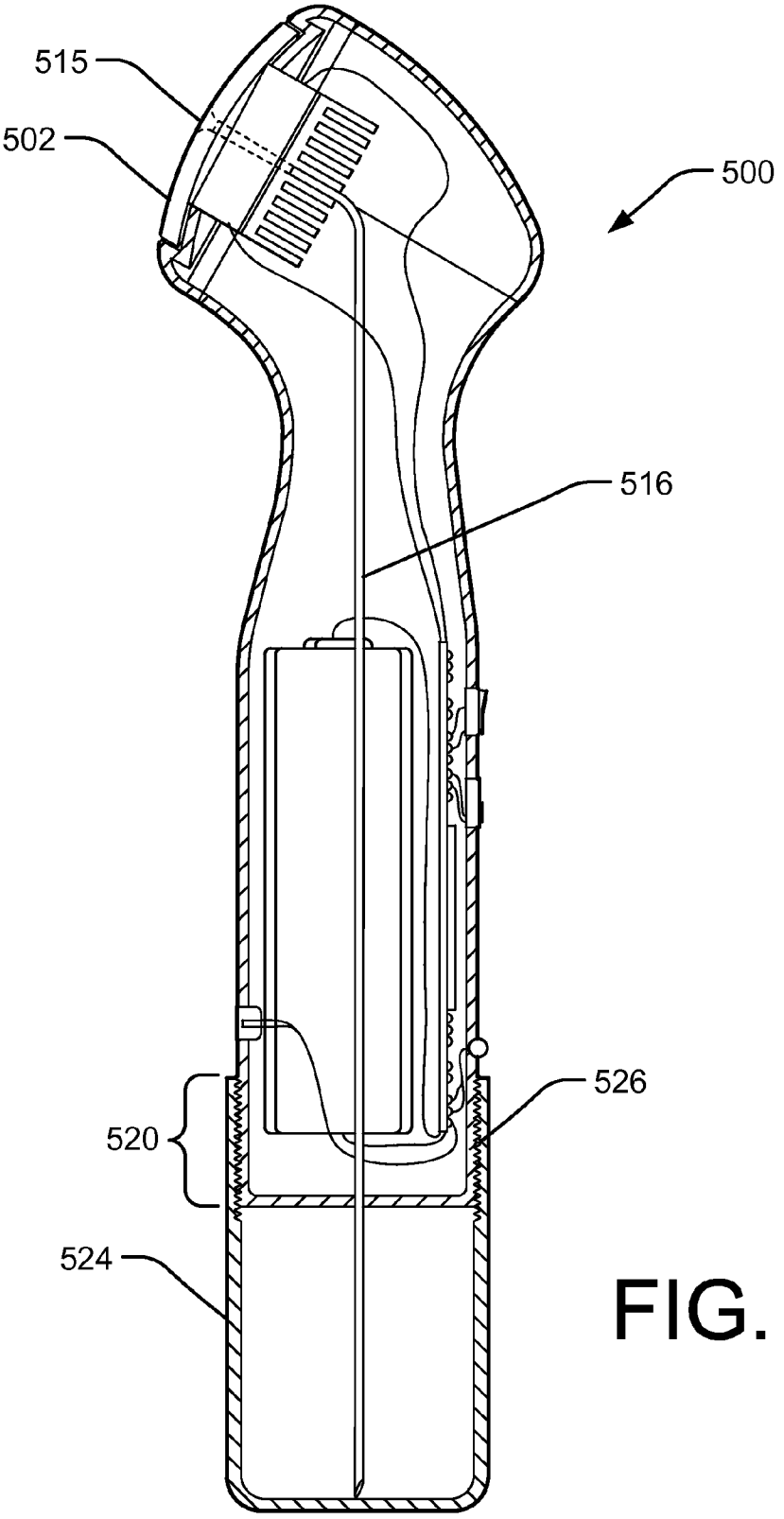


FIG. 5

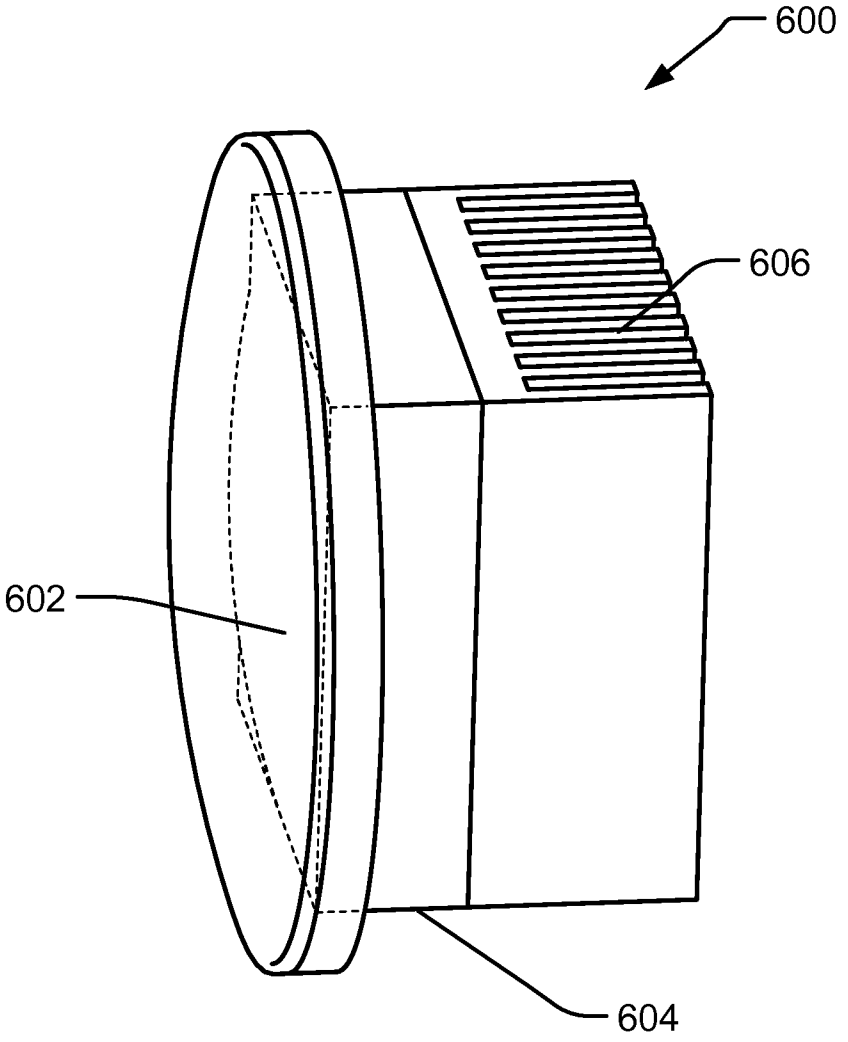


FIG. 6

COSMETIC DEVICE WITH ACTIVE TEMPERATURE MODULATION

BACKGROUND

[0001] Devices exist for dispensing cosmetic or medicinal products. Such devices usually consist of an outer tubular shell or housing, a delivery mechanism for displacement of the cosmetic or medicinal products, and an applicator tip. For example, in the medical industry, applicators are employed for applying medicinal products, such as ointments, to portions of the body. In the cosmetics and personal care industries, applicators are used to apply lipstick, lip balm, skin creams, lotions, and other cosmetic products to portions of the body.

[0002] In many cases, these medicinal and cosmetic products may include skin care substances, such as aloe or lanolin, that provide a healing or therapeutic effect to heal damaged skin or maintain healthy skin. In addition, these products may include therapeutic substances, such as topical anesthetics, analgesics, fragrances, menthol, or other substances that provide a soothing or stimulating sensation when applied to skin of a user of the product. In addition to skin care substances, thermal treatments (e.g., application of heat and/or cold) are known to relieve pain, provide a therapeutic sensation, and to slow the body's natural response to injury so that a slower and more controlled healing process may ensue.

[0003] Existing cosmetic and medicinal dispensers are limited to application of products to the skin, and do not provide for thermal treatments of the skin by active control of the device temperature. Accordingly, there remains a need in the art for improved applicators and dispensers.

SUMMARY

[0004] This summary is provided to introduce simplified concepts of temperature modulating devices and dispensers for applying, for example, cosmetics and/or medicinal products to surfaces, which are further described below in the Detailed Description. This summary is not intended to identify essential features of the claimed subject matter, nor is it intended for use in determining the scope of the claimed subject matter.

