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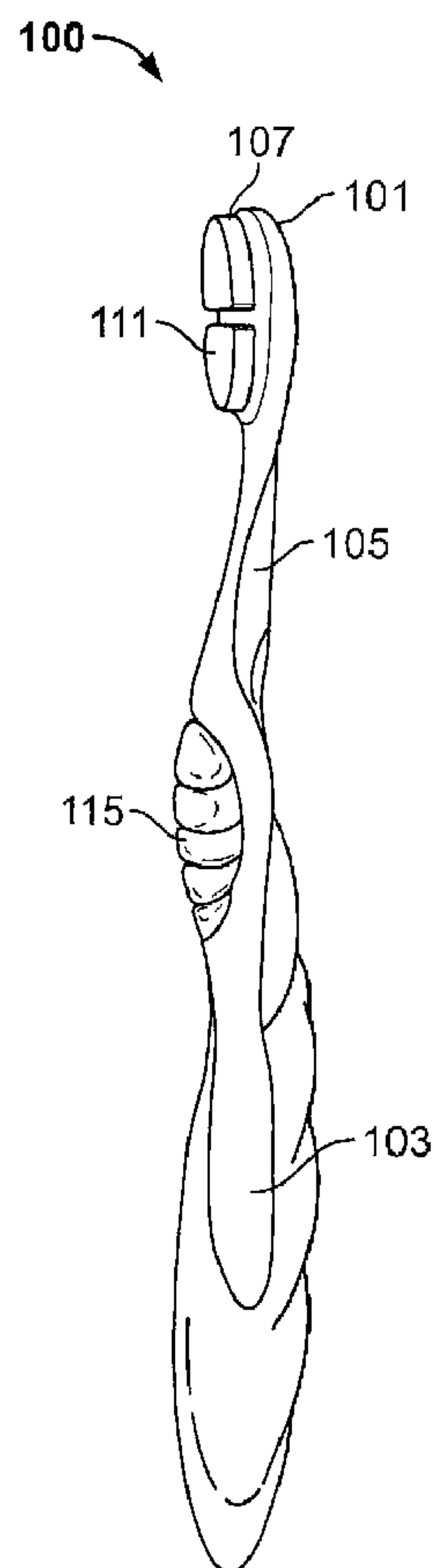
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(54) Title: ORAL CARE IMPLEMENT WITH AIR FLOSSING SYSTEM



(57) Abrégé/Abstract:

An oral care implement with an air flossing system cleans debris from the teeth of a user. The oral care implement may include an oral care region having cleaning elements for engaging oral tissue. A body is provided for gripping the implement. An air source is

(57) **Abrégé(suite)/Abstract(continued):**

disposed in the body for providing pressurized air to an air outlet. The air outlet is disposed in the oral care region for injecting the pressurized air to clean debris from the oral tissue.

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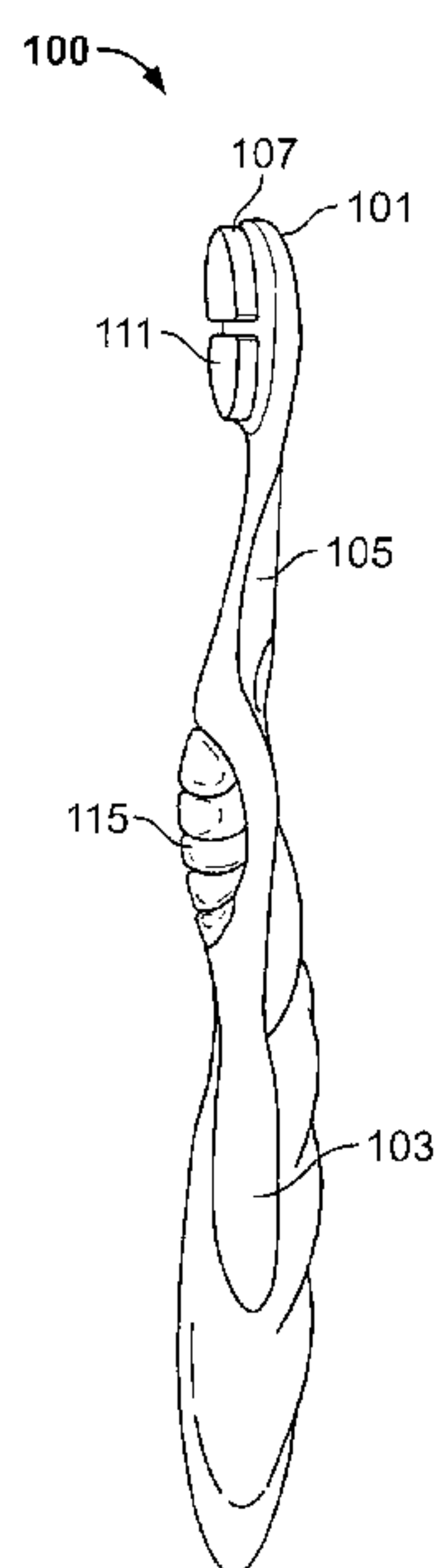


FIG. 1

(57) Abstract: An oral care implement with an air flossing system cleans debris from the teeth of a user. The oral care implement may include an oral care region having cleaning elements for engaging oral tissue. A body is provided for gripping the implement. An air source is disposed in the body for providing pressurized air to an air outlet. The air outlet is disposed in the oral care region for injecting the pressurized air to clean debris from the oral tissue.

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ORAL CARE IMPLEMENT WITH AIR FLOSSING SYSTEM

BACKGROUND OF THE INVENTION

[02] The present invention pertains to an oral care implement, in particular, to a toothbrush with an air flossing system. Individuals exhibit many forms of poor oral health including tooth decay, periodontal diseases and bad breath (halitosis). Tooth decay and periodontal disease are typically caused by harmful bacteria within the mouth. When the harmful bacteria mixes with proteins present in saliva, a film of plaque is formed on the teeth and soft tissue. If the plaque is not removed, it can attack the teeth and create cavities. Additionally, the plaque will attack the soft tissue within the mouth and cause gum disease, the leading cause of tooth loss in adults. Many individuals, especially young children, do not regularly brush their teeth or perform interdental cleaning of their teeth. Such habits often can be attributed to the individual regarding tooth brushing as a mundane duty with few pleasurable aspects.

BRIEF SUMMARY OF THE INVENTION

[03] Some aspects of the present invention pertain to an oral care implement with an air flossing system.

[04] In one aspect, an oral care implement includes an oral care region having cleaning elements for engaging oral tissue. A body is provided for gripping the implement. An air source is disposed in the body for providing pressurized air to an air outlet. The air outlet is disposed in the oral care region for injecting the pressurized air to clean debris from the oral tissue.

[05] In another aspect, an oral care implement includes an oral care region having at least one cleaning element for engaging oral tissue. An air device is provided which delivers pressurized air. An air outlet is disposed in the oral care region and is operatively connected to air device. Further, the oral care implement includes a motion-producing device capable of moving the cleaning element during

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release of pressurized air from the air outlet.

[06] In another aspect, a docking station for recharging the oral care implement has an air reservoir or an air pump, or both.

[06a] In another aspect, there is provided an oral care system comprising: an oral care
5 implement comprising: an oral care region having cleaning elements for engaging oral tissue; a body
for gripping the oral care implement; a first air reservoir disposed in the body for storing pressurized
air; a first air outlet operatively connected to the first air reservoir, the first air outlet disposed in the
oral care region for injecting pressurized air for cleaning debris from the oral tissue; an active agent
reservoir disposed in the body for storing an active agent; and an active agent outlet operatively
10 connected to the active agent reservoir, the active agent outlet disposed in the oral care region for
delivering the active agent to the oral tissue wherein the active agent outlet is isolated from the first air
outlet; and a docking station comprising: a second air reservoir for storing pressurized air; and a
compressor operably coupled to the second air reservoir. In this aspect, it is possible that when the
oral care implement is coupled to the docking station, the pressurized air stored in the second air
15 reservoir of the docking station flows into the first air reservoir of the oral care implement, wherein the
oral care implement comprises a vibratory device for vibrating the cleaning elements and wherein the
body of the oral care implement includes a third actuator; and wherein actuation of the third actuator
changes a mode of operation of the oral care implement between an air floss mode, a vibratory mode,
and a combination of air floss/vibratory mode.

20 [06b] In another aspect, there is provided an oral care implement, comprising: a
motion-producing device; a body coupled to an oral care region having at least one cleaning element
for engaging oral tissue; an air outlet disposed in the oral care region for providing an air stream to the
oral tissue; an air pump operatively connected to the air outlet; an elastomeric tooth cleaning element
extending from the oral care region; wherein the elastomeric tooth cleaning element is positioned on
25 the oral care region adjacent the air outlet so that the air stream causes a dynamic vibratory flexing
action of the elastomeric tooth cleaning element; and the body comprising an actuator, wherein
actuation of the actuator changes a mode of operation of the oral care implement between an air floss
mode, a cleaning element motion mode, and a combination of air floss/cleaning element motion mode.

[07] Other features and advantages of the invention will become apparent from the
30 following description taken in conjunction with the following drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

[08] Figures 1 and 2 are perspective front and rear views of an oral care implement, such as a toothbrush, according to one or more embodiments of the invention;

[09] Figures 3 and 4 are schematic representations of alternative toothbrush constructions according to one or more embodiments of the invention;

[10] Figures 5 -7 are a schematic representations of the toothbrush cleaning action in an oral cavity;

[11] Figures 8 and 9 are schematic representations of an alternative toothbrush construction according to one or more embodiments of the invention;

[12] Figure 10 is a schematic representation of an alternative toothbrush construction according to one or more embodiments of the invention;

[13] Figure 11 is a schematic representation of an alternative toothbrush construction and docking station according to one or more embodiments of the invention; and

[14] Figure 12 is an example functional block diagram of components of a control system according to one or more embodiments of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[15] In the following description, the invention is discussed in terms of a toothbrush (e.g. a form of an oral care implement) but could be in the form of other personal care implements. For example, a toothbrush can be used for personal hygiene, such as oral care purposes. Further, it is understood that other embodiments may be utilized and structural and functional modifications may be made without departing from the scope of the present invention.

