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

(11) EP 2 236 055 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
06.10.2010 Bulletin 2010/40

(51) Int Cl.:
A45D 26/00 *(2006.01)* ***B05B 3/08*** *(2006.01)*

(21) Application number: **09005020.4**

(22) Date of filing: **04.04.2009**

(84) Designated Contracting States:
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 SE SI SK TR
Designated Extension States:
AL BA RS

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(54) Body groomimg device comprising an atomizer unit

(57) The present invention is concerned with a body grooming device such as a hair removal device or a massaging device that comprises a drive (330), an application material supply (150) for supplying an application material at an application material supply outlet (154), and an atomizer unit (170) for atomizing the application material, which atomizer unit (170) comprises a brush-like element (171) having at least a bristle-like protrusion (172), said brush-like element (171) being coupled to the drive (330) so that the brush-like element (171) is driven during an operation mode of the body grooming device (1) such that the bristle-like protrusion (171) repeatedly contacts the application material supply outlet (154) of the application material supply (150). The special atomizer unit arrangement is simple, can be made in a cost efficient manner and is also effectively atomizing an application material, e.g. water, soap, lotion, gel etc.

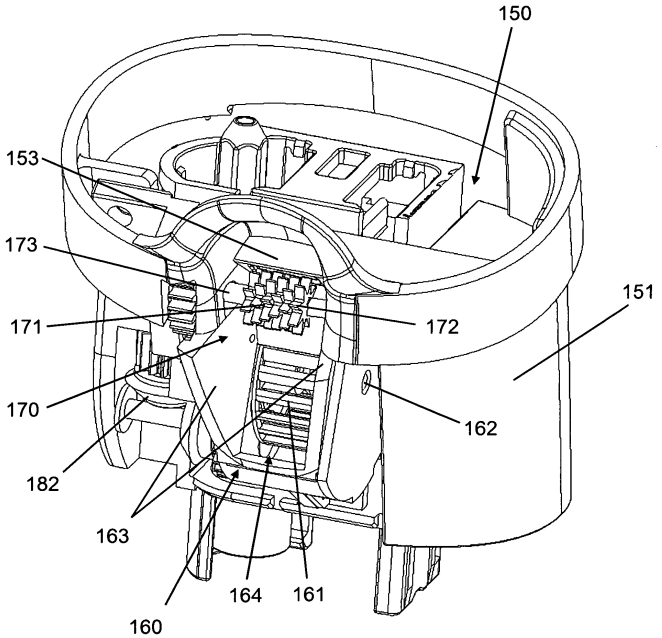

Fig. 3

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Description

FIELD OF THE INVENTION

[0001] The present invention is concerned with body grooming devices and in particular with body grooming devices that comprise an atomizer unit for atomizing an application material.

BACKGROUND OF THE INVENTION

[0002] Patent application FR 2 454 283 describes an epilation device equipped with a manually operated spray to apply a refreshing material onto the skin.

[0003] From US 5,121,541 an electric razor is known that comprises a misting mechanism realized as an ultrasonic vibrator.

SUMMARY OF THE INVENTION

[0004] It is desirable to provide a body grooming device that is improved over the known devices or at least provides an alternative solution.

[0005] Such a body grooming device is provided in accordance with claim 1. Further embodiments are given in accordance with the depending claims.

[0006] A body grooming device as proposed comprises a drive, an application material supply for supplying an application material at an application material supply outlet, and an atomizer unit for atomizing the application material. The atomizer unit comprises a brush-like element that has at least a bristle-like protrusion. The brush-like element is coupled to the drive so that it can be driven such that the bristle-like protrusion repeatedly contacts the application material supply outlet during operation of the body grooming device. The mechanical contact of the bristle-like protrusion with the application material provided at the application material supply outlet chips off small amounts of application material that are eventually catapulted away from the bristle-like protrusion due to acceleration forces and thus small application material droplets will be formed, hence the application material is atomized. As the bristle-like protrusion repeatedly contacts the application material supply outlet, this requires that the motion of the bristle-like protrusion has an oscillatory component or a rotational component, which introduces acceleration forces that are defined by movement parameters (e.g. in case of a rotary movement, the diameter of the brush-like element and the rotations per second are movement parameters that define the acceleration force acting on the application material) such that the amounts of water that are chipped off from the application material supply outlet are catapulted away from the bristle-like protrusions due to the acceleration forces. A different way to provide acceleration force without the need to move the brush-like element at a high velocity is to make the bristle-like protrusion from a flexible and resilient material or to mount the bristle-like protrusion in a flexible and resilient manner. If the bristle-like protrusion is bent when it contacts the application material supply outlet, it springs back into its unbent position when it loses contact with the application material supply outlet. This whipping movement is also introducing high acceleration forces. Further, the whipping motion also introduces the acceleration forces only during a short time period so that the application material droplets are catapulted into a small solid angle area. The same does usually not happen if the acceleration forces are applied due to a continuous movement like a rotation. Thus, a simple atomizer unit is provided that does not require any nozzle or spray. Application material that is applied to the skin may lead to better gliding of the body grooming device over the wetted skin or may lead to cooling effects due to evaporation of the application material and hence to numbing of nerves, which can reduce pain during hair removal. Thus, the application material may be water but also any other application material or lotion comprising e.g. alcohol and/or coolants and/or nurturing additives etc. may be used. The brush-like element may be arranged within a cavity formed by a housing outlet.