[0005] According to a first embodiment, this disclosure is directed to a cosmetic or medicinal temperature modulating device. The device may include a housing, and an applicator coupled to the housing, the applicator having an application face for applying a cosmetic or medicinal product to a surface, manipulating the product when on the surface or both. The device also may include a temperature modulating element disposed adjacent to the applicator. Moreover, the temperature modulating element may be controlled by an electrical circuit or controller and/or powered via an electrical source.

[0006] In some implementations, the device may include a dispenser that includes a housing having a reservoir for containing a product.

[0007] In still further implementations, the device may include an attachment component for attaching the device to a container.

[0008] In yet other implementations, the device may include a housing designed for applying a cosmetic or medicinal product to a surface or for manipulating the product when on the surface, or both, and a temperature modulating element disposed in the housing, wherein the temperature modulating element is powered via an electrical source.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The detailed description is set forth with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference numbers in different figures indicates similar or identical items.

[0010] FIG. **1** is a cross-sectional view of an illustrative cosmetic temperature modulating device taken along line A-A of FIG. **2**.

[0011] FIG. **2** is a front side view of the cosmetic temperature modulating device of FIG. **1**.

[0012] FIG. **3** is a cross-sectional view of another illustrative cosmetic temperature modulating device taken along line B-B of FIG. **4**.

[0013] FIG. **4** is a front side view of the cosmetic temperature modulating device of FIG. **3**.

[0014] FIG. **5** is a cross-sectional view of yet another illustrative cosmetic temperature modulating device.

[0015] FIG. **6** is a perspective view of a temperature modulating assembly comprising a Peltier thermoelectric cooler, heat sink, and applicator.

DETAILED DESCRIPTION

Overview

[0016] This disclosure is directed to temperature modulating devices and dispensers which have a product applicator ("applicator") and a housing having a temperature modulating element disposed therein for actively controlling a temperature of the product applicator. According to an embodiment, the applicator is also able to store and maintain a level of thermal energy. The applicator may have an application face comprising various metals, ceramics, composites, and/or other materials that can be heated or cooled by the temperature modulating element and are able to retain the heated or cooled condition for a period of time. In some embodiments, a product may be dispensed from or onto the dispenser through the applicator for application to, for example, a user's skin, hair or other surface. By virtue of the desirable thermodynamic properties of the applicator (e.g., thermal conductivity, specific heat capacity, and/or thermal diffusivity), thermal energy may be applied to the dispensed product so that it may be heated or cooled during application. Moreover, the application face of the applicator may transfer heat to or from the user's skin, thereby causing the user to feel a thermal sensation (warm or cool depending on the thermal energy in the applicator). In some cases, the heat or cold transfer may also minimize or alleviate pain or discomfort caused by, for example, damage to the skin.

[0017] In yet other implementations, the device may include a housing designed for applying a cosmetic or medicinal product to a surface or for manipulating the product when on the surface, or both, and a temperature modulating element disposed in the housing, wherein the temperature modulating element is powered via an electrical source.

Illustrative Temperature Modulating Device

[0018] FIG. **1** represents an illustrative temperature modulating device ("device") **100** with an applicator **102** and a housing **104**. In this implementation, the applicator **102** is of a generally convex, disk-shaped and is made of a material capable of holding and retaining thermal energy or maintain-

ing is thermal state for a period of time. In one implementation, the applicator **102** can be made of stainless steel. However, in other implementations, any suitable material may be used that is capable of retaining and/or transferring heat towards or away from the user and/or product. Examples of other suitable materials include, but are not limited to, metals (e.g., aluminum, titanium, steel, nickel, tin, copper, brass, silver, gold, platinum, chrome alloys thereof such as Zamac, etc.), glass, stone (e.g. precious and semi-precious stones, crystals, coral stones, volcanic stones, etc), ceramics, high-density plastics, wood, composites, or the like. According to certain embodiments, applicator **102** may be coated, sealed or have any number of surface treatments applied, such as, for example, polishing, micro-finishing, etc. The device **100** also includes a temperature modulating element **106** and an electrical source **110** disposed in the housing **104**. The temperature modulating element **106** may be disposed adjacent the applicator **102** and enables active control of the temperature of the applicator **102**. According to an embodiment, the temperature modulating element **106** can be a Peltier thermoelectric device. Examples of other technologies suitable for use as a temperature modulating element **106** include, but are not limited to, resistive elements, refrigerants, or fluid coolants. In some embodiments, the temperature modulation element **106** may include two or more different temperature modulation technologies.

