(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 223 176 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.08.2023 Bulletin 2023/32

(21) Application number: **23166881.5**

(22) Date of filing: **26.02.2021**

(51) International Patent Classification (IPC):
A45D 19/00 *(2006.01)* ***A45D 19/02*** *(2006.01)*
A45D 19/16 *(2006.01)* ***A45D 24/22*** *(2006.01)*
A45D 24/30 *(2006.01)* ***A45D 24/32*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A45D 19/00; A45D 19/005; A45D 19/02; A45D 19/16; A45D 24/22; A45D 24/30; A45D 24/32; B05B 5/043; B05B 14/00;
A45D 2200/20; B05B 5/1691; B05B 7/0012

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **28.02.2020 US 202016805582**
28.02.2020 US 202016805586
02.04.2020 FR 2003317
06.04.2020 FR 2003401

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
21712929.5 / 4 110 132

(71) Applicant: **L'OREAL**
75008 Paris (FR)

(72) Inventors:
- **SINCLAIR, Nicholas**
  Clark, 07066 (US)
- **BESEN, Richard**
  Clark, 07066 (US)
- **AKERELE, Dominic**
  Clark, 07066 (US)
- **ORSITA, Fred**
  Clark, 07066 (US)
- **CHALLES, Jacques**
  93400 Saint-Ouen (FR)
- **BALOOCH, Guive**
  Clark, 07066 (US)
- **VALDERRAMA, Vincent**
  New York, 10001 (US)
- **APPELBAUM, Alaina**
  New York, 10001 (US)

(74) Representative: **Casalonga**
Casalonga & Partners
Bayerstraße 71/73
80335 München (DE)

Remarks:
This application was filed on 05.04.2023 as a divisional application to the application mentioned under INID code 62.

(54) **SHAMPOO APPLICATOR AND REMOVER FOR CLEANSING HAIR TO NEAR DRY CONDITIONS**

(57) A device for application of hair formulation includes a body structure having one or more tines at a front end, wherein a tip of a tine includes an electrode. The device further includes an electrostatic charger electrically connected to the electrode to create an electrostatic charge on the hair or scalp or both. The electrostatic charge can attract specific hair formulations.

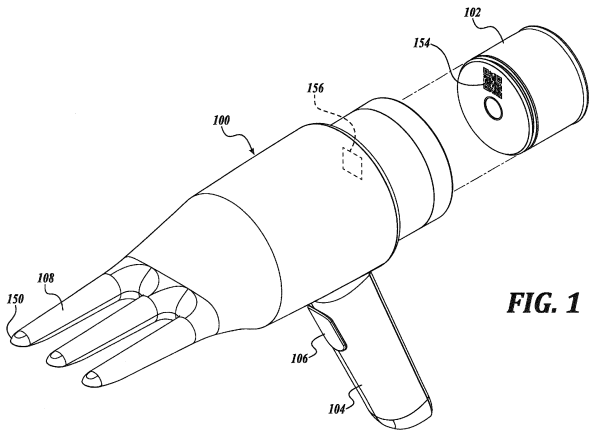

FIG. 1

EP 4 223 176 A1

Description

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Patent Application No. 16/805,586, filed February 28, 2020, U.S. Patent Application No. 16/805,582 filed February 28, 2020, French Patent Application No. FR2003401, filed April 6, 2020, and French Patent Application No. FR2003317, filed April 2, 2020; the contents of which are hereby incorporated by reference in their entirety.

SUMMARY

[0002] In an embodiment, a device for application of a hair formulation comprises, a body structure having one or more tines at a front end, wherein a tip of a tine includes a first and second opening; a nebulizer with an outlet connected to the first opening; a vacuum system with an inlet connected to the second opening; and a handle extending from the body structure at an obtuse angle with respect to the front end of the body structure.

[0003] In an embodiment, the device further comprises a cartridge containing a hair formulation, wherein the cartridge fits at a back end of the body structure, wherein the cartridge is connected to the nebulizer.

[0004] In an embodiment, the device further comprises a momentary switch that operates the nebulizer, wherein the momentary switch is located on an upper front side of the handle.

[0005] In an embodiment, the device further comprises a selector switch that operates the vacuum system, wherein the selector switch is located on a back side of the handle.

[0006] In an embodiment, the tip of a tine includes a chamfer on the bottom side, wherein the first and second openings are placed on the chamfer.

[0007] In an embodiment, all tines are arranged to lie in one plane.

[0008] In an embodiment, the plane is a horizontal plane with respect to top and bottom sides of the device.

[0009] In an embodiment, the tine has a conical shape that decreases in diameter with forward length.

[0010] In an embodiment, the device further comprises more than one tine, wherein adjacent tines are separated by a lengthwise space between the tines that is approximately the same as the average width of a tine or greater.

[0011] In an embodiment, the tip of the tine is a truncated round shape with a flat chamfer at the bottom side.

[0012] In an embodiment, a method of making a device for cleansing hair comprises, assembling a device to have a body structure having one or more tines at a front end, wherein a tip of a tine includes a first and second opening; a nebulizer with an outlet connected to the first opening; a vacuum system with an inlet connected to the second opening; and a handle extending from the body structure at an obtuse angle with respect to the front end of the body structure.

[0013] In an embodiment, the method further comprises placing a cartridge containing a hair formulation at a back end of the body structure.

[0014] In an embodiment, the method further comprises placing the first and second openings on a chamfer on the bottom side of the tip of a tine.

[0015] In an embodiment, the method further comprises placing more than one tine in a horizontal plane at the front end of the body structure.

[0016] In an embodiment, a method for cleansing hair comprises, with a device, applying a hair formulation to hair or scalp or both; with the device, agitating the hair formulation; and with the device, vacuuming used hair formulation to remove any debris or oils from the hair or scalp.

[0017] In an embodiment, the method further comprises before applying the hair formulation, starting a vacuum system on the device.

[0018] In an embodiment, no external water is mixed with the hair formulation after applying.

[0019] In an embodiment, the applying step further comprises generating a mist from the hair formulation.

[0020] In an embodiment, the agitating step further comprises contacting the hair or scalp with more than one tine provided on the device.

[0021] In an embodiment, the method further comprises before the applying step, placing a cartridge at a back end of the device, wherein the cartridge contains the hair formulation.

[0022] In an embodiment, the device includes, a body structure having one or more tines at a front end, wherein a tip of a tine includes a first and second opening; a nebulizer with an outlet connected to the first opening; a vacuum system with an inlet connected to the second opening; and a handle extending from the body structure at an obtuse angle with respect to the front end of the body structure.

[0023] In an embodiment, a device for application of a hair formulation comprises, a body structure having one or more tines at a front end, wherein a tip of a tine includes an electrode; an electrostatic charger electrically connected to the electrode; and a handle extending from the body structure at an obtuse angle with respect to the front end of the body structure.

[0024] In an embodiment, the device further comprises a cartridge containing a hair formulation, wherein the cartridge fits at a back end of the body structure.

[0025] In an embodiment, the cartridge comprises a product identification tag, and the device includes a product identification tag reader.

[0026] In an embodiment, the product identification tag includes instructions for the electrostatic charger.

[0027] In an embodiment, the instructions include instructions for turning on the electrostatic charger.

[0028] In an embodiment, the instructions include instructions for setting a voltage output by the electrostatic charger.

[0029] In an embodiment, the hair formulation includes

cationic, anionic, zwitterionic polymers or surfactants.

