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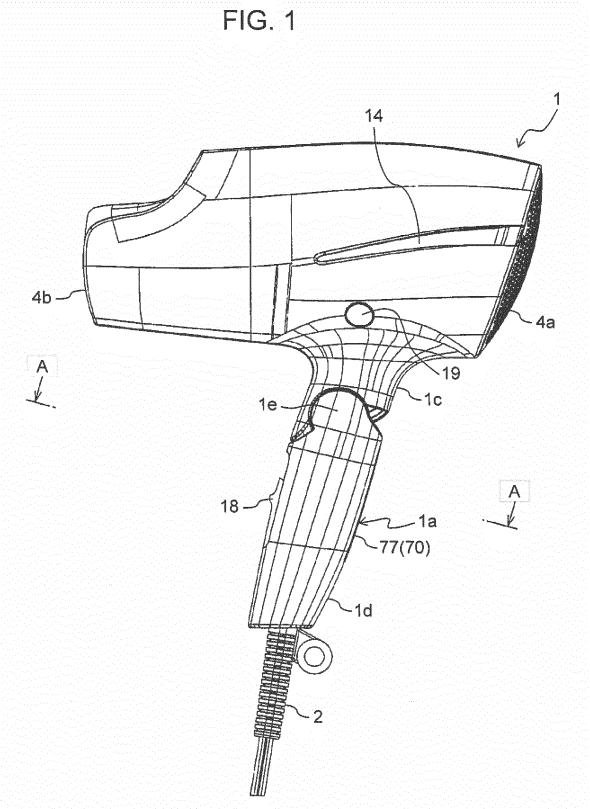
(54) HAIR CARE DEVICE

(57) A voltage supply unit in a hair care device includes a voltage supply member which has an exposed surface exposed to the outside and is attached to a housing, and a first conductive section that is electrically connected to the voltage supply member. Furthermore, the voltage supply member has a visible light transmission section having visible light transparency, the visible light transmission section having a second conductive section electrically connected to the first conductive section. In addition, the second conductive section has a contact surface contacted by supply object U, and at least a portion of the exposed surface serves as the contact surface. Furthermore, a shield section that overlaps an entirety of the exposed surface and does not transmit visible light is provided inward of the exposed surface.

FIG. 1



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Description

BACKGROUND

1. Technical Field

[0001] The present disclosure relates to a hair care device.

2. Description of the Related Art

[0002] Conventionally, a hair care device has been known which is provided with a voltage supply unit for supplying a voltage to a supply object such as a user and enhances a hair care effect by bringing the supply object into a desired charged state, as disclosed in Unexamined Japanese Patent Publication No. 2003-275016 and Unexamined Japanese Patent Publication No. 2011-005149.

[0003] In Unexamined Japanese Patent Publication No. 2003-275016 and Unexamined Japanese Patent Publication No. 2011-005149, the voltage supply unit has a voltage supply panel provided to a housing that constitutes a contour of the hair care device, and a voltage is supplied to the supply object when at least a portion of the supply object is in contact with the voltage supply panel.

[0004] Meanwhile, in the case in which the voltage supply panel is provided to the housing, it is general that the surface of the voltage supply panel is subjected to a coating treatment and an outermost layer is formed from an insulating material, because of the reason of improvement in design or the like, as disclosed in Unexamined Japanese Patent Publication No. 2011-005149. Therefore, the supply object is in contact with the voltage supply panel through the insulating material.

[0005] When the insulating material is interposed between the supply object and the voltage supply panel as described above, conductivity in supplying a voltage to the supply object is lowered, and thus, it is hard to further enhance a hair care effect.

SUMMARY

[0006] The present disclosure is accomplished to solve the conventional problem, and aims to provide a hair care device that further enhances a hair care effect while suppressing degradation in design.

[0007] In order to solve the foregoing conventional problem, the hair care device according to the present disclosure includes a housing that constitutes a contour and a voltage supply unit that supplies a voltage to a supply object.

[0008] In addition, the voltage supply unit includes: a voltage supply member which has an exposed surface exposed to the outside and is attached to the housing; and a first conductive section that is electrically connected to the voltage supply member.

[0009] Furthermore, the voltage supply member has a visible light transmission section having visible light transparency, the visible light transmission section having a second conductive section electrically connected to the first conductive section.

[0010] In addition, the second conductive section has a contact surface contacted by the supply object, and at least a portion of the exposed surface serves as the contact surface.

[0011] Furthermore, the hair care device is provided with a shield section, which overlaps an entirety of the exposed surface and does not transmit visible light, inward of the exposed surface.

[0012] The hair care device according to the present disclosure can further enhance a hair care effect while suppressing degradation in design.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a side view of a hair care device according to an exemplary embodiment of the present disclosure;

FIG. 2 is a front view of the hair care device according to the exemplary embodiment of the present disclosure;

FIG. 3 is a sectional view of the hair care device according to the exemplary embodiment of the present disclosure;

FIG. 4 is a plan view illustrating a region where a metal microparticle generator and a mist generator are provided in a main body section of the hair care device according to the exemplary embodiment of the present disclosure;

FIG. 5 is a sectional view taken along line A-A in FIG. 1;

FIG. 6 is a sectional view illustrating a mounting state of a voltage supply panel according to the exemplary embodiment of the present disclosure;

FIG. 7 illustrates a grip section according to the exemplary embodiment of the present disclosure, as viewed from the voltage supply panel side;

FIG. 8 is an exploded perspective view of the grip section according to the exemplary embodiment of the present disclosure;

FIG. 9 is a circuit diagram illustrating a voltage supply circuit included in the voltage supply unit according to the exemplary embodiment of the present disclosure;

FIG. 10 is sectional view illustrating a modification of the grip section according to the exemplary embodiment of the present disclosure;

FIG. 11 is sectional view illustrating another modification of the grip section according to the exemplary embodiment of the present disclosure;

FIG. 12 is a side view of a hair care device according to a modification of the exemplary embodiment of

the present disclosure; and

FIG. 13 is a side view of a hair care device according to another modification of the exemplary embodiment of the present disclosure.