[16] Figures 1-2 illustrate an oral care implement, such as a toothbrush, generally designated with the reference numeral 100. The toothbrush 100 generally

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includes a head 101 and a handle 103.

[17] The handle 103 is generally an elongated member dimensioned so that a user can readily grip and manipulate the toothbrush 100. The handle 103 may be formed of many different shapes, lengths and with a variety of constructions. In one construction, the handle 103 has a neck portion 105 positioned adjacent the head 101. The neck portion 105 may be a narrowed region on the handle 103 between head 101 and the part of the handle normally gripped by the user. Nevertheless, the neck portion 105 could be the region between the head 101 and the part of the handle normally gripped by the user. In another construction, the handle 103 is integrally formed with the head 101. Other attachment configurations also are possible.

[18] The head 101 may include an oral care region comprising one or more tooth cleaning elements 111. As used herein, the term "tooth cleaning elements" or "cleaning elements" includes any type of structure that is commonly used or is suitable for use in providing oral health benefits (e.g., tooth cleaning, tooth polishing, tooth whitening, massaging, stimulating, etc.) by making contact with portions of the teeth and gums. Such tooth cleaning elements include but are not limited to tufts of bristles that can be formed to have a number of different shapes and sizes and elastomeric cleaning members that can be formed to have a number of different shapes and sizes, or a combination of both tufts of bristles and elastomeric cleaning members.

[19] In one construction, the one or more tooth cleaning elements 111 are formed from a plurality of bristles. Referring to Figures 1 and 2, the tooth cleaning elements 111 are bristle regions having different shapes, however, it is understood that a number of different configurations of oral care implements may be utilized. The one or more tooth cleaning elements 111 may be attached to the head 101 by known methods, such as being fit within recesses formed in the head 101 along a front portion 107 of the toothbrush 100 (Figure 1). The head 101 also may be configured to be detached from the neck 105 or handle 103 and replaced with a new head 101, if desired.

[20] Referring to FIG. 3, toothbrush 100 includes head 101 with an air flossing outlet 109 surrounded by the tooth cleaning elements 111. Toothbrush 100

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includes an air inlet 113 for receiving ambient air to be stored in a rechargeable air reservoir or air cartridge 117 for storing pressurized air. In air inlet is connected to an air pump/compressor 119. The both the reservoir 117 and pump/compressor 119 serve as pressurized air sources to air flossing outlet 109. The air inlet 113 may have a filter to trap air borne particulates before storage in the reservoir. To prevent over-pressurizing the reservoir 117, a pressure relief valve 122 may be provided in the handle 103. The relief valve 122 may be preset to open and release air from the reservoir at predetermined pressure, such as 50 to 60 p.s.i. Alternatively, the pump/compressor 119 may be preset to stop operation at a specific pressure or range of pressure in lieu using a pressure relief valve.

[21] Toothbrush 100 may include an air pressure button 115 for controlling pressurized air provided to the reservoir 117. In operation, the engagement of button 115 by the user initiates the operation of air pump/compressor 119. Button 115 may be used for releasing the pressurized air to enable an air flossing operation of the teeth of user. In operation, the button 115 may control the opening and closing of an air valve 123. For example, the air valve 123 may be connected to a relay or solenoid component for opening closing. Also, the air components can be connected together via air conduit 118, such as tubing or other hollow pathway to enable air flow. In an alternative construction shown in FIG. 4, toothbrush 100' may not include a reservoir 117 for pressurized air storage. In such a construction, the pressurized air is directly transferred from the pump/compressor 119 to air outlet 109. Nevertheless in both constructions, the provided pressure at air outlet 109 may range from 15.0 pounds per square inches (p.s.i.) to 30.0 p.s.i.

[22] The controlled release of the pressurized air from the outlet 109 provides for interdental cleaning of the teeth of a user. The outlet 109 is provided in the form of an orifice. The orifice can be of different sizes and shapes, such as circular, rectangular, square or triangular. In one construction, the orifice has a circular shape. The diameters of the orifice may range from 0.50 mm to 2.00 mm. Nevertheless, other diameters are possible. Referring to FIGS. 5-7, as can be appreciated in operation, the pressurized air exits from the air outlet 109 in the form of an air stream 500. The air stream can be delivered at a constant rate or could be

pulsated at a predetermined rate, as discussed with regard to Figure 12. The air stream 500 interacts with dentifrice and water within the field of cleaning elements 111. It is understood that the air-dentifrice-water interaction creates a high pressure bubble matrix 503. A schematic representation of flow of air stream 500 and cleaning action is shown in FIG. 7. Referring to FIG. 7, as can be appreciated, the velocity of the bubbles 503 against the tooth surfaces 505 generally conform to the curvature of the teeth, penetrates into the interproximal areas between the teeth and sweeps away the plaque and debris. The loosened plaque and debris are received by the cleaning elements 111 of the head 101. The effective cleaning of the interproximal areas 507 between the teeth provides a floss-like clean. While one air outlet may be used in the toothbrush 100, the inventive aspect may be practiced with a plurality of air outlets, such as two or three outlets.

[23] In an alternative construction of the toothbrush 200 shown in FIGS. 8-9, the tooth cleaning elements of head 201 may include a variety of tooth cleaning elements which can be used for wiping, cleaning and massaging the user's teeth and gums. In the illustrated construction of FIG. 12, tooth cleaning elements include distal tooth cleaning elements 203a-b disposed at a distal end 121 of head 201, peripheral tooth cleaning elements 205a-l, longitudinal tooth cleaning elements 207b-c disposed along longitudinal axis a-a, arcuate tooth cleaning elements 209a-d and 211a-b, and proximal cleaning elements 213a,b. Tooth cleaning elements 205, 207, 211 and 213 can be provided as tufts of bristles whereas tooth cleaning elements 209 can be formed as elastomeric wall segments. Nevertheless, other forms and types of tooth cleaning elements may be used.

[24] In this construction, air outlet 109 is provided generally in the center of the arcuate tooth cleaning elements structure near the distal end 121. Nevertheless, the air outlet 109 can be disposed at other locations on the head 201, such as generally in the center of the other arcuate tooth cleaning element structure. In the example of the arcuate elastomeric wall segments, as can be appreciated that the air stream causes a dynamic vibratory flexing action of individual segments with respect to their vertical axis, which in-turn enhances the cleaning action of the distal tip (e.g., wiping edge) of the segment 209 against the tooth surface. Additionally, the

interior space defined between the arcuate elements 209 enables the elements to form a nozzle structure/configuration 250 to direct the air stream into the interproximal areas of between the teeth. The gaps 212 formed between the arcuate segments 209a-d enables some controlled flow of the fluid and air flow to other regions of the head 101 during brushing.

[25] It should be appreciated that the nozzle configuration could be formed by tightly packed, elongate bristle tufts. Further, in lieu of gaps between the elements, the nozzle configurations could have completely closed sidewall structures in other constructions. While four arcuate segment cleaning elements 209a-d are shown surrounding each of the generally cleaning elements 207, the inventive aspects may be practiced with more or fewer arcuate segments. While the arcuate segments form a generally circular structure, the segments can form an elliptical shape or a rectangular shape or other shapes in cross-section. Nevertheless, other shapes are possible to form the nozzle-like structure. Hence, the pressurized air stream of toothbrush 100 has synergistic benefits of providing a floss-like clean and improved surface cleaning of the tooth.

[26] The elastomeric material of the cleaning elements has a hardness property in the range of A15 to A35 Shore hardness; A20 to A30 Shore hardness; or A25 to A28 Shore hardness. As an example, one elastomeric material is styrene-ethylene/butylene-styrene block copolymer (SEBS) manufactured by GLS Corporation. Nevertheless, SEBS material from other manufacturers or other materials within and outside the noted hardness range could be used.

[27] Referring to FIG. 10, in an alternative construction, toothbrush 300 may operate in conjunction with a docking station 400. Toothbrush 300 includes the features of toothbrush construction 100, except for on-board pump/compressor 119. The docking station 400 comprises cavity 452 for seating, receiving and/or storing the handle 103 of the toothbrush 300. The docking station 400 may include an air inlet 413 for receiving ambient air to be stored in a reservoir 417 for storing pressurized air received via the air inlet 413 from air pump/compressor 419. The air inlet 413 may have a filter to trap air borne particulates. To prevent over-pressurizing the reservoir 417, a pressure relief valve 422 may be provided. The

relief valve 422 may be preset to open and release air from the reservoir 417 at predetermined pressure, such as 50 to 60 p.s.i. Alternatively, the pump/compressor 419 may be preset to stop operation at a specific pressure in lieu using a pressure relief valve.

[28] Docking station 400 may include an air pressure button 415 for controlling pressurized air entry into the reservoir 417. In operation, the depression or otherwise engagement of button 415 initiates the operation of air pump/compressor 419. Docking station 400 may further include a button 412 for releasing the pressurized air into the rechargeable reservoir in the toothbrush handle 103. In operation, the button 412 controls the opening and closing of an air valve 423 to fill the reservoir 119 of toothbrush 300. An input 431 is operative connected to the air valve 423. Air input 431 works in cooperating with the air inlet 113 of toothbrush 300. The connection between air input 431 and air inlet 113 can be air tight seal based on a threaded connection, press-fit, and the like. Docking station 400 may include a control system 401 which may comprise one or more printed circuit boards to controlling the operation pump/compressor 419 in conjunction with button 412, 415. In alternative construction, the docking station 400 may not have a reservoir 417 for pressurized air storage. In such a construction, pressurized air is directly transferred to the reservoir of toothbrush handle 103 by the pump/compressor 419 in the docking station 400. In other constructions of the docking station 400, a power source such as a battery or the like, is provided in the interior cavity to power the air storage and filling features. Alternatively, the docking station 400 may to draw electric power from a household outlet.