[0030] In an embodiment, all tines are arranged to lie in one plane.

[0031] In an embodiment, the plane is a horizontal plane with respect to top and bottom sides of the device

[0032] In an embodiment, the tine has a conical shape that decreases in diameter with forward length.

[0033] In an embodiment, the device further comprises more than one tine, wherein adjacent tines are separated by a lengthwise space between the tines that is approximately the same as the average width of a tine or greater.

[0034] In an embodiment, a method of making a device for cleansing hair comprises, assembling a device to have a body structure having one or more tines at a front end, wherein a tip of a tine includes an electrode; an electrostatic charger electrically connected to the electrode; and a handle extending from the body structure at an obtuse angle with respect to the front end of the body structure.

[0035] In an embodiment, the method further comprises placing a cartridge containing a hair formulation at a back end of the body structure, wherein the cartridge includes a machine readable product identification tag.

[0036] In an embodiment, the device includes a product identification tag reader.

[0037] In an embodiment, the machine readable product identification tag includes instructions that control the electrostatic charger.

[0038] In an embodiment, the instructions control the electrostatic charger to turn on or to set a voltage.

[0039] In an embodiment, a method for cleansing hair comprises, with a device, applying a hair formulation to hair or scalp or both; with the device, agitating the hair formulation; and with the device, creating an electrostatic charge on the hair or scalp or both.

[0040] In an embodiment, no external water is mixed with the hair formulation after applying.

[0041] In an embodiment, the hair formulation includes cationic, anionic, zwitterionic polymers or surfactants.

[0042] In an embodiment, the agitating step further comprises contacting the hair or scalp with more than one tine provided on the device.

[0043] In an embodiment, the method further comprises before the applying step, placing a cartridge at a back end of the device, wherein the cartridge contains the hair formulation.

[0044] This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This summary is not intended to identify key features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

DESCRIPTION OF THE DRAWINGS

[0045] The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same become better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a diagrammatical illustration of a device in accordance with one embodiment of the present disclosure;

FIGURE 2 is a diagrammatical illustration of the device of FIGURE 1;

FIGURE 3 is a diagrammatical illustration of a side view of the device of FIGURE 1;

FIGURE 4 is a diagrammatical illustration of a back view of the device of FIGURE 1;

FIGURE 5 is a diagrammatical illustration of a bottom view of the device of FIGURE 1;

FIGURE 6 is a schematic illustration of components of the device of FIGURE 1;

FIGURE 7 is a flow diagram of a method in accordance with one embodiment; and

FIGURE 8 is a flow diagram of a method in accordance with one embodiment.

DETAILED DESCRIPTION

[0046] Typically, most persons will use shampoo while taking a shower because it is easier to use water to lather up and then rinse the shampoo out of the hair. Such shampoo is best for cleansing but since persons prefer to shower every day, daily use of shampoo can be damaging to hair. Dry shampoo offers an alternative to washing hair while showering in order to refresh the hair between showers but does not provide as effective cleansing compared to the shampoo used in the shower.

[0047] This disclosure relates to a device for cleansing hair while out of the shower that can be used with hair cleansing formulations. In one embodiment, the device provides cleansing on par with shampoo used in the shower, and convenience on par with dry shampoo so as not to have to step into the shower in order just to wash hair. In one embodiment, the device uses a brush- or comb-like architecture that relies on a combination of mechanical and chemical action to deposit desired formulations for cleansing, removing the formulations with unwanted particulates, and further provides additional cosmetic or health attributes. The comb-like action provides a familiar gesture easy to incorporate into current beauty and haircare routines. Further, the device includes an electrostatic charger to charge the scalp or hair with positive or negative charges that will attract hair formulations to the charged areas.

[0048] In one embodiment, the device removes more than "macro" particulates like dandruff. The device provides a cleansing formulation along with agitation to dissolve and absorb oils, sebum, and other odor trapping items to leave the hair with signifiers of being clean/refreshed. The device creates a mist for formulation dispersal, includes tines for mechanical agitation, and vacuum removal to accomplish the goal of cleansing.

[0049] Because the device can clean hair on par with shampoo used in the shower, the hair is easy to style afterwards, resulting in longer term healthier hair.

[0050] Referring to FIGURE 1, a device 100 for shampoo application and removal is illustrated. The device 100 is an electrically powered device including a nebulizing component for misting, spraying or atomizing a shampoo formulation, and a vacuum component for removing the used shampoo formulation and any debris or oils washed out with the shampoo formulation, and an electrostatic charger for electrostatically charging an area of the scalp or hair to attract charged shampoo formulations. In one embodiment, the shampoo formulation is a liquid shampoo formulation.

[0051] In one embodiment, the device 100 exterior shape includes one or more geometric forms, including regular or irregular forms, having cross-sections of substantially any geometric shape including circular, elliptical, conical, triangular, square, rectangular polygonal, regular or irregular shapes, or the like, as well as other symmetrical and asymmetrical shapes, or combinations thereof.

[0052] In one embodiment, the device 100 is shaped in the style of well-recognized familiar hair appliances to inspire trust and confidence in the device leading to intuitive use and gestures when using.

[0053] In one embodiment, the device 100 exterior housing can be constructed out of a variety of materials including, for example, metals and plastics, or combinations thereof.

[0054] Referring to FIGURE 3, in one embodiment, the device 100 includes a handle 104 connected to the device 100 at the substantially cylindrical section 138. The handle 104 is connected to the device 100 at an obtuse angle with respect to the front end of the device 100. Stated differently, the center longitudinal axis of the handle 104 intersects, at an obtuse angle, the horizontal plane on which all of the tines 108 lie. The handle 104 helps balance the device weight for more comfortable use.

[0055] Still referring to FIGURE 3, at the back side, the device 100 can include a smaller diameter cylindrical shaped rear housing 136 that accepts a removable cartridge 102 containing a shampoo formulation. The cartridge 102 can be configured to be a re-fillable cartridge or a disposable cartridge. In one embodiment, the device 100 can be configured to hold more than one cartridges.

[0056] Moving forward from the rear housing, 136, the device 100 exterior shape increases step-wise to a larger outer diameter cylindrical portion 138 compared to the rear housing 136 diameter. In one embodiment, the device 100 includes a body structure that has a substantially cylindrical or minimally tapered conical portion 138 from the back end to about the middle of the device length. In one embodiment, the handle 104 connects to the back side of portion 138. Then, proximally from the cylindrical or minimally conical portion 138, the device 100 takes on a more pronounced conical or decreasing elliptical shape 140, in the top to bottom plane (i.e., viewed from left or right side), from about the middle of the device 100 to about a third or fourth of the device length. However, in the side to side plane (i.e., viewed from top or bottom) the device 100 does not taper as much, so that the device 100 can accomodate three tines in the side to side plane, where the device 100 has to accommodate the height of a single tine in the top to bottom plane. Then, distally from the smaller end of the conical or elliptical shape 140, the device 100 has a transition portion 142 that forms one or more dispensing tines 108 at the front end, so that each tine 108 is separate from the other tines. In one embodiment, the tine 108 length is about one-third to about one-fourth of the device 100 length.