DETAILED DESCRIPTION

[0014] The hair care device according to an exemplary embodiment of the present disclosure includes a housing that constitutes a contour and a voltage supply unit that supplies a voltage to a supply object.

[0015] In addition, the voltage supply unit includes: a voltage supply member which has an exposed surface exposed to the outside and is attached to the housing; and a first conductive section that is electrically connected to the voltage supply member.

[0016] Furthermore, the voltage supply member has a visible light transmission section having visible light transparency, the visible light transmission section having a second conductive section electrically connected to the first conductive section.

[0017] In addition, the second conductive section has a contact surface contacted by the supply object, and at least a portion of the exposed surface serves as the contact surface.

[0018] Furthermore, the hair care device is provided with a shield section, which overlaps a entirety of the exposed surface and does not transmit visible light, inward of the exposed surface.

[0019] Since the shield section that covers the region overlapping the entire of the exposed surface and does not transmit visible light is provided on the backside of the exposed surface of the voltage supply member provided with the visible light transmission section as described above, degradation in design can be suppressed.

[0020] In addition, at least a portion of the exposed surface is defined as the contact surface of the second conductive section, which can allow the supply object to be in contact with the voltage supply member without having the insulating section interposed therebetween. Thus, reduction in conductivity in supplying a voltage to the supply object can be suppressed.

[0021] Accordingly, the hair care device according to the present exemplary embodiment can further enhance a hair care effect while suppressing degradation in design.

[0022] The shield section is located between the region of the first conductive section overlapping the exposed surface and the visible light transmission section.

[0023] According to this configuration, degradation in design can be suppressed while the region overlapping the exposed surface is effectively utilized.

[0024] In addition, the shield section has an insulating section, and the second conductive section and the first conductive section are electrically connected to each other without having the insulating section interposed therebetween.

[0025] According to this configuration, reduction in conductivity in supplying a voltage to the supply object can more reliably be suppressed.

[0026] In addition, the shield section is an inner wall projecting from the housing.

[0027] According to this configuration, it is unnecessary to separately provide the shield section, whereby more simple configuration is implemented, and easier assembling is enabled.

[0028] In addition, a conductive path leading to the contact surface from the first conductive section has a bypass path that bypasses the inner wall.

[0029] This configuration can more reliably avoid the insulating section from being interposed in the middle of the conductive path leading to the contact surface from the first conductive section, while enabling simplification of the configuration.

[0030] In addition, the shield section has a third conductive section.

[0031] This configuration can more reliably avoid the insulating section from being interposed in the middle of the conductive path leading to the contact surface from the first conductive section.

[0032] In addition, the second conductive section and the first conductive section are electrically connected to each other through the third conductive section.

[0033] According to this configuration, it is unnecessary to allow the second conductive section and the first conductive section to bypass the shield section when they are electrically connected to each other, whereby the configuration can be much more simplified.

[0034] In addition, the housing has a grip section and a grip-side housing constituting the contour of the grip section, and the voltage supply member is provided on the grip-side housing.

[0035] According to this configuration, a voltage can be supplied to the supply object while in normal use, whereby usability of the hair care device is enhanced.

[0036] In addition, the voltage supply member is pressed against the first conductive section when the grip section is held.

[0037] According to this configuration, the electrical connection between the voltage supply member and the first conductive section while in use of the hair care device can more reliably be ensured, whereby a voltage can more reliably be supplied to the supply object.

[0038] Furthermore, the hair care device further includes a charged particle supply unit that supplies charged particles to the supply object.

[0039] According to this configuration, the hair care effect is further enhanced.

[0040] In addition, the charged particle supply unit discharges charged fine water droplets including charged particles.

[0041] This configuration can allow more water to adhere to hair, thereby much more enhancing the hair care effect.

[0042] The configuration described above is applicable to a dryer, a hair iron, or a hair brush serving as the hair

care device.

[0043] Hereinafter, an exemplary embodiment of the present disclosure will be described with reference to the drawings. Note that the present disclosure is not limited to the exemplary embodiment.

EXEMPLARY EMBODIMENT

[0044] Dryer 1 serving as the hair care device according to the present exemplary embodiment includes grip section 1a gripped by a user (supply object) U with his/her hand and main body section 1b connected to grip section 1a in the direction intersecting grip section 1a. Dryer 1 is configured to have substantially T-shaped or substantially an L-shaped appearance (substantially T-shaped appearance in the present exemplary embodiment) with grip section 1a and main body section 1b while in use, and to be foldable while not in use.

[0045] Power supply cord 2 is extracted from the projecting end of grip section 1a. In addition, grip section 1a is separated into base part 1c close to main body section 1b and tip part 1d, and base part 1c and tip part 1d are connected to each other through connection part 1e so as to be rotatable. Tip part 1d can be folded to a position along main body section 1b.