[29] Referring to Figures 1 and 2, toothbrush 100 includes a front portion 107 and a rear portion 109. A thumb gripping portion 115 is provided so that a user may hold the toothbrush 100 with their thumb resting on gripping portion 115. Thumb gripping portion 115 may be formed of a pliable, cushioning material that is depressible as a user presses their thumb against it. In one or more constructions, as described herein, the thumb gripping portion 115 may serves as an actuator to control operation of the toothbrush features. For example, thumb gripping portion 115 may serve as a button to turn control a device associated with the toothbrush 100

“on” and/or “off”. For example, the device may be the on-board pump or an air valve for controlling the pressurized air.

[30] In a powered toothbrush construction, thumb gripping portion 115 serves as a button to change a mode of operation of the toothbrush 100. Button 115 enables a user to change the mode of operation to any of a number of different operations. (e.g., an air flossing only mode, a vibratory only mode, or air flossing/vibratory mode). For example, depression or other engagement of button 115 may change the mode of operation to air floss only mode. In the air floss mode, an air stream is provided from the outlet. A subsequent engagement of button 115 may change the mode of operation moving cleaning element mode (e.g., vibratory head or oscillating head portion). A subsequent engagement of button 115 may change the mode of operation to combination air flossing/ moving cleaning element mode. Nevertheless, the specific order of the engagement events of the button 115, does not limit the scope of the inventive concepts. Further, the toothbrush 100 may have two or more buttons or actuators for controlling the modes of operation.

[31] In another construction, toothbrush 100 may be a powered toothbrush including motion-producing device that drives a powered element, such as movable cleaning elements 111 with an activation/deactivation or “on/off” button, such as button 115.

[32] Referring to FIGS. 3-4, in another construction, toothbrush 100 may include a motion-producing device 130 to define a vibratory head 102. A wide variety of motion-producing devices (e.g., vibratory devices) can be used to produce vibrations over a wide range of frequencies. Various types of vibratory devices are commercially available, such as transducers. One example of a vibratory device provides frequencies in the range of about 100 to 350 kHz. The vibration frequencies may be of different waveforms, including sinusoid, square, sawtooth and the like. Nevertheless, other values and waveforms are possible. A vibratory device may be located in head of the toothbrush or neck thereof. When activated, vibratory device is powered by battery (and controlled by electronics on circuit board or switching system) so as to induce vibrations in head of the toothbrush and thereby enhances teeth-cleaning action imparted by the tooth cleaning elements. In alternate

constructions, a vibratory device may include a micro motor attached to a shaft, with the shaft coupled to an eccentric rotating about an axis parallel to the longitudinal axis of the toothbrush. In still other constructions, a vibratory-producing device includes an eccentric that is driven by a micro motor in a translatory manner.

[33] A switch, such as a button, toggle switch, rotating dial, or the like, can be provided for activating the vibratory device, such a switch/button 115 of toothbrush 100. A vibratory device often has a power source, such as a battery. Activating the switch can cause the vibration-producing device to operate for a user-defined interval (e.g., during the time that a button is depressed or a switch is in an engaged position), or alternatively can activate a timing circuit that causes the vibratory device to operate for a predetermined interval. If a timing circuit is used, the associated interval either may be preset or may be adjustable, e.g., by a user-activated switch.

[34] Referring to FIG. 11, in an alternative construction, toothbrush 500 may include an active agent feature. Toothbrush 500 may include the features of toothbrush constructions 100, 100', 200, and 300. An active agent outlet 150 may be provided with the field of cleaning elements 111. The toothbrush 500 can be supplied with one or more cartridges or reservoirs 151 containing active agent(s). Multiple cartridges can be provided, for example, for supplying different active agents or a replacement supply of the same active agent. The outlet 150 is connected to the reservoir 151 via a conduit 153. Depending on the type of active agent used and the location of the air outlet 109 and an active agent outlet, the active agent can be administered before, during, or after initiation of air stream. As can be appreciated, the active agent and air stream interaction on the oral surfaces can improve plaque removal/bacterial removal interdental areas. In one construction, a user-activated switch, such as a dial (not shown), can have multiple settings for selecting one or more of several active agents. For example, the dial can have a first setting for oxidizer/whitener treatment, a second setting for breath freshener treatment, and a third setting for antimicrobial treatment.

[35] Non-limiting examples of active agents which can be used include antibacterial agents, such as chlorhexidine, cetyl pyridinium chloride, triclosan,

zinc salts, and; oxidative or whitening agents, such as hydrogen peroxide, urea peroxide, sodium percarbonate, and PVP-H₂O₂; supercharged fluoride delivery ingredients; tooth sensitivity ingredients, such as KNO₃; occluding agents, such as Novamin[®] bioactive glass and arginine salts such as arginine bicarbonate; gum health actives, including those which reduce inflammation pathways and/or interfere in bacterial processes which produce inflammatory stimuli, such as Univestin (Unigen Pharma), bachalin, polyphenols, triclosan, ethyl pyruvate, and guanidinoethyl disulfide; nutritional type ingredients, such as vitamins, minerals, amino acids, vitamin E, and folic acid; tartar control or anti-stain ingredients, including phosphate salts, polyvinylphosphonic acid, PVM/MA copolymer; enzymes, such as those used for plaque disruption; sensate ingredients, such as those providing cooling, tingle, or heat sensations; flavors and flavor ingredients; anti-cavity or enamel repair agents; breath freshening ingredients; oral malodor reducing agents; anti-attachment agents, such as ethyl lauroyl arginate; diagnostic solutions, such as plaque-indicator dyes; and combinations thereof.

[36] Examples of flavors and flavor ingredients include essential oils, menthol, carvone, and anethole, and various flavoring aldehydes, esters, and alcohols. Examples of essential oils include oils of spearmint, peppermint, wintergreen, sassafras, clove, sage, eucalyptus, marjoram, cinnamon, lemon, lime, grapefruit, and orange. Flavoring agents typically are provided at a concentration of about 0.1 to about 2 wt% based on the weight of the composition, more usually from about 0.1 to about 0.5 wt%.

[37] The active agent and/or its medium can be selected to complement a toothpaste formula, such as by coordinating flavors, colors, aesthetics, or active ingredients. A flavor can be administered to create a gradual flavor change during brushing, which presently is not possible using toothpaste alone.

[38] The active agent can be provided in any suitable vehicle, such as in aqueous solution or in the form of gel or paste. Non-limiting examples of vehicles include water, monohydric alcohols such as ethanol, poly(ethylene oxides) such as polyethylene glycols such as PEG 2M, 5M, 7M, 14M, 23M, 45M, and 90M available from Union Carbide, carboxymethylene polymers such as Carbopol[®] 934 and 974

available from B.F. Goodrich, and combinations thereof. The selection of a suitable vehicle will be apparent to persons skilled in the art depending on such factors as the properties of the active agent and the desired properties of the medium, such as viscosity.

[39] As described herein with respect to Figure 12, a control system 600 for toothbrush constructions 100, 100', 200, 300, and 500 may be included to control the air stream for the "floss-like" clean. Figure 12 illustrates a block diagram of components in one or more constructions of control system 600. One or more of the components shown in Figure 12 may be included within one or more printed circuit boards. Possible alternatives include flash memory, flash ROM, RAM with battery backup. Control system 600 may include a pump control 619 operatively connected to one or more components of the system 600 and a user interface 615, such button 115.

[40] Mode selection circuitry 621 may include electrical circuitry, software, computer-readable instructions, or other components to allow for changing the mode of operation of the toothbrush 100. For example, mode selection circuitry 621 may receive and process an input signal to change the mode of operation from an air floss mode to moving-cleaning element mode of operation. Mode selection circuitry 621 may be configured to perform the functions for processing signal(s) performing computer-readable instructions, and reading from and writing to a memory (not shown) associated with the toothbrush 100 switching between different modes of operation.

[41] Timer circuitry 622 may include hardware, software, computer-readable instructions, or other components to allow for counting up or counting down time. Timer circuitry 622 may include a crystal oscillator for counting seconds, minutes, etc. Timer circuitry 622 may be configured to perform the functions for processing signal(s) performing computer-readable instructions, and reading from and writing to a memory (not shown) associated with the toothbrush 622 operating in a timer mode for two (2) minutes for air flossing mode. In one arrangement, the air floss mode can end after an elapsed time of 2 minutes.

[42] Control system 600 may include a valve control 623 operatively

connected to one or more components of the system 600 to controlling release of air for flossing, including a constant stream of air or pulsating stream of air. The pulsation frequency can may be of different waveforms, including sinusoid, square, sawtooth and like. The control system circuitry 600 may include hardware, software, computer-readable instructions, or other components to enable control the air flow. For example, the control system 600 may include memory of a programmable type in which nonvolatile storage can be electrically erased and reprogrammed.

[43] As discussed, the inventive aspects may be practiced for a manual toothbrush or a powered toothbrush with moving tooth cleaning elements. While the various features of the toothbrush 100 work together to achieve the advantages previously described, it is recognized that individual features and sub-combinations of these features can be used to obtain some of the aforementioned advantages without the necessity to adopt all of these features.

[44] While the invention has been described with respect to specific examples including presently preferred modes of carrying out the invention, those skilled in the art will appreciate that there are numerous variations and permutations of the above described systems and techniques. Thus, the spirit and scope of the invention should be construed broadly as set forth in the appended claims.