[0007] A "body grooming device" is a device out of the class of devices that are used to treat the body, specifically the skin, by hair removal through plucking, shaving or sheering, by massaging (e.g. to stimulate blood circulation, remove muscle tension or to treat cellulites), peeling or abrading, by rubbing in an application material such as a nurturing lotion etc. The drivable body grooming unit may comprise a combination of two or more sub-units for performing two or more of the mentioned grooming treatments.

[0008] "Application material" means e.g. a fluid-like or lotion-like or crème-like or gel-like or soap-like or wax-like or paste-like etc. material. The atomizer unit atomizes a fluid or liquid into a mist of fine droplets, a soap-like material into a dust of fine particles, and gels, crèmes, and pastes are atomized into fine material clusters.

[0009] In a further embodiment, the body grooming device comprises a blower unit. A blower unit can be used to apply an air stream onto the skin of the user during a regular use operation. Watery application material that is applied onto the skin via the atomizer may be evaporated faster by applying an air stream onto the wet skin. In a refinement of this embodiment, the blower unit is arranged at an end of an air conduit that guides the air stream that is generated by the blower unit during a use operation such that the air stream passes the brush-like element. The air stream may hence be used to carry the fine application material droplet or particle or cluster generated by the atomizer unit so that air and application material are simultaneously applied to the skin. The blower unit may comprise a drivable fan or a gas cylinder from which gas can be released.

[0010] In an embodiment, the drive is manually operated instead of using a motor-powered drive. This can e.g. be used for devices where the user wants to apply application material only now and then instead of a con-

tinuous application.

[0011] In another embodiment, the bristle-like protrusion is made from a flexible and resilient material, e.g. a natural or synthetic rubber, or the bristle-like protrusion may itself be made from a rigid material but is flexibly mounted so as to be resilient. This means that the bristle-like protrusion is bent when it contacts the application material supply outlet due to mechanical interaction between the bristle-like protrusion and the application material supply outlet and that the bristle-like protrusion springs back into its original, unbent position when the bristle-like protrusion loses contact with the application material supply outlet. Due to the resiliency of the material, the bristle-like protrusion springs back fast into its unbent position. This fast movement leads to acceleration forces acting on the application material that was chipped off from the application material supply outlet so that the application material is catapulted away from the bristle-like protrusion as fine droplets or particles or clusters. This bending and springing back is enforced if the bristle-like protrusion does not only contact an application material provided at the application material supply outlet or contacts an edge of the application material supply outlet only with a small tip portion (hence: in a grazing manner) but if the bristle-like protrusion contacts an edge of the application material supply outlet such that a considerable portion of the bristle-like protrusion is bent so that the springing back is a whipping movement. The material of the bristle-like protrusion may specifically be chosen to have a high abrasion resistance with respect to the material(s) of the application material supply outlet, e.g. the bristle-like protrusion can be made from a thin metal sheet that is flexible and also resilient (as the metal sheet essentially is a leaf spring). Flexibility of the material allows that not only the very tip of the bristle-like protrusion contacts the application material supply outlet but that a somewhat larger portion contacts (huddles against) the application material supply outlet.

[0012] In an embodiment, the application material supply outlet comprises a capillary force element. A capillary force element can supply a liquid application material at the application material supply outlet due to capillary forces, which are effectual independent on the orientation of the body grooming device. The capillary force element may get directly contacted by the bristle like protrusion or the capillary force element may be sheathed, e.g. by a conduit in which the capillary force element is arranged. In the latter case, the bristle-like protrusion may be first bent by the contact with an edge of the conduit and may then slide along the front of the capillary force element to carry along application material. The capillary force element may be an open-porous material or a fleece-material etc.

[0013] In an even further embodiment, the body grooming device comprises a container for storing the application material.

[0014] In a further embodiment, the brush-like element is realized as a cylindrical element (which shall mean that its enveloping surface is essentially cylindrical) that is mounted on its cylinder axis so that it can be driven to rotate around the cylinder axis during operation. The bristle-like protrusion is arranged to extend radially outwards.

[0015] In another embodiment, the body grooming device comprises a detachable attachment section that comprises at least the atomizer unit. This allows for removing the atomizer unit in case the body grooming device shall be used without the application material application function. The attachment section may be realized as an attachment section that is detachably connected between a head section and a hand piece section of the body grooming device.

[0016] In an embodiment, the body grooming device is realized as an epilator and in another embodiment, the body grooming device is arranged as an electrical shaver.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The invention will be further elucidated by detailed explanation of exemplary embodiments and with reference to figures. In the figures

- Fig. 1 is a perspective view onto a body grooming device as proposed in an attached state;
- Fig. 2 is a perspective view onto the top of an attachment section comprising the atomizer unit;
- Fig. 3 is the perspective view onto the attachment section as in Fig. 2 but where the lower housing part is not shown;
- Fig. 4 is a schematic depiction of elements present in a specific embodiment of a body grooming device as described.