[0046] Housing 3 constituting the contour of dryer 1 is configured by joining a plurality of split bodies. A hollow space is formed in housing 3, and various electric components are stored in the hollow space.

[0047] Wind tunnel (air blowing path) 4 which leads to exit opening (discharge opening) 4b from entry opening (intake opening) 4a on one side (right side) of main body section 1b in the longitudinal direction (horizontal direction in FIG. 3) is formed inside main body section 1b. Fan 5 stored in wind tunnel 4 rotates to form air stream W1. Specifically, air stream W1 enters wind tunnel 4 through entry opening 4a from the outside, and is discharged to the outside from exit opening 4b through wind tunnel 4.

[0048] Entry opening 4a is covered with reticulate frame 10. Each opening of frame 10 has a honeycomb shape, for example. According to this configuration, the strength of crossbars partitioning the openings is uniformly ensured, and the total opening area of entry opening 4a becomes larger to increase air volume.

[0049] In addition, as illustrated in FIG. 3, mesh body 11 having an opening percentage of about 55% to 90% and a mesh width of about 300 nm to 650 nm is formed integrally with frame 10. Mesh body 11 is formed from a metal or flame-retardant resin such as polyester. The configuration described above in which mesh body 11 having fine meshes is molded integrally with frame 10 can more reliably prevent fine dust and hair from entering an air path.

[0050] In addition, substantially cylindrical inner cylinder 6 is provided inside outer cylinder 3a of housing 3 in main body section 1b. Air stream W1 flows in inner cylinder 6. Inside inner cylinder 6, fan 5 is disposed at the most upstream side, motor 7 for driving fan 5 is disposed at the downstream side of fan 5, and heater 8 serving as a heating mechanism is disposed at the downstream side of motor 7.

[0051] When heater 8 is activated, hot air is blown from exit opening 4b. While heater 8 is configured such that a band-like and corrugated electric resistor is wound along an inner circumference of inner cylinder 6 in the present exemplary embodiment, it is not limited to have this configuration.

[0052] In hollow space 9 formed between housing 3 and inner cylinder 6 in main body section 1b, two (a plurality of) metal microparticle generators (ion generators: charged particle supply units) 30 and 40; mist generator (ion generator: charged particle supply unit) 50; first voltage applying circuit 12 for applying a voltage to mist generator 50, and the like are stored. In addition, in hollow space 9, a second voltage applying circuit (not illustrated) for applying a voltage to metal microparticle generators 30 and 40 is stored at a location different from the location where first voltage applying circuit 12 is stored.

[0053] It is preferable that first voltage applying circuit 12 and the second voltage applying circuit are disposed in grip section 1a or a region on an extension line of grip section 1a in main body section 1b. According to this configuration, rotational moment caused by masses of first voltage applying circuit 12 and the second voltage applying circuit is decreased when user U holds grip section 1a, and therefore, a load exerted on the hand of user U is decreased.

[0054] It is also preferable that first voltage applying circuit 12 and the second voltage applying circuit are disposed on opposite sides across inner cylinder 6. This configuration can prevent troubles such as reduction, instability, or the like of a voltage caused by mutual interference between first voltage applying circuit 12 and the second voltage applying circuit.

[0055] In addition, in the present exemplary embodiment, a switch unit (not illustrated) for switching between hot air and cold air or for switching an operation mode is stored on the side face (the region of hollow space 9 different from the region where first voltage applying circuit 12 is stored) of hollow space 9.

[0056] Further, another switch unit 16 for turning on and off a power supply is stored in a hollow space in tip part 1d of grip section 1a. The electric components are connected to one another with lead lines 17 formed by covering cores made of a metal conductor or the like with insulating resin or the like (see FIG. 4).

[0057] Note that lead line 17 connected to metal microparticle generator 30, lead line 17 connected to metal microparticle generator 40, and lead line 17 connected to mist generator 50 are preferably wired to be separated from one another as much as possible without being mutually intersected. This is to prevent the situation in which desired voltage cannot be obtained by metal microparticle generators 30 and 40 and mist generator 50 and to prevent the voltage from becoming unstable, due to the mutual interference of current flowing through respective

lead lines 17.

[0058] Switch unit 16 is configured such that an on-off state of an internal contact is switched through an operation on operation member 18 exposed on the surface of housing 3. Switch unit 16 is configured such that the on-off state of the internal contact is switched in stages by the vertical sliding movement of operation member 18.

[0059] Specifically, switch unit 16 is switchable among four modes which are off, low airflow, middle airflow, and high airflow. When operation member 18 is located at the lowermost part, the power supply is turned off. When the user slides up operation member 18 by one stage from the lowermost part, the power supply is turned on, and air at a low flow rate is blown. When the user further slides up operation member 18 by one more stage, air at a middle flow rate is blown, and when the user slides up operation member 18 to the uppermost part, air at a high flow rate is blown.

[0060] On the other hand, the switch unit that switches between hot air and cold air or switches an operation mode is configured such that an on-off state of an internal contact is switched through an operation (deformation) of operation member 19 formed on the surface of housing 3. Display unit 14 that displays the currently selected mode is formed above operation member 19.

[0061] The switch units, display unit 14, and the like are electrically connected to a microcomputer on a control board not illustrated.