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CLAIMS:

1. An oral care system comprising:
 - an oral care implement comprising:
 - an oral care region having cleaning elements for engaging oral tissue;
 - 5 a body for gripping the oral care implement;
 - a first air reservoir disposed in the body for storing pressurized air;
 - a first air outlet operatively connected to the first air reservoir, the first air outlet disposed in the oral care region for injecting pressurized air for cleaning debris from the oral tissue;
 - 10 an active agent reservoir disposed in the body for storing an active agent; and
 - an active agent outlet operatively connected to the active agent reservoir, the active agent outlet disposed in the oral care region for delivering the active agent to the oral tissue wherein the active agent outlet is isolated from the first air outlet; and
 - a docking station comprising:
 - 15 a second air reservoir for storing pressurized air; and
 - a compressor operably coupled to the second air reservoir;
 - 20 wherein when the oral care implement is coupled to the docking station, the pressurized air stored in the second air reservoir of the docking station flows into the first air reservoir of the oral care implement, wherein the oral care implement comprises a vibratory device for vibrating the cleaning elements and wherein the body of the oral care implement includes a third actuator; and wherein actuation of the third actuator changes a mode of operation of the oral care implement between an air floss mode, a vibratory mode, and a combination of air floss/vibratory mode.

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2. The oral care implement of claim 1, wherein a portion of the cleaning elements defines a nozzle for directing the pressurized air and the first air outlet is disposed within the nozzle.

3. The oral care implement of claim 2, wherein the portion of the cleaning
5 elements comprise elastomeric walls.

4. The oral care implement of claim 2, wherein the portion of the cleaning elements comprise a packed wall of bristles.

5. The oral care implement of claim 1, the docking station further comprising:

a first air inlet for receiving ambient air;

10 a second air outlet;

an air valve operably coupled between the second air reservoir and the second air outlet;

a first actuator operably coupled to the air valve; and

wherein actuation of the first actuator opens the air valve so that the
15 pressurized air stored in the second air reservoir flows into the first air reservoir of the oral care implement.

6. The oral care implement of claim 5, wherein the oral care implement comprises a second air inlet, and wherein coupling the oral care implement to the docking station operably connects the second air inlet of the oral care implement to the second air outlet of the
20 docking station with an air tight seal.

7. The oral care implement of claim 1 wherein the body includes a pressure relief valve operatively connected to the first air reservoir.

8. The oral care implement of claim 5, wherein the docking station further comprises a second actuator operably coupled to the compressor, and wherein actuation of the

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second actuator initiates operation of the compressor to pump ambient air from the first air inlet to the second air reservoir.

9. The oral care implement of claim 1, wherein the active agent is delivered to the oral tissue before, during or after the injection of pressurized air from the first air outlet.

5 10. The oral care implement of claim 1, wherein the active agent is selected from the group consisting of antibacterial agents; oxidate or whitening agents; supercharged fluoride delivery ingredients, tooth sensitivity ingredients; gum health actives; nutritional ingredients; tartar control or anti-stain ingredients; enzymes; sensate ingredients; flavors or
10 flavor ingredients; anti-cavity or enamel repair agents; breath freshening ingredients; oral malodour reducing agents; anti-attachment agents; diagnostic solutions; occluding agents; and combinations thereof.

11. An oral care implement, comprising:

a motion-producing device;

15 a body coupled to an oral care region having at least one cleaning element for engaging oral tissue;

an air outlet disposed in the oral care region for providing an air stream to the oral tissue;

an air pump operatively connected to the air outlet;

an elastomeric tooth cleaning element extending from the oral care region;

20 wherein the elastomeric tooth cleaning element is positioned on the oral care region adjacent the air outlet so that the air stream causes a dynamic vibratory flexing action of the elastomeric tooth cleaning element; and

the body comprising an actuator, wherein actuation of the actuator changes a mode of operation of the oral care implement between an air floss mode, a cleaning element
25 motion mode, and a combination of air floss/cleaning element motion mode.

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12. The oral care implement of claim 11, wherein the elastomeric tooth cleaning element defines a nozzle for directing the air stream and the air outlet is disposed within the nozzle.

13. The oral care implement of claim 11 further comprising a reservoir for storing
5 pressurized air and being operatively connected to the air outlet.

14. The oral care implement of claim 11, wherein the motion-producing device comprises an eccentric member with a motor.

15. The oral care implement of claim 11, wherein the body includes an active agent reservoir for storing an active agent, and wherein the oral care region includes an active
10 agent outlet connected to the active agent reservoir to deliver the active agent to the oral tissue.

16. The oral care implement of claim 15, wherein the active agent is selected from the group consisting of antibacterial agents; oxidative or whitening agents; supercharged fluoride delivery ingredients; tooth sensitivity ingredients; gum health actives; nutritional
15 ingredients; tartar control or anti-stain ingredients; enzymes; sensate ingredients; flavors or flavor ingredients; anti-cavity or enamel repair agents; breath freshening ingredients; oral malodor reducing agents; anti-attachment agents; diagnostic solutions; occluding agents; and combinations thereof.

17. The oral care implement of claim 11, wherein the body includes an air
20 reservoir for storing pressurized air, and the oral care implement further comprising a docking station for receiving the body, the docking station providing the pressurized air to the air reservoir.

18. An oral care system comprising:

an oral care implement comprising:

25 an oral care region having cleaning elements for engaging oral tissue;

a body for gripping the oral care implement;

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a first air reservoir disposed in the body for storing pressurized air;

a first air outlet operatively connected to the first air reservoir, the first air outlet disposed in the oral care region for injecting pressurized air for cleaning debris from the oral tissue;

5 an active agent reservoir disposed in the body for storing an active agent; and

an active agent outlet operatively connected to the active agent reservoir, the active agent outlet disposed in the oral care region for delivering the active agent to the oral tissue wherein the active agent outlet is isolated from the first air outlet; and

a docking station comprising:

10 a second air reservoir for storing pressurized air; and

a compressor operably coupled to the second air reservoir;

wherein when the oral care implement is coupled to the docking station, the pressurized air stored in the second air reservoir of the docking station flows into the first air reservoir of the oral care implement.

15 19. The oral care implement of claim 18, wherein the oral care implement comprises a vibratory device for vibrating the cleaning elements and wherein the body of the oral care implement includes a third actuator; and wherein actuation of the third actuator changes a mode of operation of the oral care implement between an air floss mode, a vibratory mode, and a combination of air floss/vibratory mode.

20 20. The oral care implement of claim 18 or 19, wherein a portion of the cleaning elements defines a nozzle for directing the pressurized air and the first air outlet is disposed within the nozzle.

21. The oral care implement of claim 20, wherein the portion of the cleaning elements comprise elastomeric walls.

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22. The oral care implement of claim 20, wherein the portion of the cleaning elements comprise a packed wall of bristles.

23. The oral care implement of claim 18 or 19, the docking station further comprising:

5 a first air inlet for receiving ambient air;

a second air outlet;

an air valve operably coupled between the second air reservoir and the second air outlet;

a first actuator operably coupled to the air valve; and

10 wherein actuation of the first actuator opens the air valve so that the pressurized air stored in the second air reservoir flows into the first air reservoir of the oral care implement.

24. The oral care implement of claim 23, wherein the oral care implement comprises a second air inlet, and wherein coupling the oral care implement to the docking
15 station operably connects the second air inlet of the oral care implement to the second air outlet of the docking station with an air tight seal.

25. The oral care implement of claim 18 wherein the body includes a pressure relief valve operatively connected to the first air reservoir.

26. The oral care implement of claim 23, wherein the docking station further
20 comprises a second actuator operably coupled to the compressor, and wherein actuation of the second actuator initiates operation of the compressor to pump ambient air from the first air inlet to the second air reservoir.

27. The oral care implement of claim 18, wherein the active agent is delivered to the oral tissue before, during or after the injection of pressurized air from the first air outlet.

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28. The oral care implement of claim 18, wherein the active agent is selected from the group consisting of antibacterial agents; oxidate or whitening agents; supercharged fluoride delivery ingredients, tooth sensitivity ingredients; gum health actives; nutritional ingredients; tartar control or anti-stain ingredients; enzymes; sensate ingredients; flavors or
- 5 flavor ingredients; anti-cavity or enamel repair agents; breath freshening ingredients; oral malodour reducing agents; anti-attachment agents; diagnostic solutions; occluding agents; and combinations thereof.

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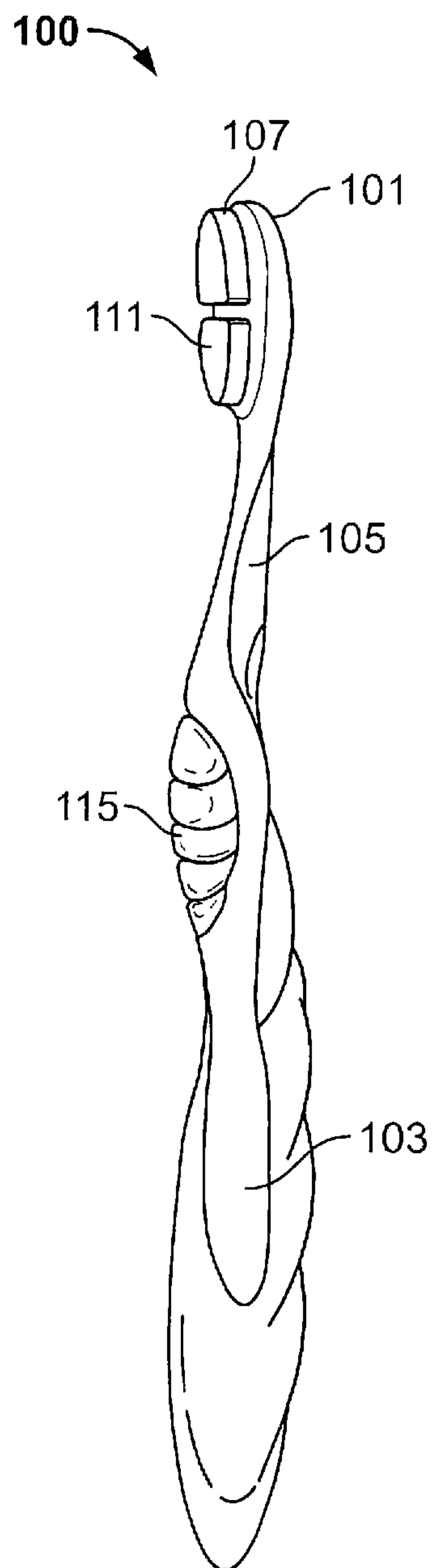