[0019] The electrical source **110** provides electrical power for the temperature modulating element **106**. According to an embodiment, electricity provided to the temperature modulating element **106** can be controlled, for example, via an electronic circuit. Such electronic control techniques include pulse width modulation, voltage divider circuitry, and the use of integrated circuits (ICs) with discreet voltage output(s) (e.g. Buck/boost converter). According to an embodiment, the electrical source **110** can be, for example, one or more fuel cells, one or more solar cells and/or one or more batteries which may be disposable or rechargeable. According to another embodiment, the device can include an alternating current (AC) adapter (not shown) to be plugged into a wall socket or other external electrical source.

[0020] According to certain embodiments, the device **100** also includes a cap **112** that encapsulates the applicator **102** when the device is not in use. According to yet another embodiment, the housing **104** can be designed to include one or more openings (not shown) formed in the housing **104** adjacent the temperature modulating element **106** to allow heat to escape. In some examples, the applicator **102** may be articulatable (e.g. pivotable, rotatable, etc.) relative to the handle through an angle θ.

[0021] According to certain implementations, the device **100** may have an angle θ between the applicator **102** and the handle portion **108** of the housing **104**. In certain embodiments, the angle θ is about 120°. This design facilitates application of the product to the user's skin. However, other designs may be used. For example, in other implementations the angle θ may be from about 80° to about 180°. Still further implementations may have angles anywhere from about 90° to about 160°.

[0022] In other implementations, the applicator **102** may additionally or alternatively include a brush, a sponge, or various other features to assist in the application of a dispensed product to a user's skin and/or manipulation of the product when on the user's skin. In still other embodiments, the device **100** may include additional components such as, for example, an on/off switch **134**; an LED indicator not shown; an LED charge indicator **130**; temperature setting adjustment **132** (e.g. a sliding switch, a rotating knob, or a push button); and a recharge cord jack **136**. In still other embodiments, the device **100** may include a vibration element **140** that may be disposed within the housing **104** for, for example, vibrating or sonicating the applicator **102**.

[0023] According to certain embodiments, the device **100** may be programmed (e.g. by the manufacturer or the user) to apply heat, cold, and/or vibration according to a profile. For example, the device **100** can be preprogrammed by the manufacture or programmed by the user prior to use to provide any one of a heating, cooling, or vibration profile to the applicator **102** for a period of time. According to another example, the device **100** can be programmed to provide any combination of one or more heating, cooling, and vibration profiles to the applicator **102**. According to still other embodiments, the device **100** can be preprogrammed to include an automatic shut-off or temperature control circuit to prevent the device from becoming too cold or too hot.

[0024] FIG. **2** is a front side view of the temperature modulating device **100**. Again, the applicator **102** generally comprises an application face **214** which can contact a product of choice, such as for example, a cosmetic or medicinal ointment. The application face **214** and product imparted thereon or adsorbed or absorbed therein can then be placed in contact with a surface, such as, for example, a user's lip, under-eye, face, neck body, or skin in general to transfer the product and/or heat or cold to the surface. According to certain embodiments, the device **100** may also be used to apply a therapeutic or medicinal product to, for example, a user's muscle or joint area.

[0025] In this implementation the applicator **102** is shown as being a generally convex, disk-shaped body. In addition, the applicator **102** in this implementation is made at least in part of stainless steel, and has a contact surface area that properly correlates with its intended use. For example, for eye and face applications, the applicator can have a contact surface area of from about 75 to about 315 mm^2; from about 100 to about 300 mm^2; or from about 150 to about 250 mm^2. For neck applications, the applicator can have a contact surface area of from about 175 to about 700 mm^2; from about 200 to about 600 mm^2; or from about **300** to about 500 mm^2. Moreover, for body applications, the applicator can have a contact surface area of from about 700 to about 4000 mm^2; from about 1000 to about 3000 mm^2; or from about 1500 to about 2500 mm^2. While features of various illustrative implementations are described, in other implementations, the applicator **102** may be configured in any form suitable for the application of the product contained on the applicator surface **214** and/or manipulation of the product on the surface. For example, the applicator may be constructed in any other suitable shape and size and may have any suitable mass, surface finish, and/or surface treatment desired for a given application.