[0062] Inner cylinder 6 has cylindrical part 6a, a plurality of support ribs 6b (only one of them is illustrated in FIG. 3) extending radially outward from cylindrical part 6a and dispersively disposed in the circumferential direction, and flange part 6c connected to cylindrical part 6a through support ribs 6b and projecting in the direction substantially orthogonal to the axial direction of cylindrical part 6a.

[0063] Gap g1 is formed between cylindrical part 6a and flange part 6c (see FIG. 3). A portion of air stream W1 is bifurcated and flows into hollow space 9 through gap g1 to become branch stream W2. Note that gap g1 which becomes an inlet of branch stream W2 into hollow space 9 is formed at the downstream side with respect to fan 5 and at the upstream side with respect to heater 8. Therefore, branch stream W2 is relatively a cold air stream which has not yet been heated by heater 8.

[0064] A portion of branch stream W2 is further bifurcated to become branch stream W3 (see FIG. 3). Branch stream W3 is relatively a cold air stream blown from an outer circumferential portion of exit opening 4b through between inner cylinder 6 and housing 3 without passing through later-described metal microparticle outlet openings (ion discharge openings) 20a and 20b and mist outlet opening (ion discharge opening) 20c.

[0065] Housing 3 is formed with oval through-hole (opening) 3b at the position on hollow space 9 close to exit opening 4b, and this through-hole 3b is covered with cover 20 formed from an insulating synthetic resin material.

[0066] As described above, in the present exemplary embodiment, cover 20 is attached to housing 3 so as to cover through-hole 3b formed on housing 3. In addition, in the present exemplary embodiment, cover 20 is attached to housing 3 in such a manner that cover 20 is moved from the left side to the right side in FIG. 3 relative to housing 3. Therefore, in the present exemplary embodiment, the direction from the downstream side to the upstream side of wind tunnel 4 coincides with the direction of attaching cover 20 to housing 3.

[0067] In addition, cover 20 is formed with metal microparticle outlet openings 20a and 20b and mist outlet opening 20c, which are independently formed (see FIG. 2).

[0068] Notably, ion path 4c through which ion flows is formed in front of mist generator 50 and metal microparticle generators 30 and 40 (see FIG. 4), and metal microparticle outlet openings 20a and 20b and mist outlet opening 20c are formed at the downstream side of ion path 4c.

[0069] In addition, it is preferable that cover 20 is formed to have conductivity lower than that of housing 3 in order to prevent cover 20 from being charged by metal microparticles or mist. This is because, if cover 20 is charged, charged metal microparticles, negative ions, or mist are hard to be discharged from metal microparticle generators 30 and 40 or mist generator 50, due to the charges.

[0070] In order to prevent cover 20 from being charged, cover 20 is preferably formed from a material which hardly causes electrical charging, such as polycarbonate (PC) resin. Note that cover 20 constitutes the contour of dryer 1 in the present exemplary embodiment.

[0071] In addition, static electricity can be removed from cover 20 by bringing cover 20 into contact with an electrode of mist generator 50.

[0072] Furthermore, in the present exemplary embodiment, the diameter of each of metal microparticle outlet openings 20a and 20b is smaller than the diameter of mist outlet opening 20c. Specifically, accidental insertion of fingers, tools, or the like into metal microparticle outlet openings 20a and 20b is inhibited, while the maintenance, confirmation of the state, or the like of mist generator 50 through mist outlet opening 20c are easy.

[0073] In addition, in the present exemplary embodiment, metal microparticle outlet openings 20a and 20b are formed on surrounding portion 20d around mist outlet opening 20c (see FIG. 2).

[0074] Specifically, metal microparticle outlet opening 20a and metal microparticle outlet opening 20b are provided so as to be symmetric with respect to mist outlet opening 20c.

[0075] That is, metal microparticle outlet openings 20a and 20b and mist outlet opening 20c are formed on cover 20 in the order of metal microparticle outlet opening 20a, mist outlet opening 20c, and metal microparticle outlet opening 20b in the width direction (horizontal direction in FIG. 2) of dryer 1.

[0076] According to this arrangement, negatively charged mist is prevented from diffusing (dispersing) outward by negative ions blown from metal microparticle outlet openings 20a and 20b formed on surrounding portion 20d of mist outlet opening 20c.

[0077] This results in enhancing linearity of mist, which makes the mist easier to reach hair. Thus, the hair care effect can further be enhanced.

[0078] In addition, wall part 20e extending in the direction in which mist blows is provided below and downstream of mist outlet opening 20c (see FIGS. 3 and 4). The formation of wall part 20e can prevent the mist blown from mist outlet opening 20c from diffusing (dispersing) downward.

[0079] In addition, metal microparticle generators 30 and 40 and mist generator 50 are arranged in parallel in hollow space 9 in the order of metal microparticle generator 30, mist generator 50, and metal microparticle generator 40 in the width direction (horizontal direction in FIG. 2) of dryer 1.

[0080] Further, shield plates (partitioning sections) 6d are formed between mist generator 50 and metal microparticle generators (negative ion generators) 30 and 40 which are adjacent to mist generator 50 (see FIG. 4).

[0081] As illustrated in FIG. 4, shield plates 6d are disposed to extend in the vertical direction of dryer 1 and in the direction in which the mist blows (horizontal direction in FIG. 4), and this configuration prevents metal microparticles or mist from being mixed before blowing from metal microparticle outlet openings 20a and 20b and mist outlet opening 20c.