DETAILED DESCRIPTION OF THE INVENTION

[0018] In the following, a specific embodiment of the body grooming device as proposed will be discussed that comprises a head section, an attachment section, and a hand piece section, where the atomizer unit is arranged in the attachment section. It is to be understood that this is not to be interpreted as limiting the invention. The invention can likewise be realized by an integrally manufactured body grooming device that has only a single housing or that has a head section and a hand piece section.

[0019] Fig. 1 is a perspective view onto an exemplary embodiment of a body grooming device 1 as proposed. The body grooming device 1 is realized as an epilator device, but it is understood that the body grooming device could likewise be realized as any other hair removal device such as an electric shaver, a massaging device, a peeling device etc. The body grooming device 1 comprises three sections and is shown in an assembled state. The body grooming device 1 comprises a head section 200, an attachment section 100, and a hand piece section 300. The attachment section 100 is detachably connect-

ed in between the head section 200 and the hand piece section 300. The head section 200 comprises a drivable body grooming unit 230, which in the shown embodiment is realized as an epilation cylinder for plucking hairs from the skin during operation. In another embodiment, the body grooming device 1 may be realized as an electric shaver and the drivable body grooming unit 230 as a foil shaver head. The attachment section 100 comprises an atomizer unit 170.

[0020] Fig. 2 is a perspective view onto an exemplary embodiment of the attachment section 100 shown in Fig. 1. In the shown embodiment, the attachment section 100 has a housing outlet 140 that is formed by a frontal shell structure 141 and an upper shell structure 142. The atomizer unit 170 is arranged in the cavity that is formed by the housing outlet 140. The atomizer unit 170 comprises a brush-like element 171 that has several bristle-like protrusions 172 and that is mounted on an atomizer axis 173 so that the brush-like element 171 can be rotated around the atomizer axis 173. The attachment section 100 has an attachment housing 101. The attachment housing 101 is formed by an upper attachment housing 101a and a lower attachment housing 101 b. An upper shell structure 142 is part of the upper attachment housing 101a. A frontal shell structure 141 is part of the lower attachment housing 101 b. An application material supply 150 comprises a container 151, a conduit 153 that contains a capillary force element 152 that draws application material stored in the container 151 due to capillary forces and transports the application material to the application material supply outlet 154. The capillary force element 152 may extend into the container 151 to be in application material contact independent on the orientation of the body grooming device 1. The capillary force element 152 may be realized as a (open porous) sintered polyethylene (Poroplast) element such as available from German company Durst Filtertechnik GmbH. Alternatively or additionally, the application material supply 150 may comprise a pump to transport the application material from the container to the application material supply outlet 154. As will be explained in more detail further below, the brush-like element 171 is drivable to rotate around the atomizer axis 173. The bristle-like protrusions 172 thereby repeatedly get into mechanical contact with the front of the capillary force element 152 present at the application material supply outlet to remove during operation tiny amounts of application material from said front part by mechanical interaction (including friction and adhesion). The removed amounts of application material are catapulted away from the bristle-like protrusions 172, e.g. by centrifugal forces due to the rotation of the brush-like element 171, so that fine droplets, particles or clusters are formed that are generally directed towards the housing outlet 140 so that they would wet a skin of a user during a regular use operation of the body grooming device. The bristle-like protrusions 172 can be made from a flexible and resilient material, e.g. a natural or synthetic rubber, a plastic material such as a thermoplastic material or a silicone, or even a metal sheet. As had been explained previously, the bristle-like protrusion is first bent when contacting the application material supply outlet and that springs back into its unbent position when it loses contact. The acceleration forces due to this whipping movement occur only for a short and defined period of time and thus the solid angle into which the droplets, particles, or clusters are catapulted can be made smaller than in an embodiment with a fast rotating brush-like element where the bristle-like protrusion only touches the application material slightly without any considerable bending and hence without any considerable whipping movements. It is noted that the general principle can be fulfilled with a single bristle-like protrusion 172. Depending on the amount of application material that should be provided in the form of droplets, particles, or clusters, two or more bristle-like protrusions 172 can be provided as is shown in the present embodiment. The application material can be watery liquid or any other lotion that is absorbed by the capillary force element 152.