[0057] Referring to FIGURES 2 and 5, each tine 108 has a gradually decreasing conical shape from the initial connection at the transition portion 142 section to the end of the tine 108 in both the side to side plane and the top to bottom plane. For example, the tine 108 decreases in diameter with the forward length. While the tines 108 emanate from the same device 100 section, each tine 108 is separated from its adjacent tines, such that the space between tines 108 lengthwise is approximately the same as the average width (average diameter) of a tine or greater. Because the tines 108 decrease in diameter progressively to the tip, the space between tines conversely increases from the attachment of the tines 108 to the tip of the tines 108. In one embodiment, the device includes three tines 108 lying on the same plane, meaning that the lengthwise centerline of each tine passes the same plane. The plane on which the tines 108 lie may be viewed as the horizontal plane of the device 100, meaning that the tines 108 are centered with respect to the top and bottom of the device 100, not considering the handle 104 (FIGURE 4).

[0058] In FIGURE 5, the tines 108 are shown having a rounded tip when viewed from the bottom (or top) plane. However, in FIGURE 3, the tines 108 are shown to have a flat area or chamfer at the bottom of the tine 108 at the front end when viewed from the side plane, resulting in a truncated rounded shape. The rounded tips of the tines 108 can part the hair for better access to the scalp and hair roots. The rounded tips of the tines include "agitation bumps" and the chamfered angle for cleansing.

[0059] In FIGURE 5, the chamfered section of the tines 108 has openings 130 for dispensing the shampoo formulation. In one embodiment, the shampoo formulation can be atomized and dispensed as a mist. Additionally, the chamfered section of tines 108 has openings 132 that lead to a vacuum system for collecting the used shampoo formulation with any debris or oils removed from the hair. The vacuum openings 132 are separate from the dispensing openings 130.

[0060] In the illustrated embodiment, each tine 108 is shown having openings 130 for dispensing and openings 132 for vacuum removal. However, in one embodiment, there can be dedicated tines that only have openings for dispensing shampoo formulation and dedicated tines that only have openings for vacuum removal. In one em-

bodiment, the device 100 is provided with three tines 108 for even cleansing coverage. The angle of the handle 104 and the tine 108 length allows users to reach all areas of the scalp for cleansing.

[0061] In one embodiment, an electrode 150 is placed at the tip of the tines 108. The electrode 150 is electrically connected to an electrostatic charger. The purpose of the electrode 150 is to charge a portion of the scalp or hair or both by induction or contact. In one embodiment, the electrode 150 can also electrostatically charge the hair formulation droplets as they are dispensed from the openings 130. The charged hair formulation will then become attracted or repelled, according to the particular charges produced, to the target areas of the scalp or the hair. In one embodiment, the electrode 150 may be surrounded by electrically insulating material.

[0062] Referring to FIGURE 6, the device 100 is represented schematically to illustrate the main components. In one embodiment, the device 100 includes a nebulizer 112.

[0063] In one embodiment, the nebulizer 112 produces a mist on demand by depressing the mist switch 106 (FIGURES 1 and 2). In one embodiment, the mist switch 106 is placed on the front side of upper part of the handle 104 to allow operation with the index finger. In one embodiment, the mist switch 106 is a momentary switch with the default position being the off position. Depressing the mist switch 106 starts the nebulizer 112 and produces mist. The nebulizer 112 is supplied shampoo formulation from the cartridge 102. Releasing the mist switch 106 stops the nebulizer and the dispensing of shampoo formulation. In one embodiment, the mist switch is a multi-positional, multi-functional, selector switch that requires positively selecting the off position to stop the nebulizer. In one embodiment, the mist switch is a multiple position selector switch that has settings for off and more than one setting for mist production, such as light or heavy mist. In one embodiment, a mist selector switch can include settings for mist and no-mist dispensing.

[0064] In one embodiment, the nebulizer 112 includes a compressor, pump, or ultrasonic wave generator to generate the mist from the shampoo formulation. In the case of a pump or compressor nebulizer 112, such nebulizer 112 causes air or the shampoo formulation to flow at a high velocity which propels the shampoo formulation through a fine nozzle designed for misting at the opening 130. In one embodiment, a hand operated pump mechanism is used to propel the shampoo formulation through the atomizing nozzle at the opening 130. In the case of a pump or compressor nebulizer, a single nebulizer 112 can be placed in the body structure of the device 100. Then, the outlet of a compressor or pump nebulizer 112 is routed through a system of conduits to each of the tines 108 and exits from the nozzle at the openings 130.

[0065] An ultrasonic wave nebulizer 112 has an ultrasonic wave generator in contact with the shampoo formulation where the frequency of the ultrasonic waves is sufficient to produce the mist. An ultrasonic wave nebulizer also includes a "mesh" nebulizer that has a vibrating mesh just touching the surface of the shampoo formulation to create the mist. Either form of ultrasonic wave nebulizer can use a piezoelectric element. In the case of an ultrasonic wave nebulizer or mesh nebulizer, the nebulizer 112 including a piezoelectric element or a piezoelectric element and mesh combination, in essence, the device 100 will have three nebulizers, one for each tine 108. In the case of case of an ultrasonic wave nebulizer or mesh nebulizer, the shampoo formulation may be routed to the tip of the tines 108 there to make contact with the piezoelectric element or the piezoelectric element and mesh combination, from which the mist is then expelled through openings 130.

[0066] In one embodiment, the device 100 includes a vacuum system having a vacuum generating motor 114 and collector 116. The vacuum motor 114 includes the impeller vanes that cause a stream of air to enter through the vacuum inlet openings 132 at the tines 108. The stream of air can carry the used shampoo formulation along with any debris and oils washed out of the hair by the shampoo formulation, which then gets captured by the collector 116, and the air is expelled out of the device 100. In one embodiment, the collector 116 includes an annular vent 134 placed at the back of the device 100 and encircling the cartridge 102 (FIGURE 4). The vent 134 allows the stream of air to exit the device 100, while the used shampoo and debris become trapped in the collector 116. In one embodiment, the collector 116 is removable from the device 100 and is dishwasher safe so as to allow cleaning in a dishwasher. In one embodiment, the surface of the collector 116, which contacts the used formulation shampoo, is coated with a hydrophobic or hydrophilic material to facilitate cleaning of the collector.

[0067] In one embodiment, the vacuum motor 114 is operated by the multi-positional, multi-functional, selector switch 110 (FIGURE 4). A selector switch 110 can be a slide switch or a dial switch with more than two positions, or a push button switch with more than two positions, for example. In one embodiment, a vacuum selector switch 110 includes settings for off and more than one vacuum speed setting, such as high and low. In one embodiment, the vacuum switch 110 is placed on the back side of lower part of the handle 104 to allow operation with the thumb, for example. The vacuum switch 110 can be isolated for uninterrupted vacuum. Light-emitting diodes 144 can be used to light up the selected position. The selector switch 110 remains in the selected position until moved to another position. In one embodiment, a momentary switch can replace the selector switch, wherein the default position of the momentary switch is the off position, and the momentary switch has to be depressed to start the vacuum motor. In one embodiment, the device 100 includes both a vacuum selector switch and momentary switch, wherein the momentary switch is used to operate the vacuum motor when depressed, and at the speed setting on the selector switch.

[0068] In one embodiment, the device 100 includes an electrostatic charger 152. An electrostatic charger can produce a positive or negative charge at a targeted area of the scalp or hair or both. The electrostatic charger 152 is connected via an electrical conductor to an electrode 150 on the end of one or more tines 108. Suitable electrodes 150 are electrically conductive and may include, for example, copper, nickel, stainless steel, aluminum, or any alloys thereof. Electrodes 150 may be insulated from surrounding areas by an electrically insulating material, such as plastics, elastomers, and the like.