[0082] A known device can be used for metal microparticle generators 30 and 40, such as a metal microparticle generation device having a discharge electrode (first electrode) and a discharge counter electrode (second electrode) which are formed from a metal material having conductivity.

[0083] In addition, a known device can also be used for mist generator 50. For example, an electrostatic atomizer can be used which generates condensation water on a surface of a cooling plate cooled by a Peltier element by condensing water in the air, and atomizes the generated condensation water by a discharge action to generate very fine mist (negatively charged mist including negative ions) of a nanometer size.

[0084] In the present exemplary embodiment, mist generator (ion generator) 50 is used as a charged particle supply unit that discharges mist (charged fine water droplets including charged particles).

[0085] In addition, in the present exemplary embodiment, voltage supply unit 70 that supplies a voltage to user U is provided, whereby the reduction in an amount of the generated charged particles adhered on hair is suppressed.

[0086] Specifically, voltage supply unit 70 includes voltage supply circuit 71 including a plurality of electric elements, and voltage supply panel (voltage supply member) 77 that supplies a voltage output from voltage supply circuit 71 to user U.

[0087] Note that voltage supply circuit 71 is the circuit illustrated in FIG. 9, for example. Specifically, voltage supply circuit 71 includes switch 72 serving as a switching element enabling to allow current supplied from commercial power supply 76 to flow bidirectionally, capacitor 73 connected in series with switch 72, and a plurality of resistors.

[0088] Voltage supply circuit 71 includes a plurality of resistors including first resistor 74 disposed between commercial power supply 76 and switch 72 and second resistor 75 disposed between capacitor 73 and voltage supply panel 77.

[0089] Note that switch 72 is composed of, for example, a photo metal oxide semiconductor (MOS) relay, and turned on and off by a controller not illustrated.

[0090] Meanwhile, voltage supply panel 77 is attached to grip-side housing 60 (housing 3) constituting the contour of grip section 1a (see FIG. 7). The surface of voltage supply panel 77 attached to grip-side housing 60 is exposed to the outer surface of grip section 1a. That is, voltage supply panel 77 has exposed surface 77a exposed to the outside when being attached to grip-side housing 60.

[0091] In addition, in the present exemplary embodiment, voltage supply panel 77 is provided with visible light transmission section 80 having visible light transparency. Second conductive section (visible light transmission section side conductive section) 85 having conductivity is formed on visible light transmission section 80 (see FIG. 6).

[0092] Second conductive section 85 is electrically connected to first conductive section 78 which is a portion of voltage supply circuit 71 described above. Second conductive section 85 is provided with contact surface 85a directly contacted by user U (without having an insulating section interposed therebetween). Contact surface 85a is also at least a portion of exposed surface 77a.

[0093] According to this configuration, when user U holds grip section 1a of dryer 1 while in normal use, the palm or the like of user U is in directly contact with contact surface 85a. With this state, a voltage output from voltage supply circuit 71 is supplied to user U from second conductive section 85.

[0094] At that time, it is preferable that the voltage is supplied to user U from voltage supply panel 77 so that user U is charged with a polarity opposite to the polarity of the charges of ions generated from mist generator 50. When user U is charged with a polarity opposite to the polarity of the charged particles supplied from charged particle supply unit as described above, the generated charged particles can be attracted to the hair of user U, whereby the reduction in the amount of the charged particles adhered to the hair can be suppressed.

[0095] In the present exemplary embodiment, semi-transparent voltage supply panel 77 is formed by using a material having semi-transparency. Further, voltage supply panel 77 has conductivity. Voltage supply panel

77 described above can be formed by using a material obtained by mixing, for example, acrylonitrile-butadiene-styrene (ABS) resin, polycarbonate (PC) resin, and an additive such as hydrophilic polymer. In addition, voltage supply panel 77 having conductivity can also be formed by using a material obtained by mixing an additive such as carbon fibers or metal microparticles into resin such as ABS resin or PC resin.

[0096] Meanwhile, if the resistance value of voltage supply panel 77 formed by using the above-mentioned materials is low, an internal circuit (circuit such as voltage supply circuit 71) may be broken due to static electricity from the outside.

[0097] To address such a problem, it is preferable that voltage supply panel 77 is formed by using a material having volume resistivity of 1.0×10^6 Ω·m or higher, for example, to prevent the internal circuit from being broken due to static electricity from the outside.

[0098] As described above, in the present exemplary embodiment, the entire of voltage supply panel 77 serves as visible light transmission section 80 and as second conductive section 85. In addition, the entire of exposed surface 77a serves as contact surface 85a.

[0099] Furthermore, grip-side housing 60 is configured by joining a plurality of split bodies. As illustrated in FIGS. 6 and 8, grip-side housing 60 includes first split housing 61 and second split housing 62.

[0100] Voltage supply panel 77 is held between first split housing 61 and second split housing 62 when first split housing 61 and second split housing 62 are joined to each other. Thus, voltage supply panel 77 is attached to grip-side housing 60.

[0101] Specifically, voltage supply panel 77 has main body part 81 having exposed surface 77a (contact surface 85a), and flange part 82 projecting outward from an end (inner side of main body part 81 in the thickness direction) of main body part 81 opposite to exposed surface 77a (see FIGS. 6 and 8).