[0026] While the device **100** and applicator **102** shown in FIGS. **1-5** are comprised of a separate applicator **102** and housing **104**, in other implementations to decrease manufacturing costs, or for any other desired reason, the applicator **102** and some or all of the housing **104** may be formed integrally.

Illustrative Dispenser and Temperature Modulating Device

[0027] FIG. **3** represents an illustrative dispenser and temperature modulating device ("device") **300** with an applicator **302** and a housing **304**. In this implementation, the applicator **302** is of a generally convex, disk-shaped and is made of a material capable of holding and retaining a thermal charge. In one implementation, the applicator **302** can be made of stainless steel. However, in other implementations, any suitable material may be used that is capable of retaining and/or transferring heat or cold during the application of the product. Examples of other suitable materials are described above. The device **300** also includes a temperature modulating element **306** and an electrical source **310** disposed in the housing **304**. According to certain embodiments, the temperature modulating element **306** is disposed adjacent the applicator **302**.

[0028] In addition, in this implementation, the applicator **302** includes a generally cylindrical insert **315** extending through the applicator **302** and forming a product delivery passageway **316** for the product contained in a reservoir **318** in housing **304**. The insert **315** may be made of a thermoplastic polymer, for example, which is non-reactive with the product stored in the reservoir **318**. In other implementations, the insert **315** may be made of virtually any other material that is non-reactive or resistant to the product being dispensed, such as various metals, plastics, ceramics, composites, or the like. In other embodiments, instead of an insert **315** a through hole or bore may simply be formed through the applicator **306** and/or heat sink. In still other embodiments, a product dispensing path may extend through or around the applicator. Regardless of the specific configuration, the route the product follows from the reservoir **318** to the application face may be referred to generally as the product dispensing path.

[0029] The dispenser **300** also includes a cap **312** that encapsulates the applicator **302** when the device **300** is not in use and includes a plug **320** that seals the product dispensing path. The plug **320** may be made of a thermoplastic polymer similar to the insert **108** or any other material which is non-reactive or resistant to the product being dispensed, such as various metals, plastics, ceramics, composites, or the like. Additionally or alternatively, either the plug **320**, the insert **315**, or both may be elastomeric, such that when the cap is in place either the plug **320**, insert **315**, or both, may expand and/or deform somewhat to seal the product delivery passageway **316**.

[0030] The following is a discussion of examples, without limitation, of delivery mechanisms for dispensing a product. The first example may be implemented using a click or a reverse click operation, whereby the user may operate the dispenser by moving the applicator **302**, or other dispensing control feature, relative to the housing **304** in either a clockwise or counterclockwise direction or by depressing on actuator button (e.g. similar to a ball-point pen).

[0031] Another example delivery mechanism for dispensing the product may be a squeeze operation. In certain embodiments wherein the delivery mechanism is a squeeze operation, when pressure is applied to the housing **304** containing the reservoir **318**, the product in the reservoir **318** may be forced, by the squeezing action, through the insert **315** via a product delivery passageway **316** for application to the user's skin.

[0032] In yet another example, a delivery mechanism for dispensing the product may be by a pressurized dispenser, such as an aerosol dispenser. In certain embodiments wherein the delivery mechanism is an aerosol delivery mechanism, the composition will be held under pressure in a container and will be dispersed along with an aerosol propellant in response to actuation by a user. Actuation may be by depressing, rotating, tilting, or otherwise manipulating the applicator, pressing a button, and/or by any other suitable dispensing mechanism. Details of the construction and propellant of an aerosol dispenser are within the skill of one of ordinary skill in the art and will, therefore, not be described in detail herein.