[0021] Fig. 3 is the same perspective view onto the exemplary attachment section 100 as shown in Fig. 2 but with the lower attachment housing 101 b removed for better visibility of internal details of the attachment section 100. It is referred to the description of Fig. 2 for features visible in Fig. 2. The respective description is not repeated. The attachment section 100 further comprises a blower unit 160 that uses a fan 161 mounted on a fan axis 162 and located inside of a fan chamber 164 to generate an air stream. Air conduit walls 163 extend the housing outlet 140 (see Fig. 2) to the fan chamber 164. During operation, an air stream is generated that is guided by the air conduit formed by the air conduit walls 163, the frontal shell structure 141 (see Fig. 4A) and upper shell structure 142 through housing outlet 140. The air stream is directed towards the skin of a user during regular operation of the body grooming device. Application material droplets, particles, or clusters that are catapulted into the housing outlet 140 are seized by the air stream and are transported with the air stream towards the skin of the user. In case of a liquid, the application material droplets wet the skin with a very thin application material coating that evaporates fast, in particular because of the air stream that is in parallel applied to the skin. Hence, the skin cools due to the evaporation and skin nerves are numbed, which e.g. enables a less painful hair plucking than without numbed nerves. It needs to be stated that a blower unit 160 is not essential for the invention and could be dispensed with. Further, various gear wheels like first bevel gear 182 are visible in Fig. 3. The function of the gear wheels is described with reference to Fig. 4.

[0022] Fig. 4 is a schematic depiction of various elements present in a body grooming device as proposed. It is noted that a body grooming device as proposed can be realized as a single section or only as a head section and a hand piece section (hence, all the elements that are shown in Fig. 4 could be arranged within a single section, e.g. a hand-piece section). Alternatively, the var-

ious elements as described may be housed in several sections. Housing and mounting structures are neglected in Fig. 4 for sake of simplicity. Fig. 4 shows a power transmission unit 190 and a power extraction unit 180. Further, parts of the atomizer unit 170, the blower unit 160, and the application material supply 150 are shown. In an embodiment of a body grooming device 1 as proposed with a detachable attachment section as described in Figs. 1 - 3, the drive 330, the drive shaft 312 and an attachment section coupling 311 are disposed within the hand piece section 300. The attachment section 100 comprises the other elements. The power transmission unit 190 comprises an attachment section coupling 110 and a first shaft 112 extending from the attachment section coupling 110, which first shaft 112 ends in a first gear wheel 114. The power transmission unit 190 further comprises a second gear wheel 115 that is mounted on a second shaft 113 that is connected with the attachment section power output 111. The first gear wheel 114 meshes with the second gear wheel 115. The first and second gear wheels 114, 115 form the gear section 191 that is used to provide for an offset of the axis of the first shaft 112 and the axis of the second shaft 113. Depending on, e.g., the geometry of the attachment section 100, the gear section 191 can be dispensed with. The drive 330 has a drive shaft 331 that ends in a hand piece section power output 311 (indicated with dotted lines), which in Fig. 4 engages with the attachment section coupling 110. The power transmission unit 190 is used to transmit power from the hand piece section 300 to the head section. The power extraction section 180 couples to the first gear wheel 114 to extract power from the power transmission unit 190 to drive the fan 161 of the blower unit 160 and the brush-like element 171 of the atomizer unit 170. It is to be understood that in an embodiment in which no offset between a first shaft 112 and a second shaft 113 is required, a single shaft extending between the attachment section coupling 110 and the attachment section power outlet 111 may be provided with a fixedly mounted gear wheel to couple with the power extraction unit 180. In the shown embodiment, a third gear wheel 181 meshes with the first gear wheel 114. The third gear wheel 181 is mounted on a common axis with a first bevel gear wheel 182. The first bevel gear wheel 182 meshes with a second bevel gear wheel 183 to tilt the rotation axis by 90 degrees from a rotation around a vertical axis to a rotation around a horizontal axis. The second bevel gear wheel 183 is mounted on a common axis with a fourth gear wheel 184. The fourth gear wheel 184 meshes with a fifth gear wheel 185, which fifth gear wheel 185 drives the fan axis 162 on which the fan 161 is fixedly mounted. The fifth gear wheel 185 meshes with a sixth gear wheel 186 which in turn meshes with a seventh gear wheel 187. The seventh gear wheel 187 drives the atomizer axis 173 to which the brush-like element 171 is fixedly mounted. Sizes of the gear wheels and hence gear transmission ratios are chosen according to the needs of the power extraction section 180 to drive the fan axis 162 and the atomizer axis 173 at certain rotational speeds. It is to be understood that the exemplary embodiment shown in Fig. 4 is not to be interpreted as limiting the present invention. It is a specific embodiment of the general concept and any gear arrangement that would be considered by a skilled person should also fall under the subject matter of the present application. In another embodiment, the atomizer unit 170 and/or the blower unit 160 are driven by an additional drive and not by the drive 330 that is used to drive the drivable body grooming unit 230. In such an embodiment, the power extraction section 180 can be dispensed with.

[0023] Alternatively to the shown motor-power driven embodiment, the atomizer unit 170 may be manually driven. E.g. a toothed rack may be arranged in meshing contact with a gear wheel mounted to the atomizer axis 173 so that a user could depress the toothed rack and thus rotate the atomizer axis and hence the brush-like element 171. This is in particular of interest if application material should be applied only now and then and not in a continuous manner. All the gear arrangements and a dedicated motor can then be dispensed with so that the body grooming device would become more light-weight, cheaper, and less bulky.