[0102] In addition, flange part 82 is provided with first protrusion 83 and second protrusions 84 which protrude outward in the width direction from the inner side of main body part 81 in the thickness direction.

[0103] When first split housing 61 and second split housing 62 are joined to each other, first protrusion 83 is engaged with engagement part 61a formed on first split housing 61, and second protrusions 84 are engaged with engagement part 62a formed on second split housing 62. Thus, voltage supply panel 77 is attached to grip-side housing 60 (see FIG. 6).

[0104] First protrusion 83 has first extension part 83a extending inward in the thickness direction of main body part 81 from the outer tip of flange part 82, and second extension part 83b extending outward in the width direction of main body part 81 from the inner tip of first extension part 83a.

[0105] When first protrusion 83 is engaged with engagement part 61a on first split housing 61, back surface 83c of second extension part 83b is in contact with surface (placement surface) 61c of first conductive section placement rib 61b formed on first split housing 61 (see FIG. 6).

[0106] Second protrusions 84 extend outward in the width direction of main body part 81 from the inner side of main body part 81 in the thickness direction, and three (a plurality of) second protrusions 84 are arranged in the longitudinal direction of main body part 81 (see FIG. 8).

[0107] Moreover, in the present exemplary embodiment, back surface 82a of flange part 82 and back surface 81a of main body part 81 are flush with each other, and back surfaces 84a of second protrusions 84 are flush with back surface 82a of flange part 82 and back surface 81a of main body part 81 (see FIG. 6).

[0108] As described above, first conductive section placement rib 61b projecting toward second split housing 62 is formed inside of first split housing 61, and first conductive section 78 is placed on surface 61c of first conductive section placement rib 61b (see FIGS. 6 and 8).

[0109] In the present exemplary embodiment, first conductive section 78 includes lead line 78a and aluminum foil 78b. The core, at the tip of lead line 78a, which is exposed by removing a coating member is covered with aluminum foil 78b, and with this state, aluminum foil 78b is attached on surface 61c of first conductive section placement rib 61b. With this, first conductive section 78 is placed on surface 61c of first conductive section placement rib 61b (see FIGS. 6 and 8).

[0110] When first protrusion 83 is engaged with engagement part 61a on first split housing 61, back surface 83c of second extension part 83b is in contact with aluminum foil 78b placed on surface 61c of first conductive section placement rib 61b (see FIG. 6).

[0111] Accordingly, in the present exemplary embodiment, back surface 83c of second extension part 83b serves as contact section 85b in contact with first conductive section 78 on second conductive section 85. The direction (the direction in which contact section 85b faces first conductive section 78) in which back surface 83c of second extension part 83b is in contact with first conductive section 78 substantially coincides with the thickness direction of main body part 81. According to this configuration, when user U holds grip section 1a, voltage supply panel 77 is pressed inward in the thickness direction of main body part 81, so that grip-side voltage supply member 77 is pressed against first conductive section 78 by the pressing force.

[0112] Notably, as illustrated in FIG. 8, a plurality of ribs 61d is formed on surface 61c of first conductive section placement rib 61b, and when lead line 78a is held between these ribs 61d, the movement of lead line 78a is restricted. In addition, recess 61e is formed on first conductive section placement rib 61b. One end of lead line 78a is routed to the inner side of first conductive section placement rib 61b by way of inserting lead line 78a into recess 61e. This one end of lead line 78a is electrically connected to electrical elements composing voltage supply circuit 71.

[0113] In the present exemplary embodiment, second extension part 83b is located inward from back surface 81a of main body part 81 in the thickness direction as illustrated in FIG. 6. Therefore, in the state in which first protrusion 83 is engaged with engagement part 61a of first split housing 61, space S1 is formed between back surface 81a of main body part 81 and surface 61c of first conductive section placement rib 61b.

[0114] In addition, in the present exemplary embodiment, semi-transparent voltage supply panel 77 is used, whereby space S1 can be visually recognized from outside.

[0115] A portion of first conductive section 78 is present in space S1. Therefore, with this state, a portion of first conductive section 78 (a portion of first conductive section 78 overlapping exposed surface 77a) is visible from outside, which might degrade design.

[0116] In view of this, in the present exemplary embodiment, shield section 90 which overlaps the entire of exposed surface 77a in the thickness direction of main body part 81 and does not transmit visible light is provided inside of exposed surface 77a to prevent degradation in design (see FIG. 6).

[0117] Specifically, rib (inner wall) 62b projecting toward first split housing 61 is formed inside of second split housing 62, and this rib 62b functions as shield section 90 to prevent a portion of first conductive section 78 from being visually recognized from the outside.

[0118] In the present exemplary embodiment, rib 62b is configured such that surface 62c of rib 62b faces the entire of back surfaces 84a of second protrusions 84, the entire of back surface 81a of main body part 81, and the entire of back surface 82a of flange part 82.

[0119] In addition, rib 62b is configured to be located above (exposed surface 77a side: outer side) first conductive section placement rib 61b, when first split housing 61 and second split housing 62 are joined to each other. Also, rib 62b is located between the region of first conductive section 78 overlapping exposed surface 77a and main body part 81 (visible light transmission section 80).

[0120] In addition, in the present exemplary embodiment, rib 62b is formed from an insulating material, so that the entire of rib 62b (entire of shield section 90) serves as insulating section 91.

[0121] Second conductive section 85 and first conductive section 78 are electrically connected to each other without having insulating section 91 interposed therebetween.