FIG. 1

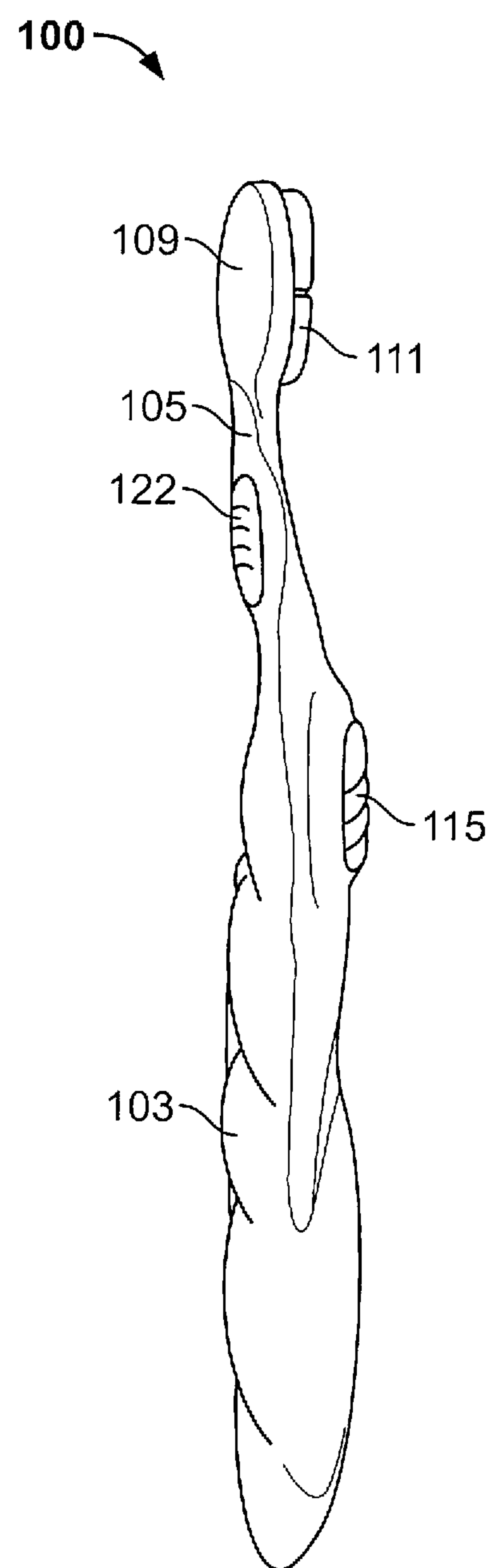


FIG. 2

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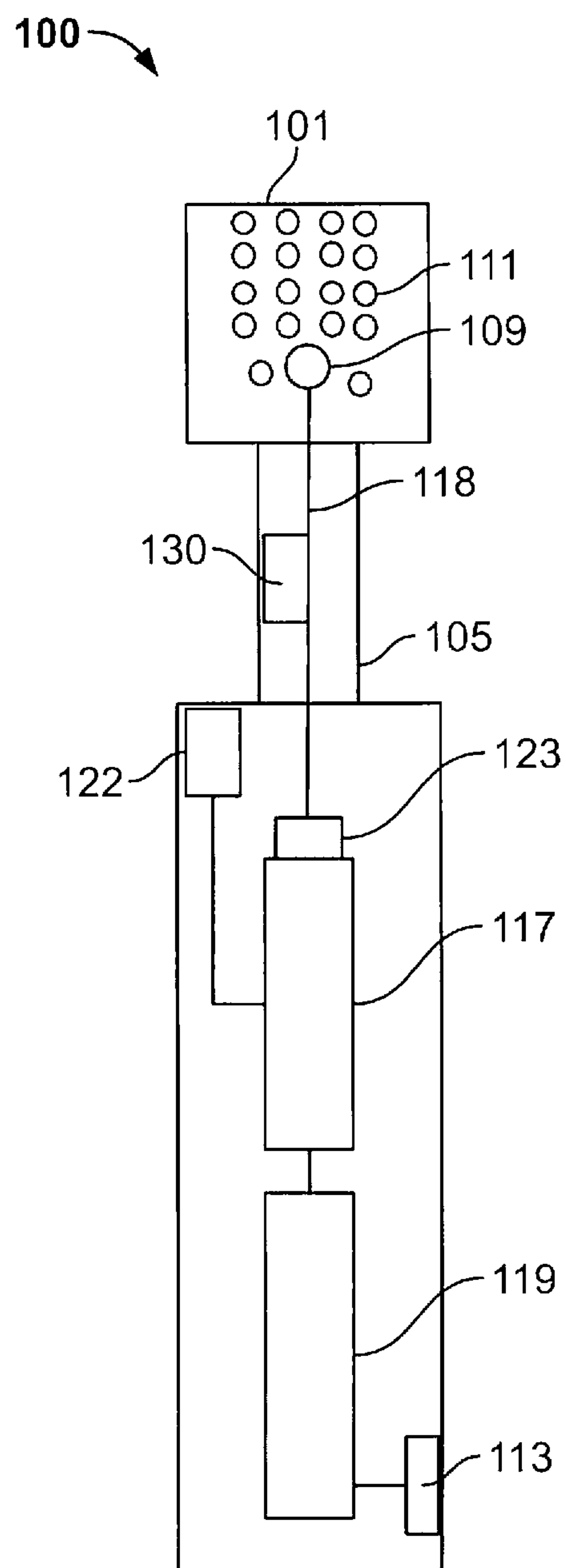