[0069] As the device 100 is operated, the electrostatic charger 152 can produce a positive or a negative charge on the scalp or hair or both to attract or repel formulations to the charged areas. In one example, positively charged areas are created by repelling electrons from the areas, and in another example, negatively charged areas are created by attracting electrons to the areas. Electrostatic charging may be conducted by contact electrocharging, induction electrocharging, and the like. In one example, the electrode 150 is connected to a high voltage source to induce the electrostatic positive or negative charges.

[0070] In another example, hair formulations are charged while passing by the charging electrode 150. Negatively charged hair formulation droplets are attracted towards the target which can be at a lower potential.

[0071] The device 100 includes a power supply 118. In one embodiment, the device 100 is powered through common household alternating current that relies on an electrical cord (not shown) to supply power to the device 100. In one embodiment, the device 100 is powered through direct current, such as a rechargeable battery that can be charged by plugging into a household alternating current outlet. A direct current powered device 100 allows the device to be used without staying or standing in proximity to an electrical outlet.

[0072] Cartridges 102 are supplied filled with a shampoo formulation. Cartridges 102 can be removable from the device 100 either to be re-filled or for disposal and replacement with a new full cartridge. As seen in FIGURE 1, the cartridge 102 is inserted through the back side of the device 100. The cartridge 102 is connected to the nebulizer 112 to supply the hair formulation to the nebulizer 112 through any suitable conduit to feed the nebulizer 112 with shampoo formulation when the nebulizer 112 is operated. Advantageously, the hair formulation does not need to be mixed with external water as compared to a shampoo used in the shower.

[0073] In one embodiment, the cartridge 102 has a product identification tag 154 (FIGURE 1) that can convey instructions for operation of the device 100 based on the specific formulation contained in the cartridge 102. The device 100 may include a product identification tag reader 156 (FIGURE 1) capable of reading the product identification tag 154 and processing the encoded signals into instructions for operation and control of the device based on the particular formulation. Product dentification tags, include for example, bar codes, 2-D bar codes, RFID, and the like. The product identification tag is encoded with a machine readable signals that convey the device settings for the particular formulation. Different formulations may have different device settings. For example, the product identification tags can include the vacuum setting, such as from strong, medium, and soft, and the nebulizer setting from fine, medium, or coarse droplets. In one embodiment, the product identification tag identifies the formulation in the cartridge 102 as a containing charged particles, which controls the device 100 to turn on the electrostatic charger 152, and the product identification tag further determines the electrostatic setting, such as the particular voltage and the polarity, such as negative or positive. In this manner, the device 100 is optimized for the particular formulation, and the user is not guessing and avoids trial and error.

[0074] In one embodiment, hair formulations the include cationic, anionic, or zwitterionic polymers and surfactants can be used to provide a charge to formulations that can interact with hair or scalp. In one embodiment, hair formulations can be charged with other materials, such as, chelating agents that can also function to complex molecules that impede charged interactions between charged materials and their interactions with the hair fiber to allow for more efficient charged interactions to occur.

[0075] Given that hair holds a charge (typically negative at neutral pH), this charge can be influenced by the presence of charged materials (such as the ones mentioned above) in formulation as they are applied to hair allowing for better and more efficient attraction/deposit or repulsion and aided removal.

[0076] Shampoo formulations can include, but are not limited to, formulations which include any one or more absorbents in a carrier. Carriers include alcohols or water. Absorbents can include cornstarch or clays, such as kaolinite, montmorillonite, smectite. A surfactant, such as fatty acid anionic surfactants, can be included to prevent lumping. If provided as a foam or aerosol, the shampoo formulation can include a gas propellant.

[0077] Referring to FIGURE 7, one embodiment of cleansing hair with the device 100 is illustrated. In block 120, the vacuum system 114 is turned on by a user. At this point, the user can be moving the device 100 to the area of scalp desired to be cleansed in preparation for dispensing the shampoo formulation. In one embodiment, the same electrostatic charger 152 is turned on by the same switch that turns on the vacuum motor. In one embodiment, the electrostatic charger 152 has a dedicated on and off switch and a selector knob for positive or negative and voltage.

[0078] From block 120, the method enters block 122. In block 122, the nebulizer 112 is turned on while the vacuum system 114 is operating. Before turning the nebulizer 112 on, the user has moved the device 100 so that the tines 108 are at the desired location on the scalp for cleansing. The electrostatic charger 152 creates electrostatic charges on the scalp or hair that can attract the

hair formulation. The user can now depress the mist momentary switch 106 for a brief time period and then release the switch. From block 122, the method enters block 124.

[0079] In block 124, after the user presses and releases the mist switch 106 to dispense the shampoo formulation the user can agitate the scalp and hair roots with the tips of the tines 108 while the electrostatic charger and vacuum are operating. The electrostatic charger charges the areas of the scalp or hair or the hair formulations to create mutual attraction, while the vacuum is operating. The vacuum removes the used shampoo formulation with any collected debris, such as dead hair or skin cells, and any oils or previously applied hair formulations. From block 126, the method enters block 128.

[0080] In block 128, the user moves the tines to a new area on the scalp desired to be cleaned and repeats the misting, agitation, electrostatic charging, and vacuuming operations. When the entire scalp is cleansed, the user can stop the electrostatic charger and vacuum in block 128.

[0081] Referring to FIGURE 8, one embodiment of cleansing hair with the device 100 is illustrated. In block 220, the vacuum system 114 is turned on by a user. At this point, the user can be moving the device 100 to the area of scalp desired to be cleansed in preparation for dispensing the shampoo formulation.

[0082] From block 220, the method enters block 222. In block 222, the nebulizer 112 is turned on while the vacuum system 114 is operating. Before turning the nebulizer 112 on, the user has moved the device 100 so that the tines 108 are at the desired location on the scalp for cleansing. The user can now depress the mist momentary switch 106 for a brief time period and then release the switch. From block 222, the method enters block 224.

[0083] In block 224, after the user presses and releases the mist switch 106 to dispense the shampoo formulation the user can agitate the scalp and hair roots with the tips of the tines 108 while the vacuum is operating. The vacuum removes the used shampoo formulation with any collected debris, such as dead hair or skin cells, and any oils or previously applied hair formulations. From block 226, the method enters block 228.

[0084] In block 228, the user moves the tines to a new area on the scalp desired to be cleaned and repeats that misting, agitation and vacuuming operations. When the entire scalp is cleansed, the user can stop the vacuum in block 228.

[0085] In either method of FIGURE 7 or 8, the device 100 allows a mechanical actions, including vacuum, "squeegee", and wiping actions that are combined with chemical action, such as surfactants and molecules capable of capturing and removing oil from hair, for cleansing the hair.

[0086] Use of the device 100 minimally impacts the hair style, the overall shape of the device is familiar to other hair appliances, such as a hair dryer, leading to simple intuitive use of the device 100. Further, the device 100 does not require hand contact with hair formulations. The device 100 allows persons to cleanse hair only when needed, to maintain the hair style longer and limit the damage to hair, as opposed to washing hair at every shower. Representative embodiments include, but are not limited to the following.

[0087] A device 100 for application of a hair formulation comprises a body structure having one or more tines 108 at a front end, wherein a tip of a tine includes a first 130 and second opening 132; a nebulizer 112 with an outlet connected to the first opening 130; a vacuum system 114 with an inlet connected to the second opening 132; and a handle 104 extending from the body structure at an obtuse angle with respect to the front end of the body structure.