[0122] In the present exemplary embodiment, contact section 85b of second conductive section 85 is brought into direct contact with first conductive section 78 on the region of first conductive section 78 not overlapping exposed surface 77a in the thickness direction of main body part 81. Thus, insulating section 91 is not interposed in the middle of conductive path 86 leading to contact surface 85a from first conductive section 78.

[0123] Note that conductive path 86 has bypass path 86a that bypasses rib 62b.

[0124] As described above, in the present exemplary embodiment, contact section 85b of second conductive section 85 and first conductive section 78 are brought into contact with each other in a region outside of rib 62b as viewed from the thickness direction of main body part 81. According to this configuration, even when insulating section 91 is present between first conductive section 78 and main body part 81, conductive path 86 having no insulating section 91 interposed in the middle thereof is formed.

[0125] In this case, if a creepage distance between exposed surface 77a and first conductive section 78 is short, the internal circuit might be broken due to static electricity from the outside.

[0126] To address this problem, voltage supply panel 77 and first conductive section 78 are disposed such that the shortest creepage distance from exposed surface 77a to first conductive section 78 is set to 5 mm or more, for example. It is preferable to prevent the internal circuit from being broken due to static electricity from the outside by applying such configuration.

[0127] Grip section 1a having the configuration described above is assembled in the manner described below, for example.

[0128] Firstly, the core, at the tip of lead line 78a, which is exposed by removing the coating member is covered with aluminum foil 78b, and with this state, aluminum foil 78b is attached on surface 61c of first conductive section placement rib 61b. With this, first conductive section 78 is placed on surface 61c of first conductive section placement rib 61b. In this case, lead line 78a is inserted between ribs 61d on surface 61c of first conductive section placement rib 61b to be held therebetween, and also inserted into recess 61e so that one end of lead line 78a is routed to the inside of first conductive section placement rib 61b.

[0129] Then, with first protrusion 83 being engaged with engagement part 61a on first split housing 61, voltage supply panel 77 is attached to first split housing 61 while contact section 85b (back surface 83c of second extension part 83b) of second conductive section 85 is brought into contact with aluminum foil 78b.

[0130] Thereafter, rib 62b of second split housing 62 is inserted into space S1 on the side closer to exposed surface 77a than to first conductive section 78, and second protrusions 84 are engaged with engagement part 62a on second split housing 62. Thus, first split housing 61 and second split housing 62 are joined to each other. Notably, in the present exemplary embodiment, positioning rib 62d is formed on second split housing 62, and when first split housing 61 and second split housing 62 are joined to each other, the tip of first conductive section placement rib 61b is engaged with the tip of positioning rib 62d.

[0131] In this way, grip section 1a on which exposed surface 77a (contact surface 85a) of voltage supply panel 77 is exposed to the outside is formed.

[0132] Note that the connection between voltage sup-

ply panel 77 and first conductive section 78 is not limited to the above configuration, and various modifications are possible.

[0133] For example, as illustrated in FIG. 10, rib 62b of second split housing 62 may be configured not to extend to first extension part 83a.

[0134] In FIG. 10, back surface 82a of flange part 82, back surface 81a of main body part 81, and back surfaces 84a of second protrusions 84 are subjected to a coating treatment or the like to form non-transparent coating film 100 having insulating property, and this coating film 100 functions as shield section 90 in place of rib 62b. That is, in FIG. 10, the entire of coating film 100 serves as insulating section 91.

[0135] Similarly in FIG. 10, the entire of voltage supply panel 77 serves as semi-transparent visible light transmission section 80 and also as second conductive section 85. Contact surface 85a formed on second conductive section 85 constitutes the entire (at least a portion) of exposed surface 77a.

[0136] In addition, similarly in FIG. 10, conductive path 86 leading to contact surface 85a from first conductive section 78 has bypass path 86a that bypasses coating film 100 (insulating section 91), so that insulating section 91 is not interposed in the middle of conductive path 86.

[0137] Note that coating film 100 may only be provided in a region, on the back surface of voltage supply panel 77, which overlaps the entire of exposed surface 77a in the thickness direction of main body part 81. Accordingly, it is also possible that coating film 100 is not provided on back surface 82a of flange part 82 and back surfaces 84a of second protrusions 84.

[0138] Note that, in the present exemplary embodiment and in FIG. 10, it is unnecessary to make the entire of voltage supply panel 77 serve as semi-transparent visible light transmission section 80.

[0139] For example, as illustrated in FIG. 11, visible light transmission section 80 and shield section 90 can be formed on voltage supply panel 77.

[0140] In FIG. 11, the outer side (exposed surface 77a side) of voltage supply panel 77 serves as visible light transmission section 80 having conductivity, and the inner side (first conductive section 78 side) of voltage supply panel 77 serves as shield section 90 having conductivity.

[0141] That is, the entire of visible light transmission section 80 serves as second conductive section 85, and the entire of shield section 90 serves as third conductive section (shield-side conductive section) 92.

[0142] Such voltage supply panel 77 can be formed integrally by two-color molding using different materials, for example.

[0143] First conductive section 78 is electrically connected to the back surface (back surface 92a of third conductive section 92) of voltage supply panel 77 through plate spring 110.

[0144] As described above, in FIG. 11, shield section 90 has third conductive section 92, and second conductive section 85 and first conductive section 78 are electrically connected to each other through third conductive section 92.