FIG. 3

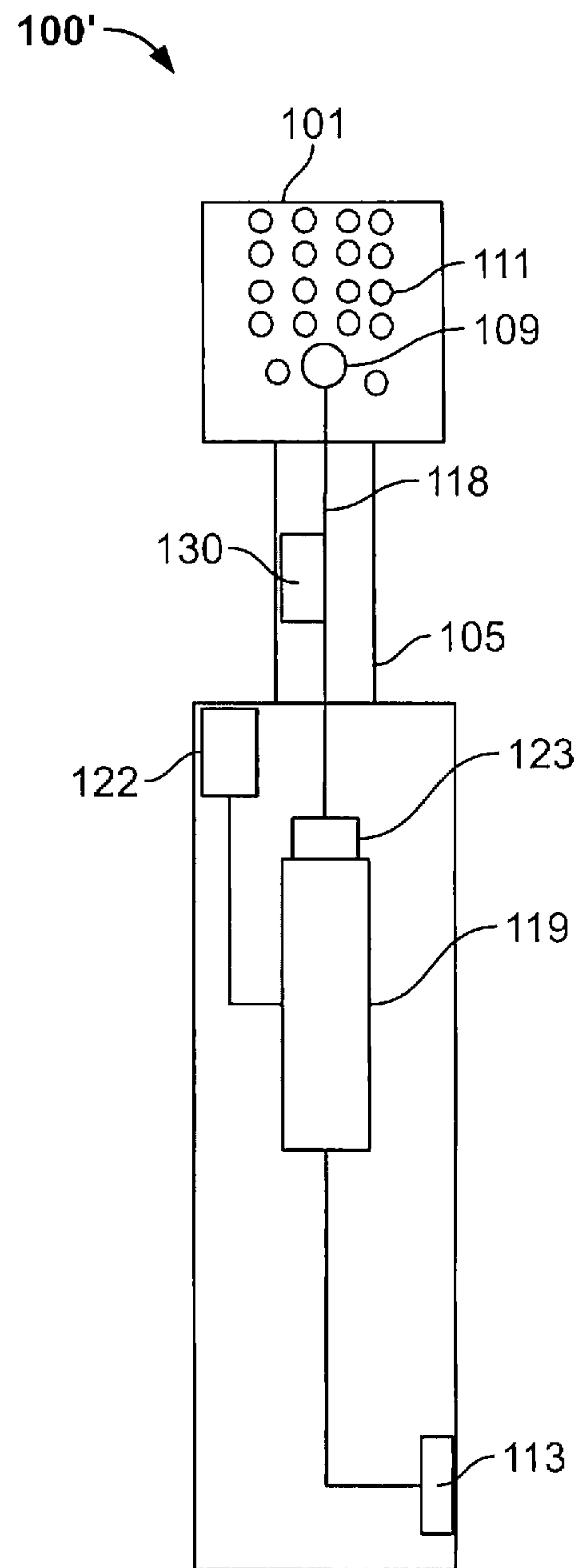


FIG. 4

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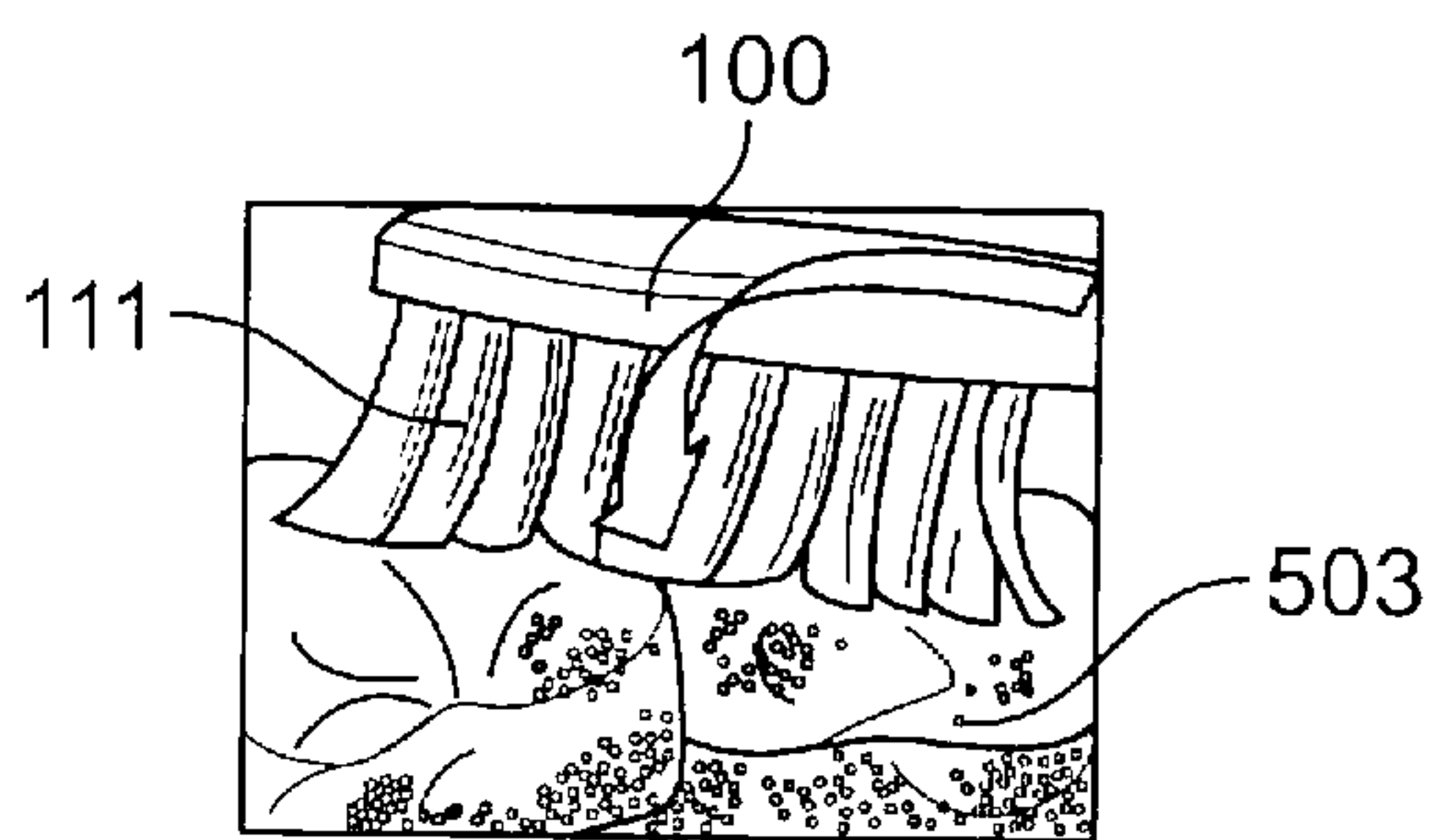