[0088] The device 100 can comprise a cartridge 102 containing a hair formulation, wherein the cartridge fits at a back end of the body structure, wherein the cartridge is connected to the nebulizer.

[0089] The device 100 can comprise three tines 108 arranged on a horizontal plane, and the tips of the tines include a chamfered section on a bottom side.

[0090] A first method for cleansing hair comprises with anyone of the embodiments of the device 100, applying a hair formulation to hair or scalp or both 222; with the device, agitating the hair formulation 224; and with the device, vacuuming used hair formulation to remove any debris or oils from the hair or scalp 224.

[0091] The first method can comprise, before applying the hair formulation, starting the vacuum system on the device 220.

[0092] In first method no external water is mixed with the hair formulation after applying.

[0093] The applying step 222 can comprise generating a mist from the hair formulation 222.

[0094] The device 100 for application of a hair formulation can comprise a body structure having one or more tines 108 at a front end, wherein a tip of a tine includes an electrode 150; an electrostatic charger 152 electrically connected to the electrode; and a handle 104 extending from the body structure at an obtuse angle with respect to the front end of the body structure.

[0095] The device 100 can comprise a nebulizer 112 to apply the hair formulation.

[0096] The device 100 can comprise a cartridge 102 containing a hair formulation, wherein the cartridge fits at a back end of the body structure.

[0097] The cartridge 102 can comprise a product identification tag 154, and the device includes a product identification tag reader 156.

[0098] The product identification tag 154 can include instructions for the electrostatic charger.

[0099] A second method for cleansing hair can comprise, with the device 100, applying a hair formulation to hair or scalp or both 122; with the device, agitating the hair formulation 124; and with the device, creating an electrostatic charge on the hair or scalp or both 124.

[0100] In the second method no external water is mixed

with the hair formulation after applying.

[0101] While illustrative embodiments have been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention.

Claims

1. A device (100) for application of a hair formulation, comprising:

   a body structure having one or more tines (108) at a front end, wherein a tip of a tine (108) includes an electrode (150);
   an electrostatic charger (152) electrically connected to the electrode (150); and
   a handle (104) extending from the body structure at an obtuse angle with respect to the front end of the body structure.

2. The device (100) of Claim 1, comprising a nebulizer (112) to apply the hair formulation.

3. The device (100) of Claim 1 or 2, comprising a cartridge (102) containing a hair formulation, wherein the cartridge (102) fits at a back end of the body structure.

4. The device (100) of Claim 3, wherein the cartridge (102) comprises a product identification tag (154), and the device includes a product identification tag reader (156).

5. The device (100) of Claim 4, wherein the product identification tag (154) includes instructions for the electrostatic charger.

6. The device (100) of anyone of Claims 1 to 5, comprising three tines (108) arranged on a horizontal plane, and the tips of the tines (108) include a chamfered section on a bottom side.

7. A method for cleansing hair, comprising:

   with the device of anyone of Claims 1 to 6, applying a hair formulation to hair or scalp or both (122);
   with the device, agitating the hair formulation (124); and
   with the device, creating an electrostatic charge on the hair or scalp or both (122).