[0033] In yet another example, a delivery mechanism for dispensing product may be an airless pump. The term airless pump refers to a pump that provides dispensing of a substance from a container under pressure in essentially a single direction without permitting reverse (intake) flow of air via the pump. That is, as product is pumped from the container, the pumped product is not replaced with a corresponding volume of air through the pump. In addition to preventing reverse intake flow of air, an airless pump typically does not allow intake of any other substances to replace the volume of product pumped out of the container. For example, an airless pump could include a one-way valve, such as a check valve.

[0034] FIG. **4** is a front side view of the temperature modulating device **300** in more detail. Again, the applicator **302** generally comprises an application face **414** which can adsorb or absorb a product thereon that has been dispensed through the insert **315**. The applicator **302** can then be placed in contact with a surface, such as, for example, a user's skin to transfer the product and/or manipulate the product and heat or cold to the surface. According to other embodiments, the product can be dispensed directly to a surface (e.g. a user's skin) via the product dispensing path. The applicator **302** can then be place in contact with the surface for manipulating the product and transferring heat or cold.

[0035] In this implementation the applicator **302** is shown as being a generally convex, disk-shaped body. In some implementations, the application face **414** and/or the entire applicator **302** may have a particular surface finish. The surface finish corresponds to the measurements of the small scale variations in the height of the physical surface. Such surface finishes may be accomplished by polishing and/or buffing inside the fabrication mold, while other surface finishes may be achieved using one or more secondary operations on the application face **414** or applicator **302** itself, such as buffing, polishing, or chroming, for example. Again, the applicator **302** may be configured in any form suitable for the application of the product dispensed and/or contained on the applicator face **414**. For example, the applicator may be constructed in any other suitable shape and size and may have any suitable mass, surface finish, and/or surface treatment desired for a given application.

Illustrative Attachable/Temperature Modulating and/or Dispensing Device

[0036] FIG. **5** shows another embodiment in which the device **500** also includes an attachment component **520**, which can be used to attach the device **500** to a bottle or other product container **524**. According to certain embodiments, the attachment component **520** extends through an opening in a bottle or product container **524** which bottle or container may be disposable. The attachment component **520** may be secured to the bottle or product container via, for example, a press-fit or friction-fit, snap-fit, adhesive, threading, clamping, and/or engagement by one or more engagement features. According to an embodiment, the attachment component **520** is retained in the bottle or product container **524** by a series of barbs **526**.

[0037] In addition, in this implementation, the device **500** includes a generally cylindrical insert **515** extending through the applicator **502** and forming a product delivery passageway **516** for the product in product container **524**. The insert **515** may be made of a thermoplastic polymer, for example, which is non-reactive with the product stored in the product container **524**. In other implementations, the insert **515** may be made of virtually any other material that is non-reactive or resistant to the product being dispensed, such as various metals, plastics, ceramics, composites, or the like.

Temperature Modulating Element

[0038] FIG. **6** shows an embodiment of a temperature modulating element. According to this embodiment, the temperature modulating element employs Peltier thermoelectric device. The Peltier thermoelectric device comprises a solid-state active heat pump which transfers heat from one side of the device to the other, with consumption of electrical energy, depending on the direction of the current. Such an instrument is also called a Peltier device, Peltier heat pump, solid state refrigerator, or thermoelectric cooler (TEC). The Peltier thermoelectric device can be used either for heating or for cooling (refrigeration) depending on the flow of electricity; although in practice the main application is cooling.

[0039] According to an embodiment, the temperature modulating assembly **600** which comprises a temperature modulating element **604** (which in this embodiment is a Peltier device but in other embodiments could be a refrigerant, etc.) that absorbs heat and a heat sink **606** which gives off or emits heat. According to certain embodiments, the temperature modulating assembly **600** also includes an applicator **602** that is adhered to or abuts the temperature modulating element **604**. While in the embodiment showed in FIG. **6**, the temperature modulating assembly **600** is configured to draw heat away from the applicator **602** thereby providing a cooling effect, the flow of electricity to the temperature modulating element **604** can be reversed to thereby provide heat to the applicator **602**, thus providing a heating effect.

[0040] As mentioned above, examples of other technologies suitable for use as a temperature modulating assembly **600** include, but are not limited to, resistive elements, refrigerants, or fluid coolants.