FIG. 5

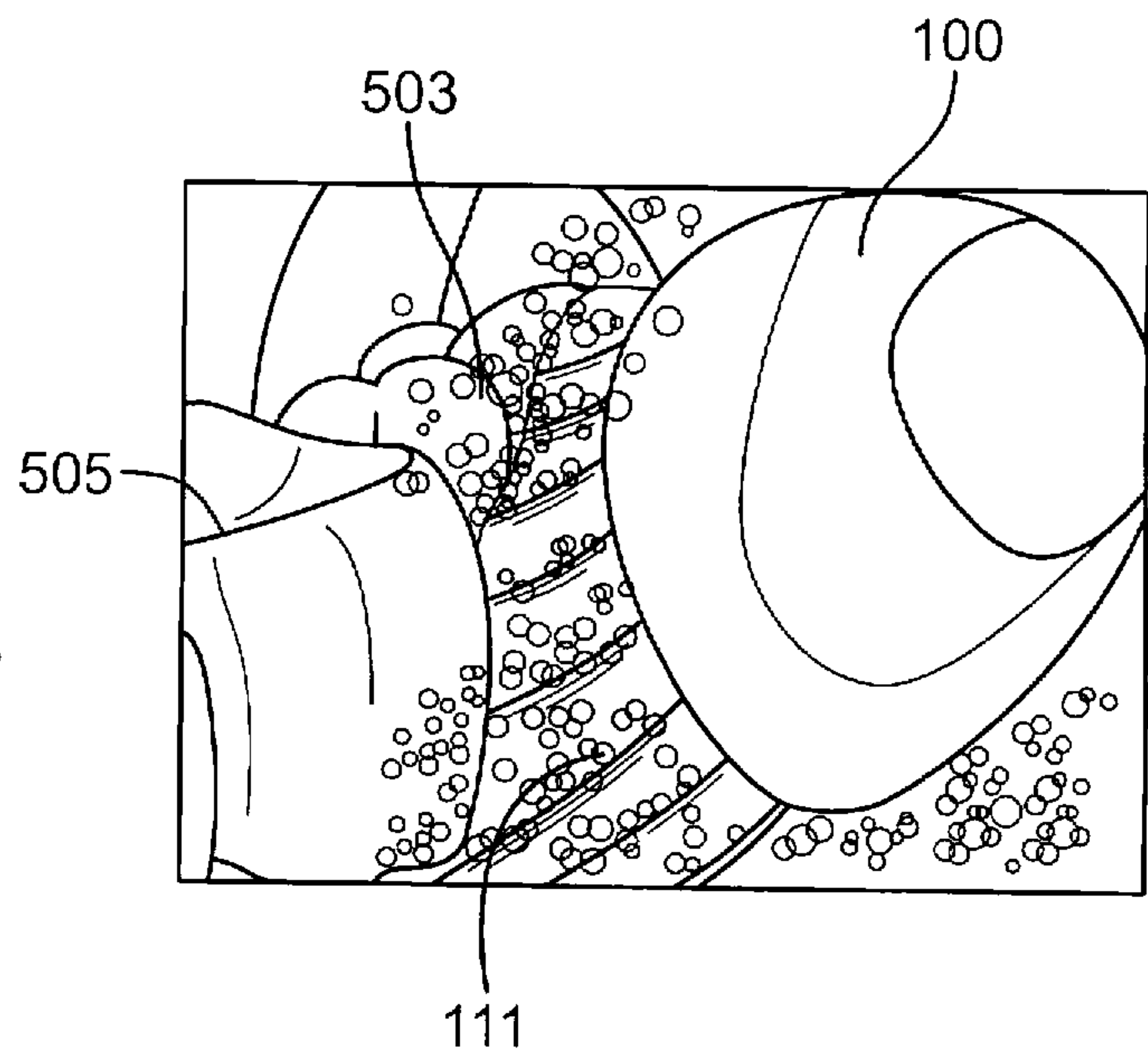


FIG. 6

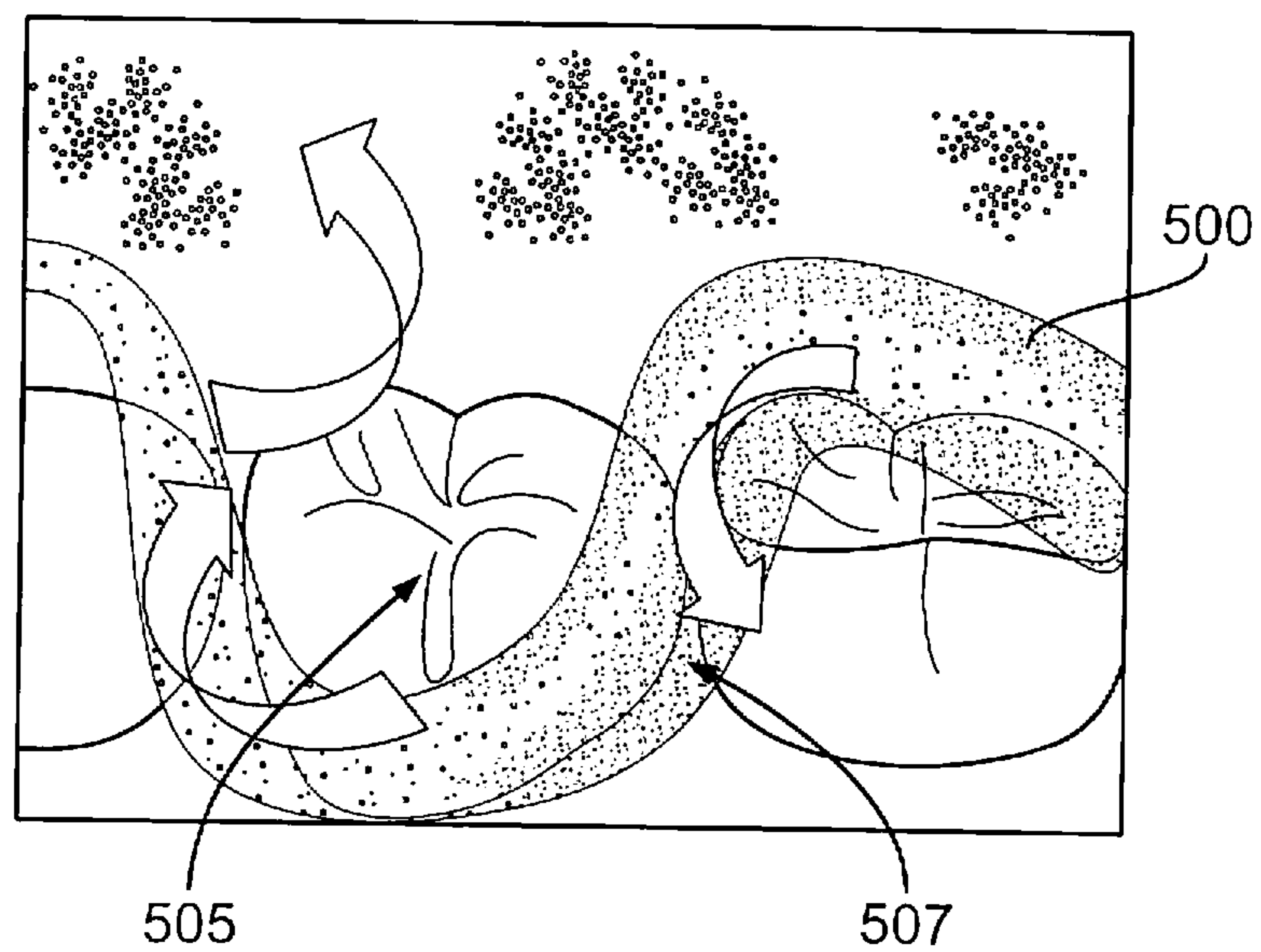


FIG. 7

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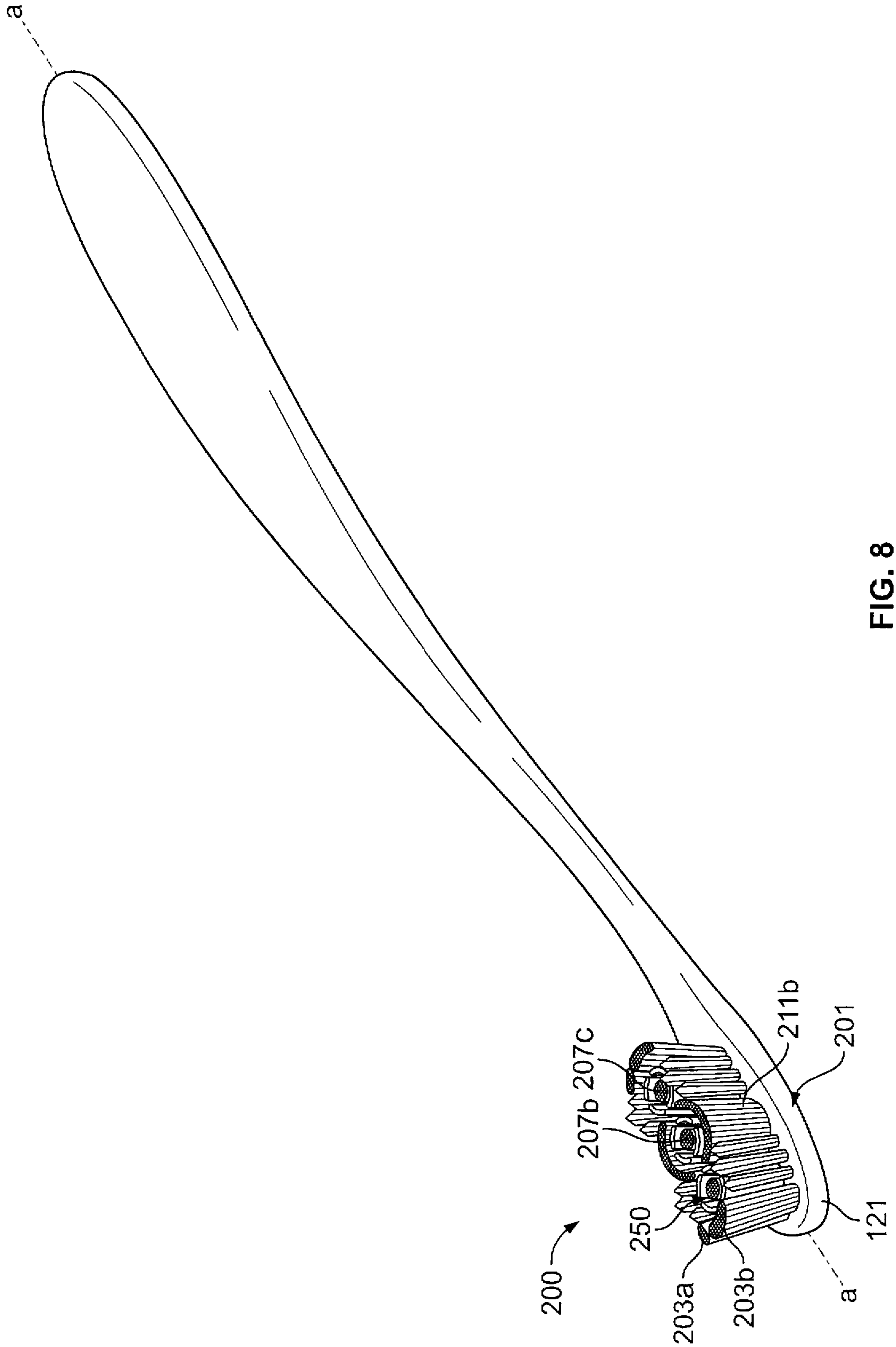