8. The method of Claim 7, wherein no external water is mixed with the hair formulation after applying.

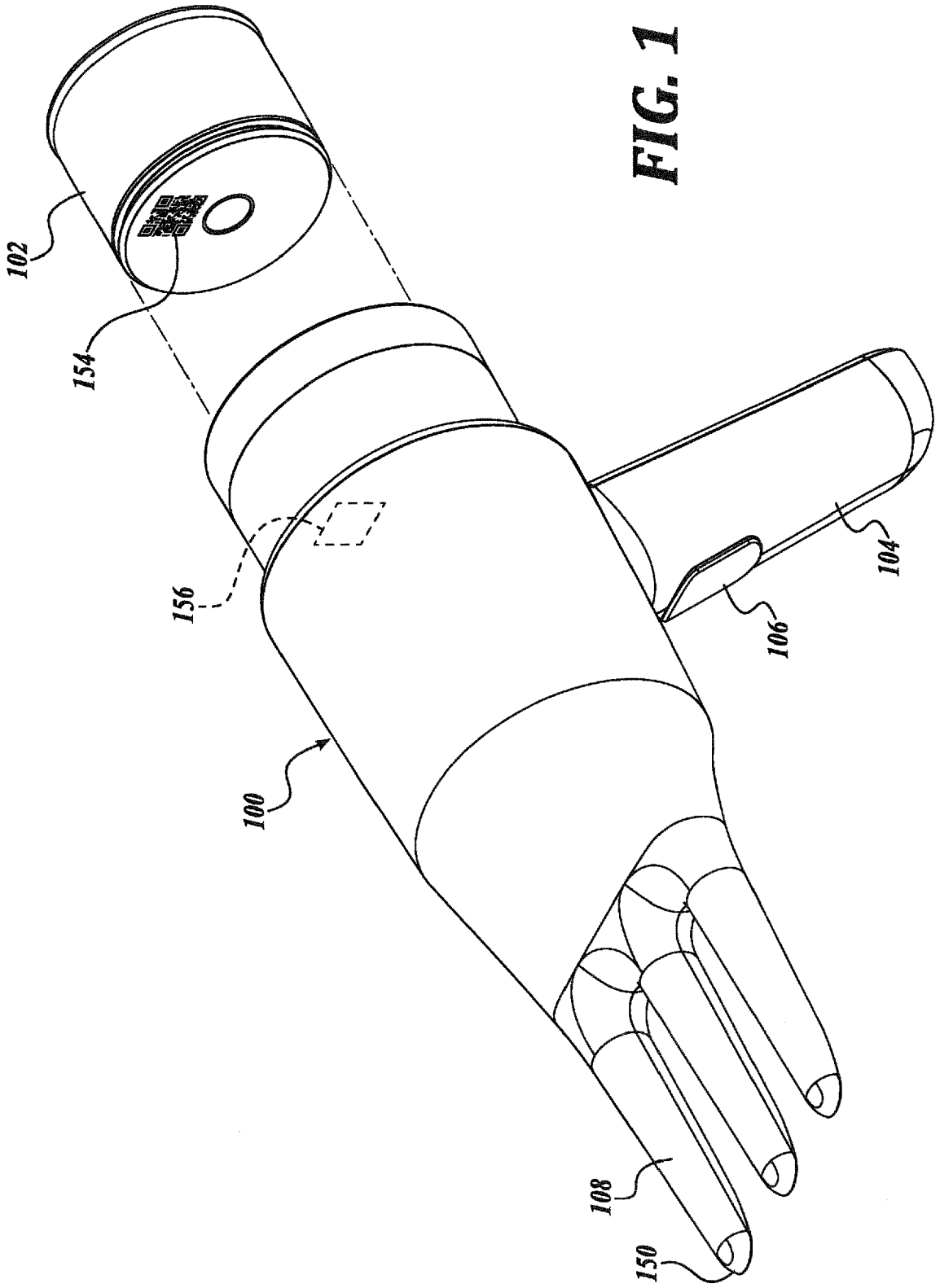

FIG. 1

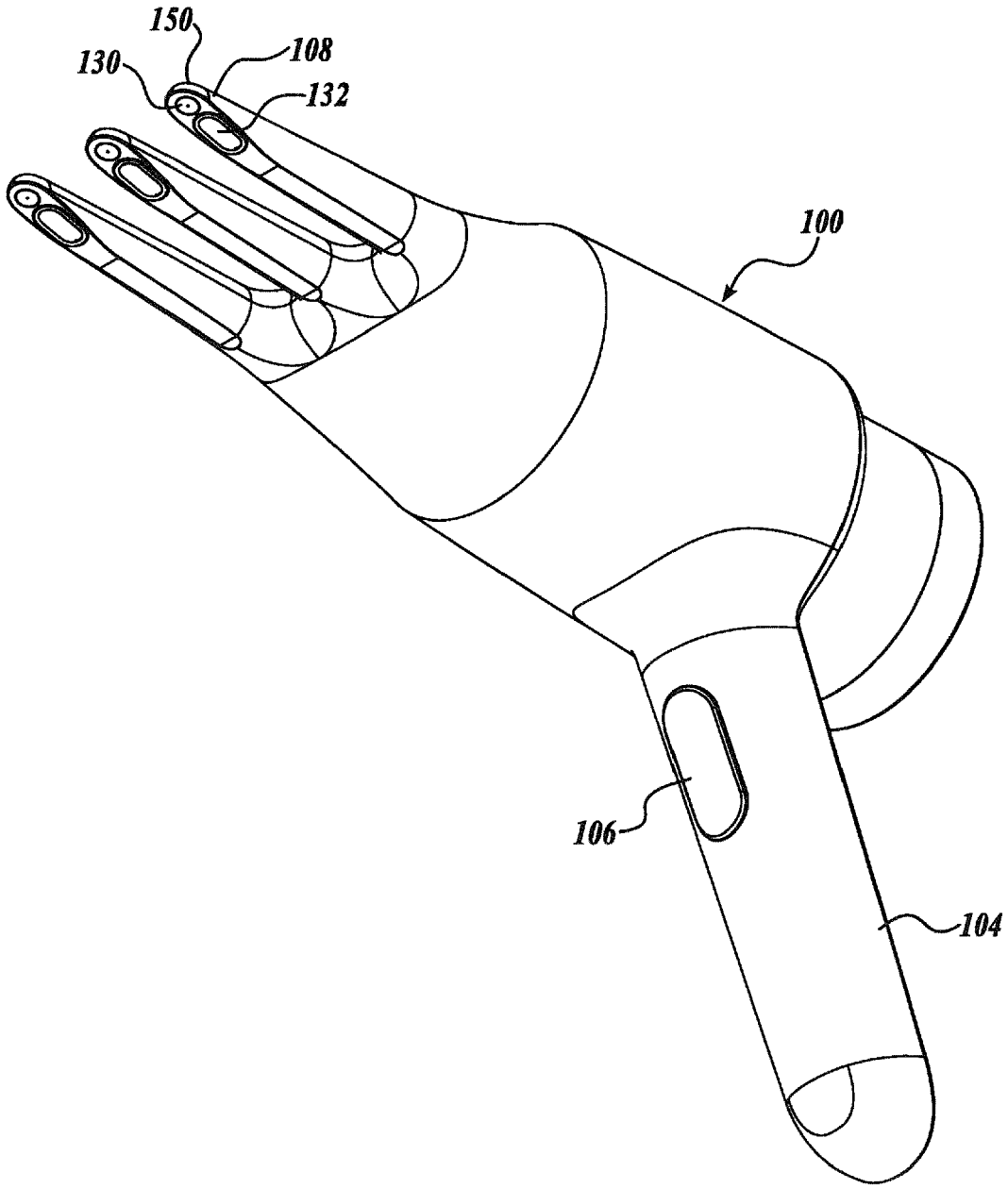

FIG. 2

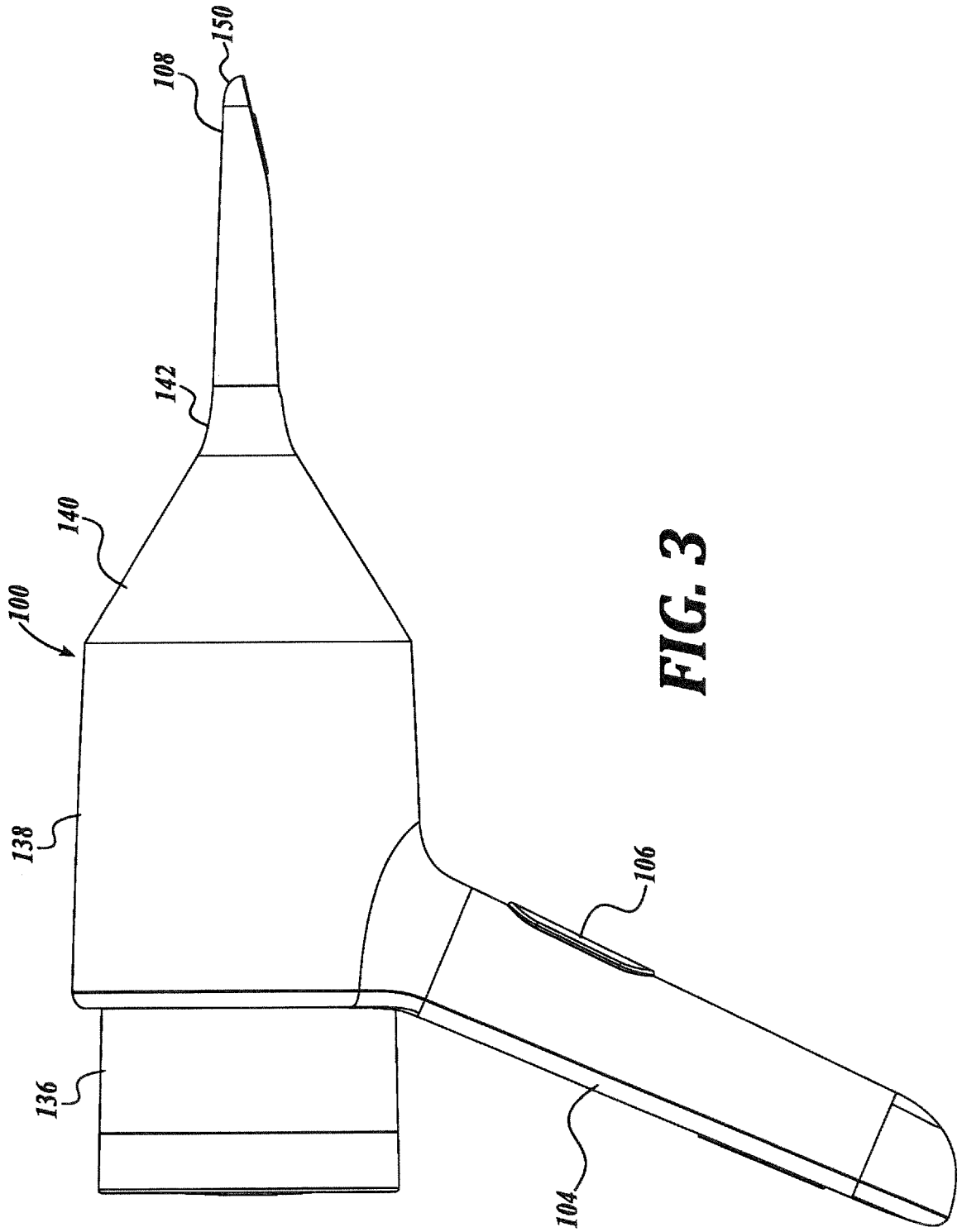

FIG. 3

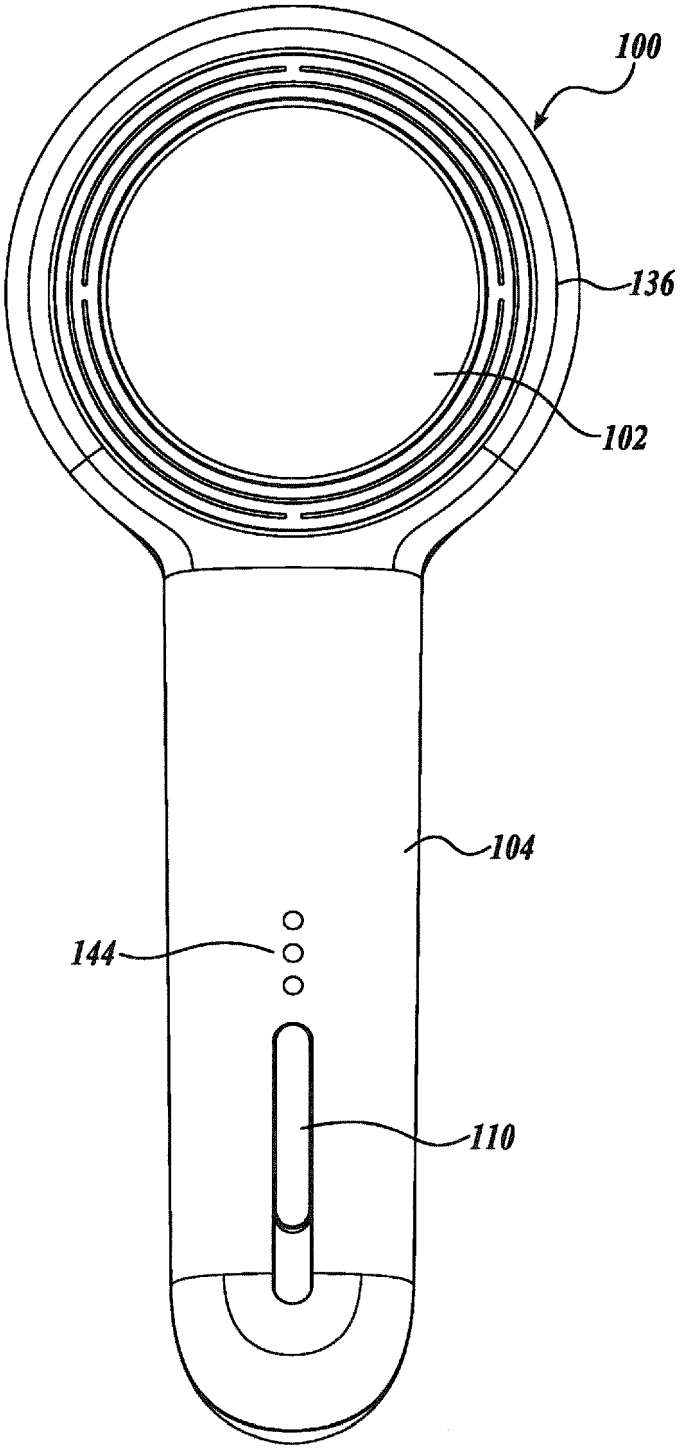

FIG. 4

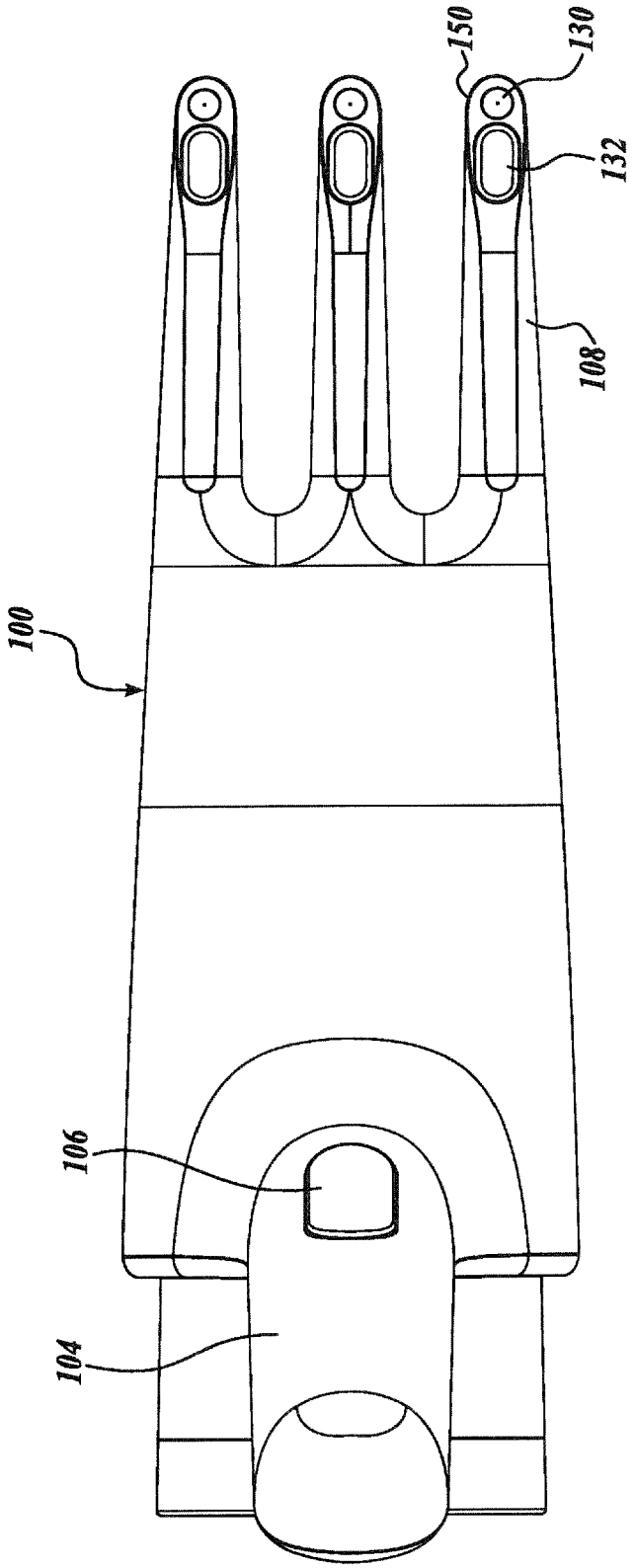

FIG. 5

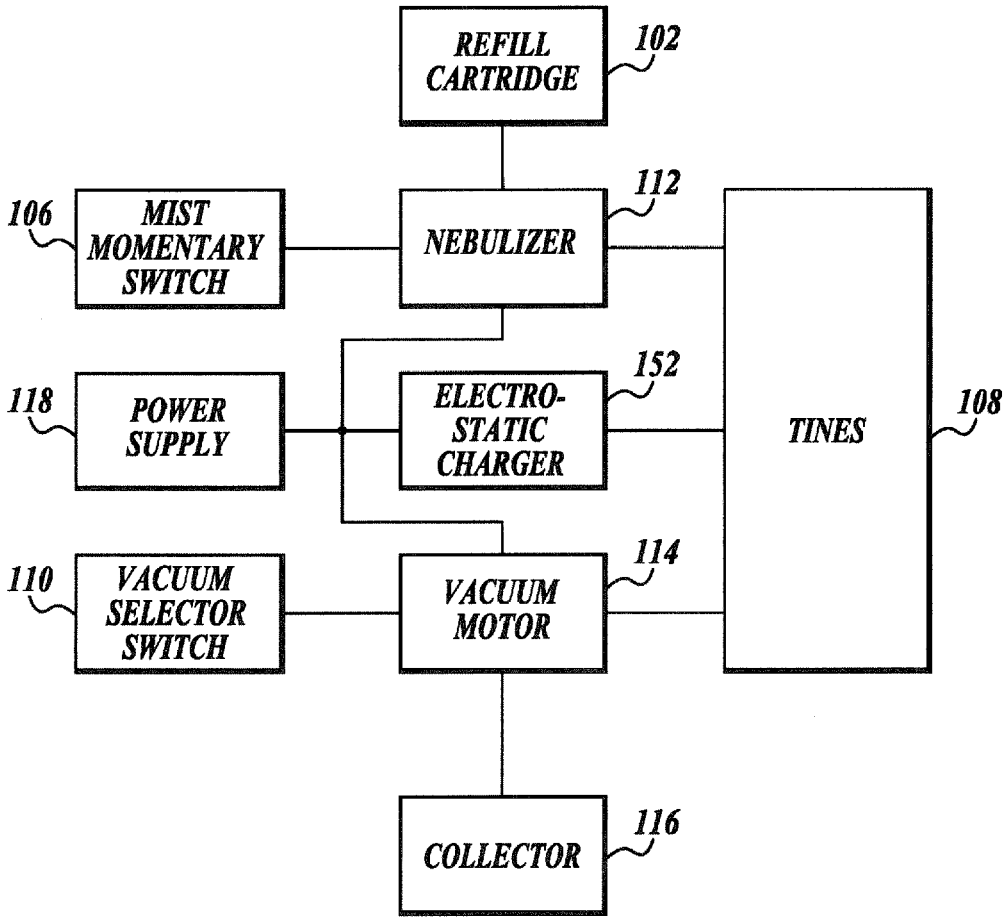
REFILL CARTRIDGE
102
MIST MOMENTARY SWITCH
106
NEBULIZER
112
POWER SUPPLY
118
ELECTRO-STATIC CHARGER
152
TINES
108
VACUUM SELECTOR SWITCH
110
VACUUM MOTOR
114
COLLECTOR
116

FIG. 6

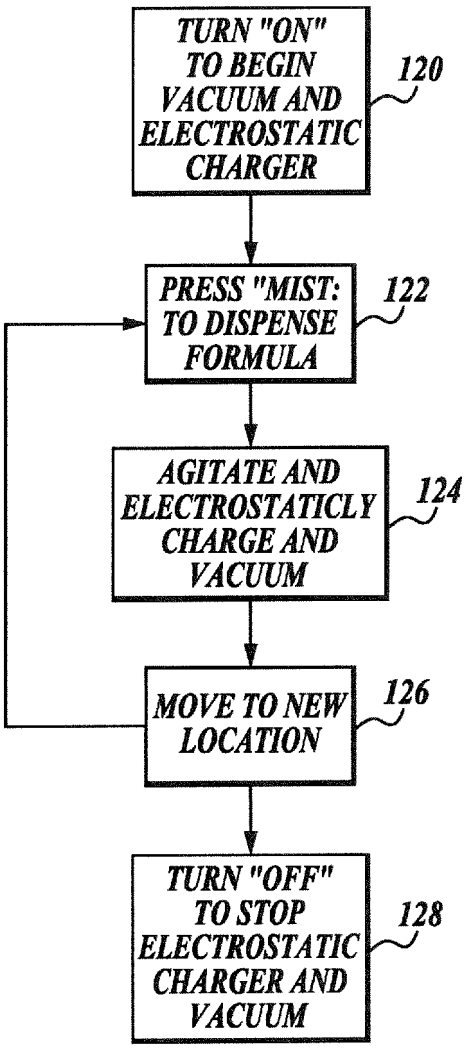
TURN "ON" TO BEGIN VACUUM AND ELECTROSTATIC CHARGER
120
PRESS "MIST: TO DISPENSE FORMULA
122
AGITATE AND ELECTROSTATICLY CHARGE AND VACUUM
124
MOVE TO NEW LOCATION