[0024] Fig. 4 further depicts parts of the application material supply 150. The application material supply 150 comprises a container 151 and a capillary force element 152 that extends into the container 150. A liquid application material (typically of low to medium viscosity) that is stored in the container 150 is drawn to the application material supply outlet 154 by capillary forces, which are effectual independent on the orientation of the body grooming device. The capillary force element 152 may be made from a fibrous or porous material. The capillary force element 152 is arranged in a conduit 153. Container 151 and capillary force element 152 can be realized as a replaceable module so that certain wear of the material of the capillary force element 152 at the application material supply outlet 154 due to the mechanical contact with the rotating bristle-like protrusions 172 of the brush-like element 171 is acceptable.

[0025] In conclusion, the gist of the described invention lies in the realization of the atomizer unit 170. The atomizer unit 170 comprises a brush-like element 171 that has a least a bristle-like protrusion 172, which brush-like element is driven to repeatedly get into contact with an application material supply outlet 154. Tiny amounts of application material are withdrawn from the application material supply outlet 154 due to mechanical contact between the application material provided at the application material supply outlet and the bristle-like protrusion 172. The application material is then eventually catapulted away from the bristle-like protrusion 172 due to acceleration forces (e.g. the centrifugal force due to a rotation or the acceleration force due to the whipping movement a resilient bristle-like protrusion performs when it looses contact with the application material supply outlet) so that fine application material droplets, particles, or clusters

are formed that can be applied to a skin surface of a user of the body grooming device 1.

[0026] It is to be noted that the general arrangement of a brush-based atomizer that in particular comprises an application material supply with a capillary force element can also be employed as an application material dispensing system as such. Use of such an application material dispensing system is contemplated e.g. for misting devices such as air humidifiers and inhalers (nebulizers), household bottles containing cleaning agents or the like, bottles containing beauty care agents such as skin lotions, and perfume bottles. Such an application material dispensing system would comprise a brush-like element that is movably mounted, an application material supply comprising an application material supply outlet and a capillary force element, and a (manually powered or motor-powered) drive to move the brush-like element such that a bristle-like protrusion of the brush-like element repeatedly contacts the application material supply outlet, where the application material supply outlet may at least in part be formed by a part of the capillary force element.

[0027] The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

Claims

1. Body grooming device comprising:

   a drive (330);
   an application material supply (150) for supplying an application material at an application material supply outlet (154); and
   an atomizer unit (170) for atomizing the application material;
   which atomizer unit (170) comprises a brush-like element (171) having at least a bristle-like protrusion (172), said brush-like element (171) being coupled to the drive (330) so that the brush-like element (171) is driven during an operation mode of the body grooming device (1) such that the bristle-like protrusion (171) repeatedly contacts the application material supply outlet (154) of the application material supply (150).

2. Body grooming device according to claim 1 that further comprises a blower unit (160).

3. Body grooming device according to claim 2, wherein the blower unit (160) is arranged at an end of an air conduit for guiding an air stream generated by the blower unit (160) during operation such that the air stream passes the brush-like element (171).

4. Body grooming device according to one of claims 1 to 3, wherein the drive is manually operated.

5. Body grooming device according to one of claims 1 to 4, wherein the bristle-like protrusion (172) is at least partially made from a flexible and resilient material or is flexibly and resiliently mounted.

6. Body grooming device according to one of claims 1 to 5, said application material supply (150) comprising a capillary force element (152).

7. Body grooming device according to claim 6, wherein the application material supply outlet is at least partially formed by at least a part of the capillary force element.

8. Body grooming device according to one of claims 1 to 7 that further comprises a container (151) to store the application material.

9. Body grooming device according to one of claims 1 to 8, wherein the brush-like element (171) is realized as a cylindrical element arranged for driven rotation around its cylinder axis during the operation mode and the bristle-like protrusion (172) is arranged to extend radially outwards.

10. Body grooming device according to one of claims 1 to 9 that comprises a detachable attachment section (100) comprising at least the atomizer unit (160).

11. Body grooming device according to one of claims 1 to 10, wherein the body grooming device is realized as a device chosen from the group consisting of a hair removal device such as an epilator device or a shaver device, a massaging device, a peeling device, a rubbing device, or an abrading device.