FIG. 8

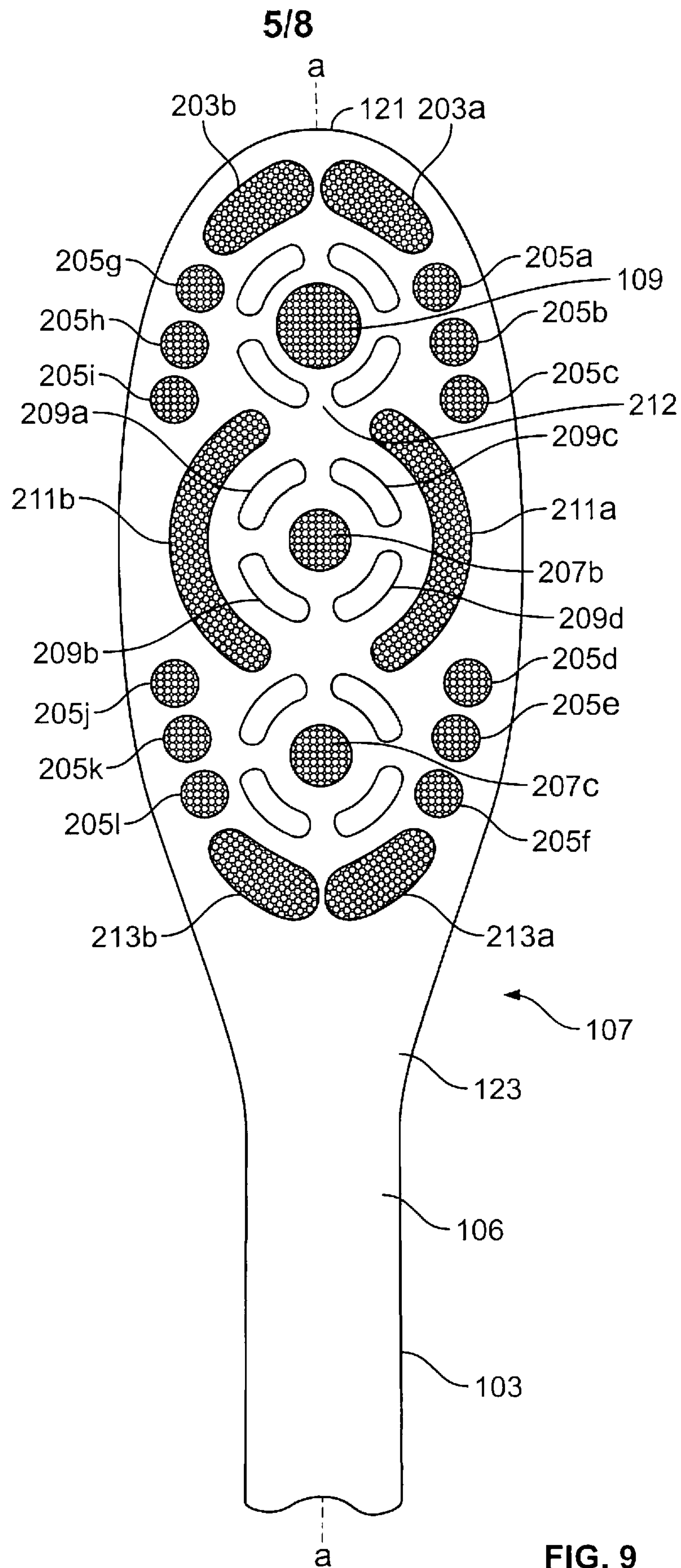


FIG. 9

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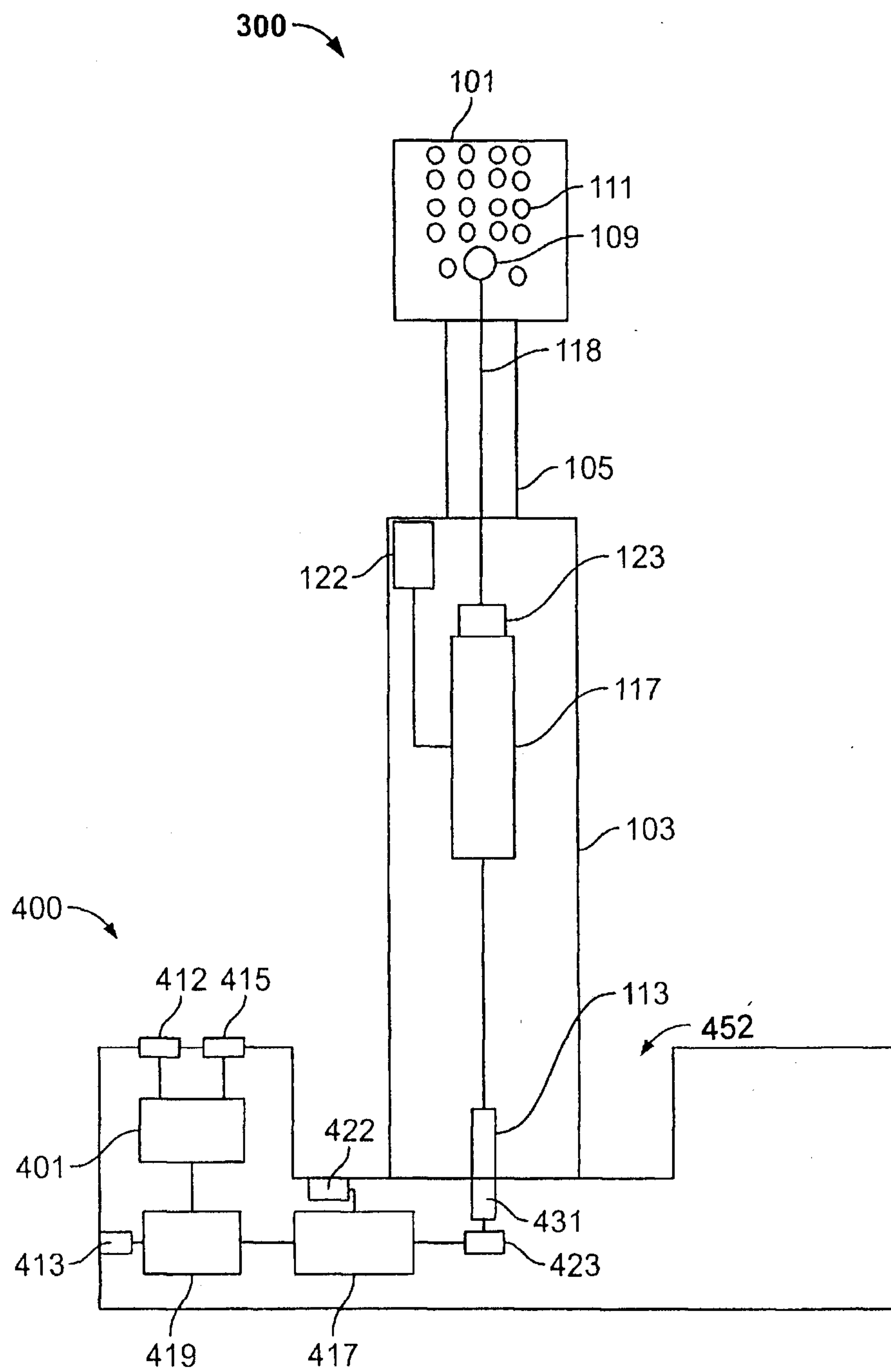


FIG. 10

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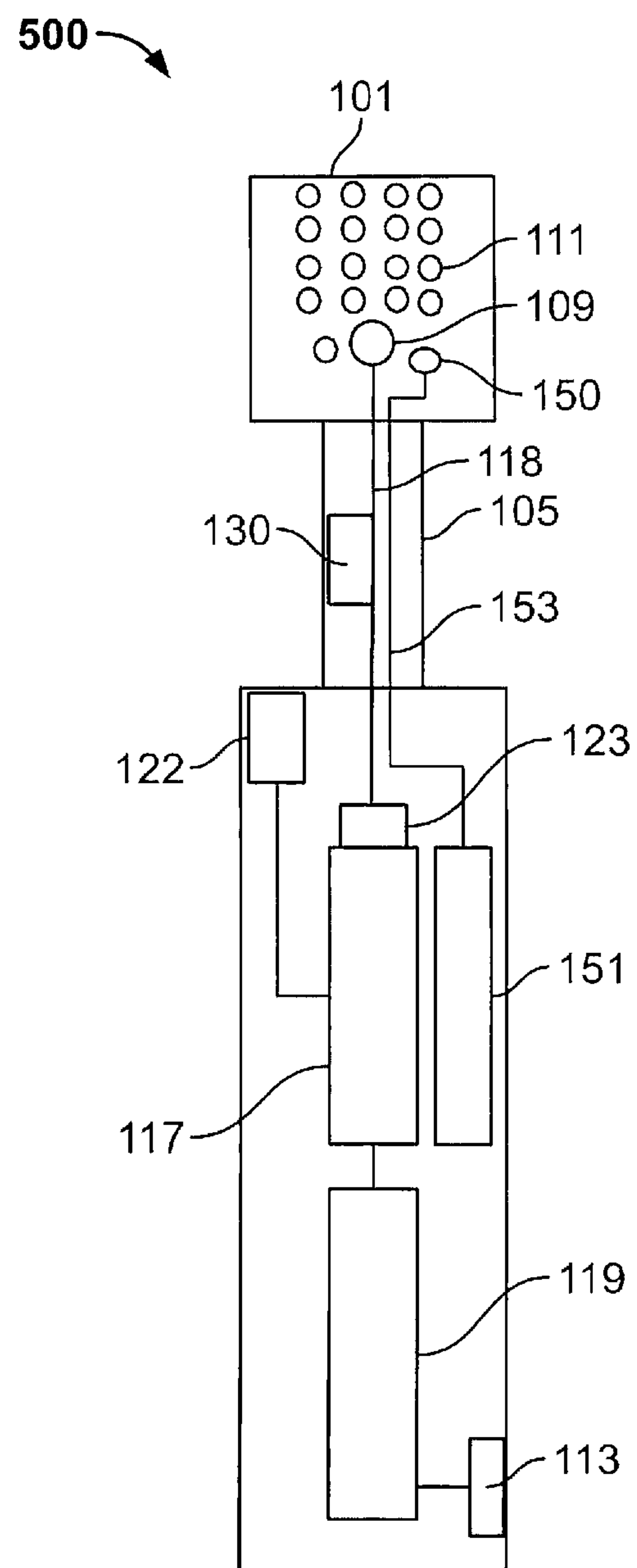


FIG. 11

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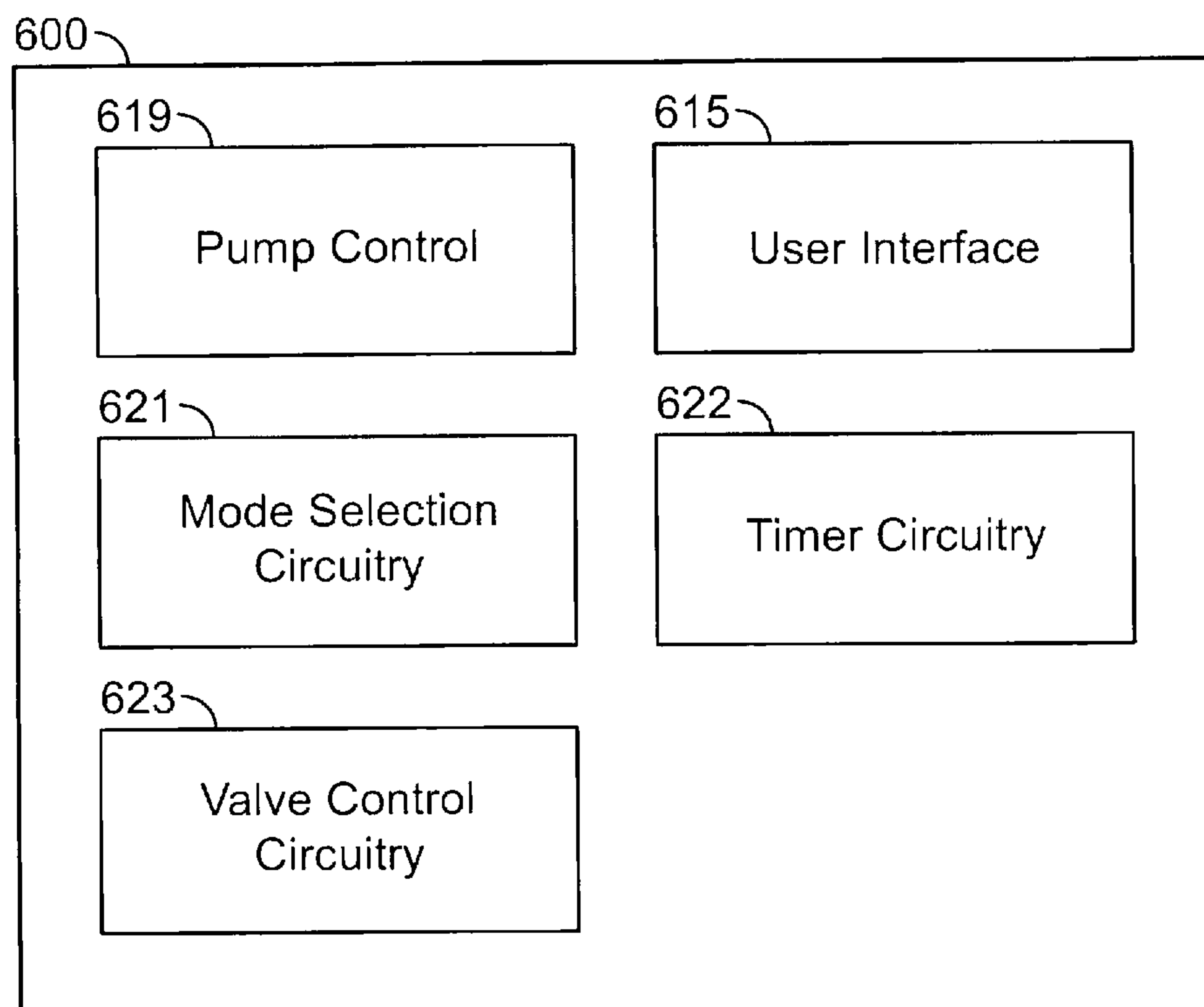


FIG. 12

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