126
TURN "OFF" TO STOP ELECTROSTATIC CHARGER AND VACUUM
128

FIG. 7

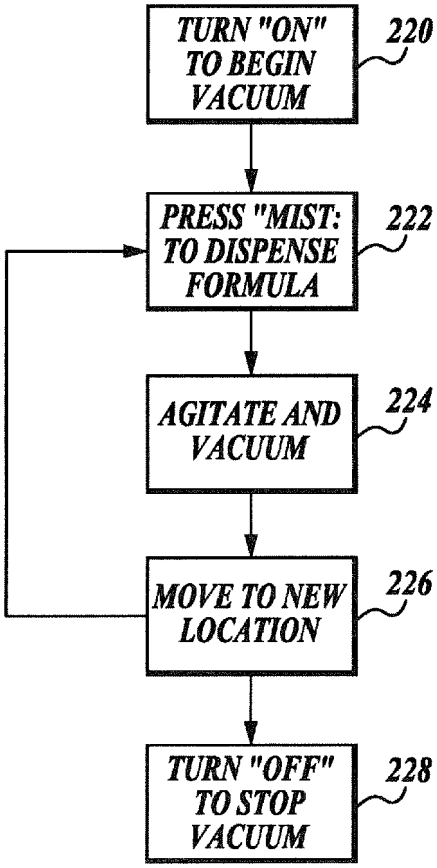
TURN "ON" TO BEGIN VACUUM
220
PRESS "MIST: TO DISPENSE FORMULA
222
AGITATE AND VACUUM
224
MOVE TO NEW LOCATION
226
TURN "OFF" TO STOP VACUUM
228

FIG. 8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 16 6881

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 6 835 210 B1 (BARTOLONE JOHN BRIAN [US] ET AL) 28 December 2004 (2004-12-28) * columns 18-19; figures *	1,7,8	INV. A45D19/00 A45D19/02 A45D19/16
Y	JP H07 116029 A (MATSUSHITA ELECTRIC WORKS LTD) 9 May 1995 (1995-05-09) * the whole document *	1,7,8	A45D24/22 A45D24/30 A45D24/32
A	GB 2 387 533 A (COMPLEMENTARY HEALTH GROUP LTD [GB]) 22 October 2003 (2003-10-22) * pages 4-7; figures *	1-8	
A	JP 2003 219909 A (TANAKA YASUHISA; OKANO BANKIN KOGYO KK) 5 August 2003 (2003-08-05) * the whole document *	1-8	

TECHNICAL FIELDS SEARCHED (IPC)

A45D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 June 2023	Dinescu, Daniela

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 16 6881

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-06-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6835210 B1	28-12-2004	US 6835210 B1	28-12-2004
		US 2005102768 A1	19-05-2005
JP H07116029 A	09-05-1995	NONE	
GB 2387533 A	22-10-2003	NONE	
JP 2003219909 A	05-08-2003	JP 3995487 B2	24-10-2007
		JP 2003219909 A	05-08-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 80558620 **[0001]**
- US 80558220 **[0001]**
- FR 2003401 **[0001]**
- FR 2003317 **[0001]**