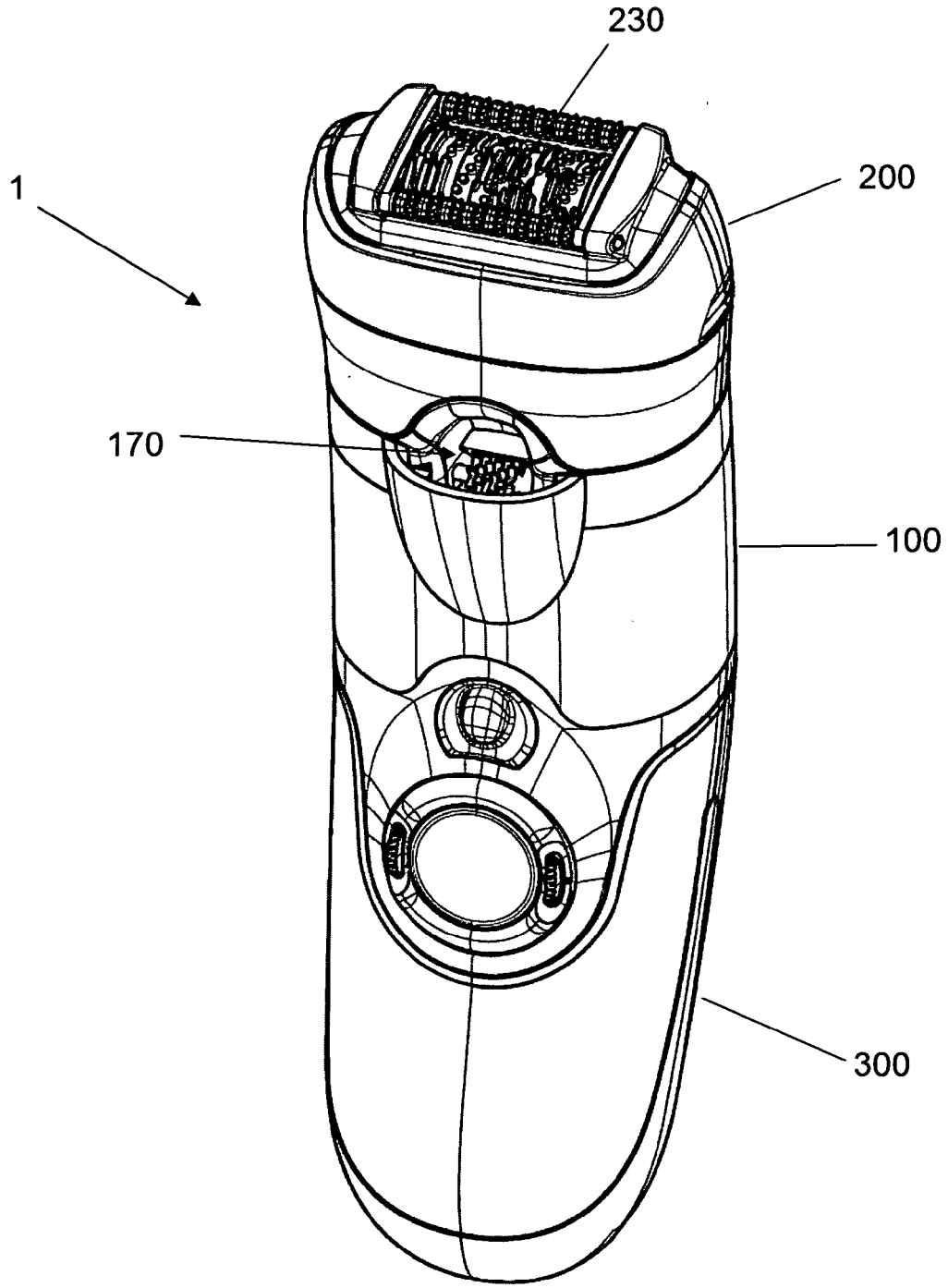

Fig. 1

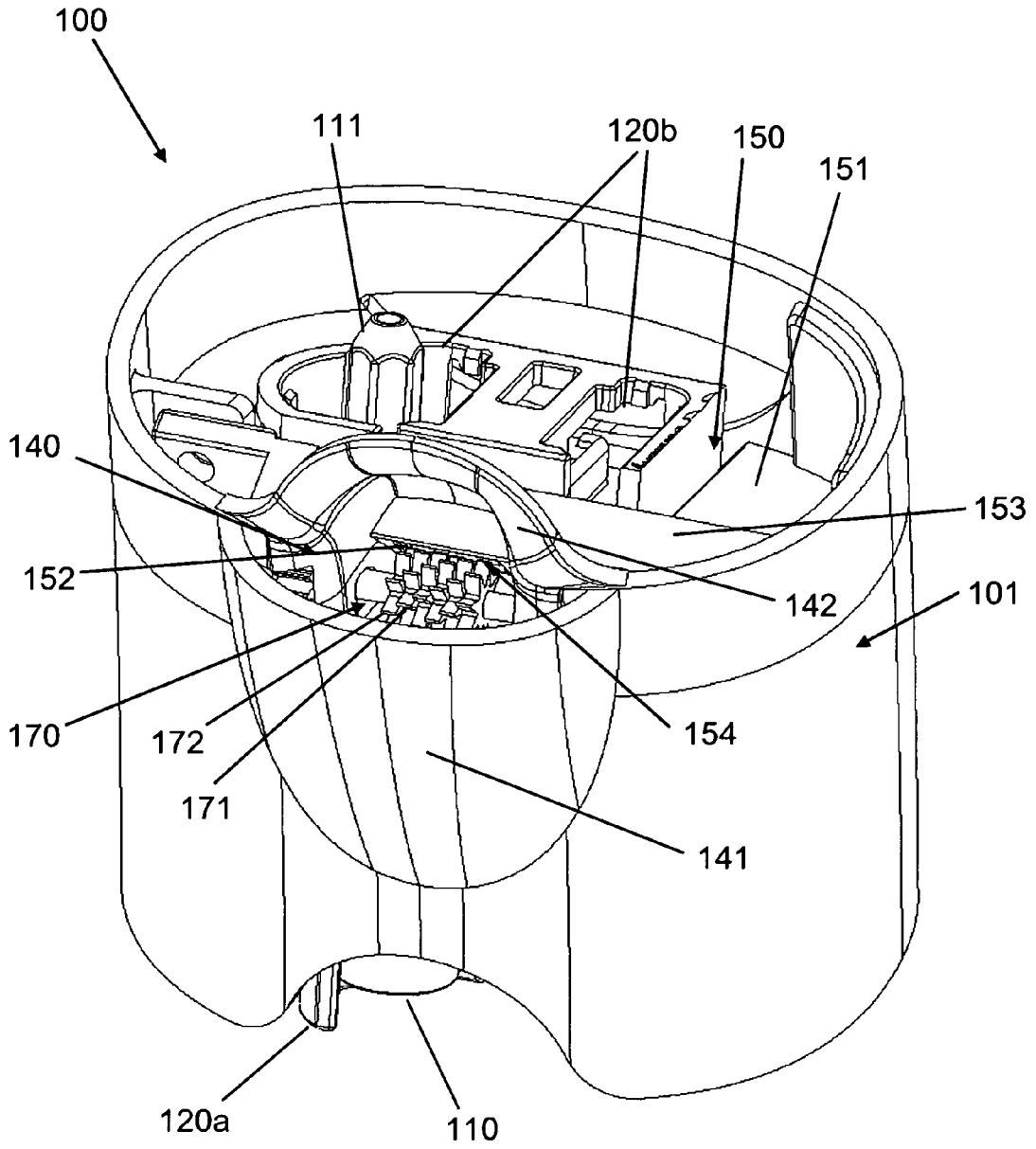
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Fig. 2