CONCLUSION

[0041] Although the invention has been described in language specific to structural features and/or methodological acts, it is to be understood that the invention is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as illustrative forms of implementing the invention.

What is claimed is:

1. A cosmetic temperature modulating device comprising:
- a housing,
- an applicator coupled to the housing, the applicator having an application face for applying a cosmetic or medicinal product to a surface, manipulating the product when on the surface or both,
- a temperature modulating element disposed in the housing adjacent the applicator, and
- wherein the temperature modulating element is powered via an electrical source.

2. The device of claim **1**, wherein the temperature modulating element heats or cools the applicator.

3. The device according to claim **2**, wherein the temperature modulating element comprises a resistive element, a Peltier thermoelectric device, a refrigerant, or a fluid based coolant.

4. The device of claim **1**, wherein the electrical source comprises a battery or an alternating current (AC) adapter to be plugged into a wall socket.

5. The device of claim **1**, further comprising a vibration element for vibrating the applicator.

6. The device of claim **1**, further comprising:
- a housing;
- a reservoir for containing a product disposed in said housing, and
- an insert disposed in the applicator, the insert defining a product delivery passageway in communication with the reservoir, the product delivery passageway extending through or around the applicator.

7. The device of claim **6**, further comprising a product delivery mechanism to dispense product from the dispenser, the product delivery mechanism comprising:
- a reverse click motion delivery mechanism;
- a click motion delivery mechanism;
- a squeeze tube delivery mechanism;
- an airless pump delivery mechanism; or an aerosol delivery mechanism.

8. The device of claim **1**, wherein the applicator comprises a material capable of retaining heat or cold during application of the product.

9. The device of claim **1**, wherein the applicator comprises a metal, a glass, a stone, a ceramic, a high-density plastic, a wood, or a composite thereof

10. The device of claim **1**, wherein the applicator comprises a generally convex, disk-shaped body.

11. A dispenser comprising:
- a housing having a reservoir for containing a product;
- an applicator coupled to the housing, the applicator having and an application face for applying a product to a surface, manipulating the product when on the surface, or both, and a product dispensing path, for dispensing the product onto the surface, the applicator face, or both, extending through or around the applicator; and
- a temperature modulating element disposed in the housing and adjacent the applicator, wherein said temperature modulating element is controlled via an electrical source.

12. The dispenser of claim **11**, wherein the applicator comprises a material capable of retaining heat or cold during application of the product.

13. The dispenser according to claim **12**, wherein the temperature modulating element comprises a resistive element, a Peltier thermoelectric cooler, a refrigerant, or a fluid based coolant.

14. The dispenser of claim **11**, wherein the electrical source comprises a battery or an alternating current (AC) adapter to be plugged into a wall socket.

15. The device of claim **11**, wherein the temperature modulating element heats or cools the applicator.

16. The dispenser of claim **11**, wherein the applicator is fixed to the housing against movement relative to the housing.

17. The dispenser of claim **11**, wherein the applicator comprises a generally convex, disk-shaped body.

18. The dispenser of claim **11**, wherein the applicator comprises a generally curvilinear shape, a generally cylindrical shape, or a generally planar shape.

19. A dispenser comprising:

a housing having an attachment component for attaching the housing to a container;

an applicator being fixedly mounted to the housing and having a generally disk-shape and comprising:

an application face for applying a product to a surface, manipulating the product when on the surface, or both, and

a delivery passageway configured to convey a product from the container to the application face, onto a surface, or both; and

a temperature modulating element disposed in the housing and adjacent the applicator, wherein said temperature modulating element is controlled via an electrical source.

20. The dispenser of claim **19**, further comprising the container holding the product removably attached to the housing via the attachment component.

21. The device of claim **19**, further comprising a vibration element for vibrating the applicator.

22. The dispenser of claim **19**, wherein the applicator comprises a metal, a glass, a stone, a ceramic, a high-density plastic, a wood, or a composite thereof.

23. The dispenser of claim **19**, wherein the product is a cosmetic product, a medicinal product or both.

24. A cosmetic temperature modulating device comprising:

a housing designed for applying a cosmetic or medicinal product to a surface or for manipulating the product when on the surface, or both; and

a temperature modulating element disposed in the housing, wherein the temperature modulating element is powered via an electrical source.

* * * * *