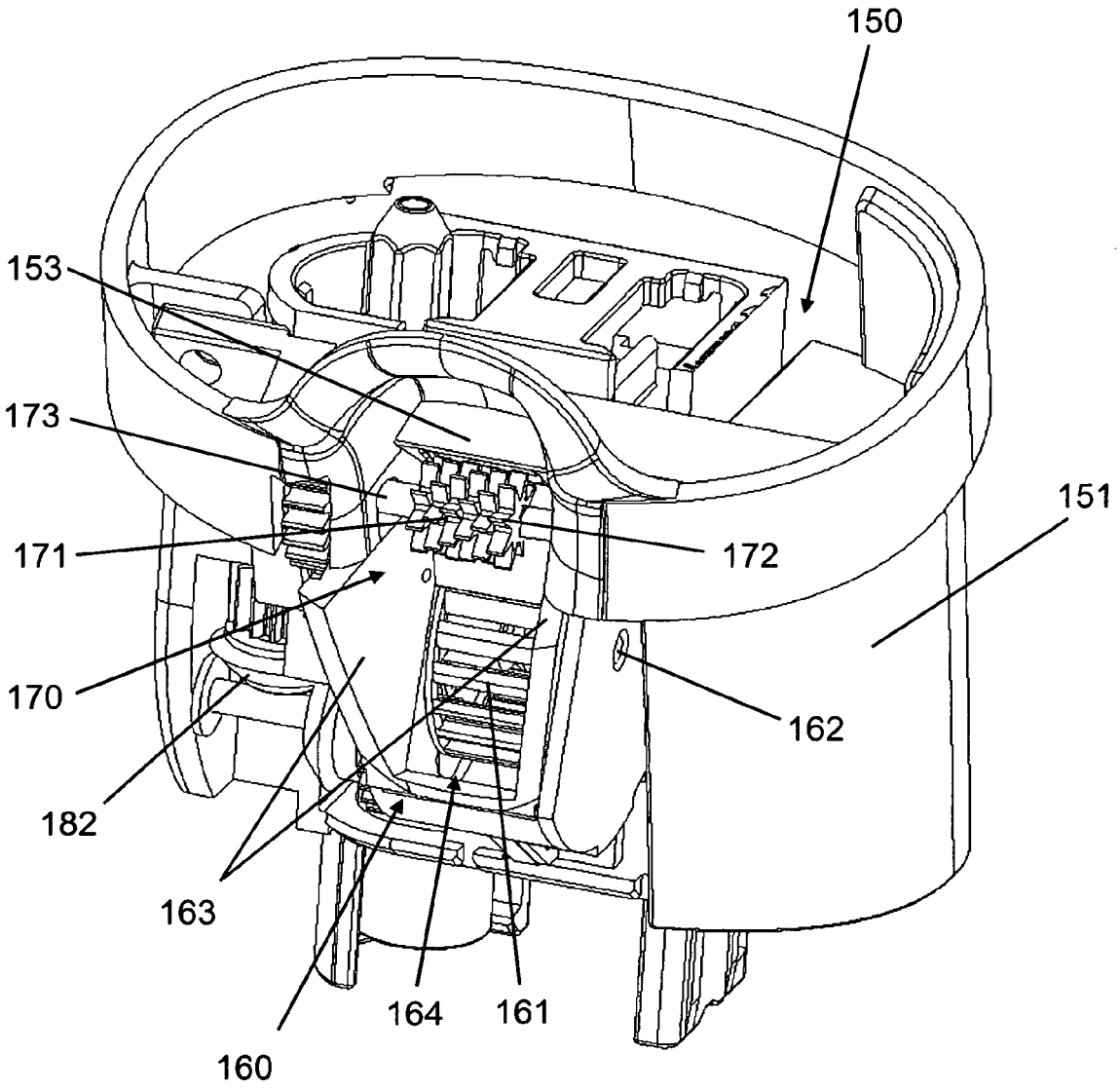

Fig. 3

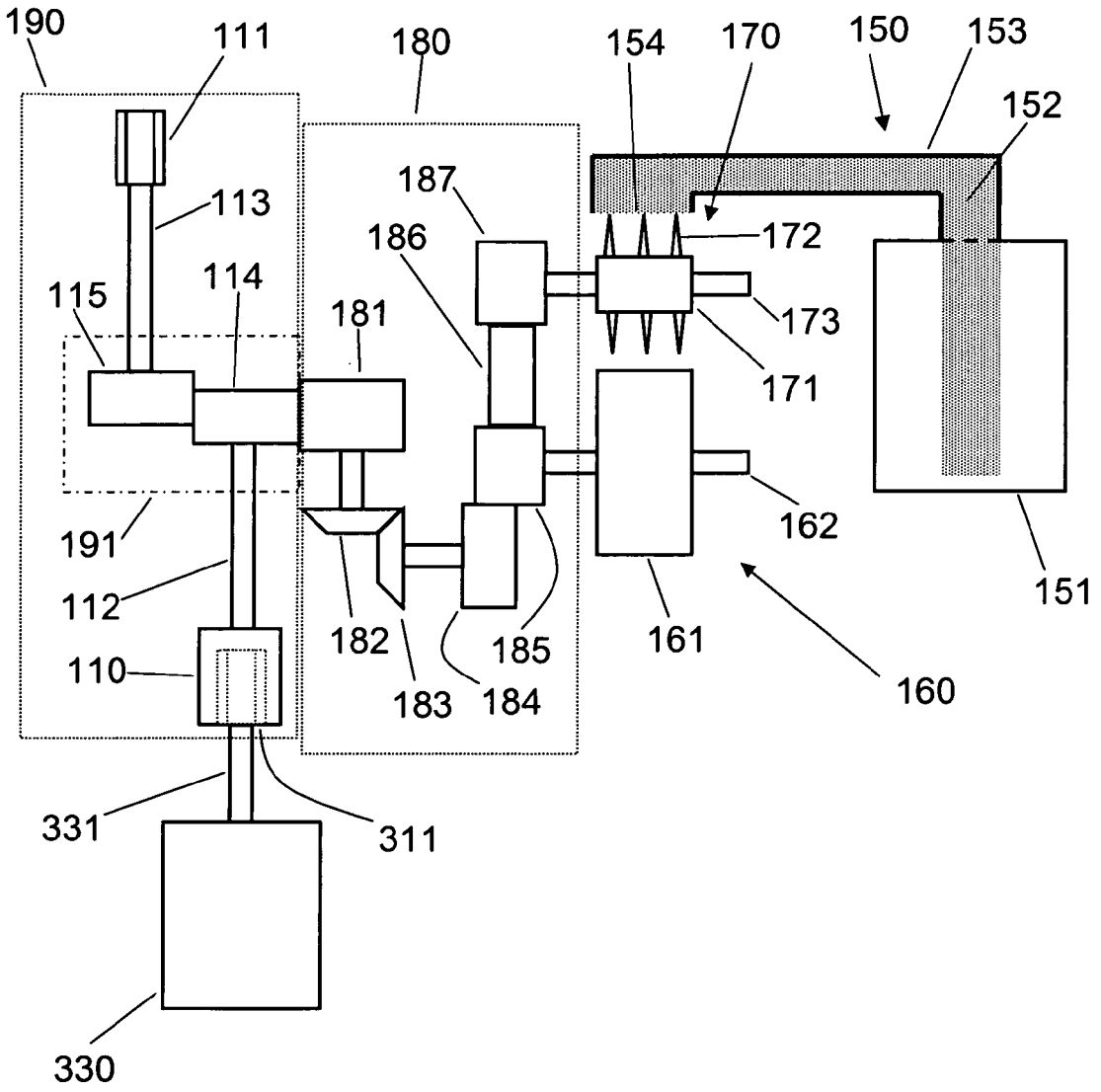
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Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 5020

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 2008/235980 A1 (CHASEN JAMES E [US] ET AL) 2 October 2008 (2008-10-02) * paragraphs [0040] - [0076] * -----	1-4,6-11 5	INV. A45D26/00 B05B3/08
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TECHNICAL FIELDS SEARCHED (IPC)

A45D
B05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 August 2009	Koob, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 00 5020

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

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- FR 2454283 **[0002]**
- US 5121541 A **[0003]**