[0145] With this configuration, it is possible to avoid insulating section 91 from being interposed in the middle of conductive path 86 leading to contact surface 85a from first conductive section 78 without allowing conductive path 86 to make a detour.

[0146] Notably, similarly in FIG. 11, shield section 90 may only be provided in a region, on the back surface of voltage supply panel 77, which overlaps the entire of exposed surface 77a in the thickness direction of main body part 81.

[0147] As described above, dryer (hair care device) 1 according to the present exemplary embodiment includes housing 3 constituting the contour and voltage supply unit 70 that supplies a voltage to user U.

[0148] In addition, voltage supply unit 70 has voltage supply panel 77 which has exposed surface 77a exposed to the outside and is attached to housing 3, and first conductive section 78 electrically connected to voltage supply panel 77.

[0149] Furthermore, voltage supply panel 77 has visible light transmission section 80 having visible light transparency, visible light transmission section 80 having second conductive section 85 electrically connected to first conductive section 78.

[0150] In addition, second conductive section 85 has contact surface 85a contacted by user U, and at least a portion of exposed surface 77a serves as contact surface 85a.

[0151] Dryer (hair care device) 1 also includes, inside of exposed surface 77a, shield section 90 that overlaps the entire of exposed surface 77a and does not transmit visible light.

[0152] Since shield section 90 that overlaps the entire of exposed surface 77a and does not transmit visible light is provided on the backside of exposed surface 77a of voltage supply panel 77 provided with visible light transmission section 80 as described above, degradation in design can be suppressed.

[0153] In addition, at least a portion of exposed surface 77a is defined as contact surface 85a of second conductive section 85, which can allow user U to be in contact with voltage supply panel 77 without having insulating section 91 interposed therebetween. Thus, reduction in conductivity in supplying a voltage to user U can be suppressed.

[0154] Accordingly, dryer (hair care device) 1 according to the present exemplary embodiment can further enhance a hair care effect while suppressing degradation in design.

[0155] Also, shield section 90 may be located between the region of first conductive section 78 overlapping exposed surface 77a and visible light transmission section 80.

[0156] According to this configuration, degradation in design can be suppressed while the region overlapping

exposed surface 77a is effectively utilized (as the location where first conductive section 78 is disposed).

[0157] In addition, shield section 90 may have insulating section 91, and second conductive section 85 and first conductive section 78 may be electrically connected to each other without having insulating section 91 interposed therebetween.

[0158] According to this configuration, reduction in conductivity in supplying a voltage to user U can more reliably be suppressed.

[0159] Furthermore, shield section 90 can be constituted by rib 62b projecting from housing 3.

[0160] According to this configuration, it is unnecessary to separately provide shield section 90, whereby more simple configuration is implemented. Moreover, shield section 90 is provided by the assembly of housing 3, whereby easier assembling is implemented.

[0161] In addition, conductive path 86 leading to contact surface 85a from first conductive section 78 may have bypass path 86a that bypasses rib 62b.

[0162] This can more reliably avoid insulating section 91 from being interposed in the middle of conductive path 86 leading to contact surface 85a from first conductive section 78, while enabling simplification of the configuration.

[0163] In addition, shield section 90 may have third conductive section 92.

[0164] This configuration can more reliably avoid insulating section 91 from being interposed in the middle of conductive path 86 leading to contact surface 85a from first conductive section 78.

[0165] Furthermore, second conductive section 85 and first conductive section 78 can be electrically connected to each other through third conductive section 92.

[0166] According to this configuration, it is unnecessary to allow second conductive section 85 and first conductive section 78 to bypass shield section 90 when they are electrically connected to each other, whereby the configuration can be much more simplified.

[0167] In addition, voltage supply panel 77 can be formed on grip-side housing 60 serving as housing 3 and constituting the contour of grip section 1a.

[0168] According to this configuration, a voltage can be supplied to user U while in normal use, whereby usability of dryer (hair care device) 1 is enhanced.

[0169] Moreover, it can be configured such that, when grip section 1a is held, voltage supply panel 77 is pressed by first conductive section 78.

[0170] According to this configuration, the electrical connection between voltage supply panel 77 and first conductive section 78 while in use of dryer (hair care device) 1 can more reliably be ensured, whereby a voltage can more reliably be supplied to user U.

[0171] Moreover, dryer (hair care device) 1 can be configured to further include a charged particle supply unit (metal microparticle generators 30 and 40 and mist generator 50) that supplies charged particles to user U.

[0172] According to this configuration, the hair care effect is further enhanced.

[0173] In addition, dryer (hair care device) 1 can be configured such that the charged particle supply unit has mist generator 50 that discharges charged fine water droplets (mist) including charged particles.

[0174] This configuration can allow more water to be adhered to hair, thereby much more enhancing the hair care effect.

[0175] While the preferable exemplary embodiment of the present disclosure has been described above, the present disclosure is not limited to the exemplary embodiment described above, and various modifications are possible.

[0176] For example, as illustrated in FIG. 12, the present disclosure is applicable to hair iron 1A as a hair care device. Hair iron 1A includes at least charged particle supply unit (metal microparticle generators 30 and 40 and mist generator 50), voltage supply unit 70, and a controller (not illustrated), and voltage supply panel 77 is formed on grip section 1aA.

[0177] In addition, as illustrated in FIG. 13, the present disclosure is applicable to hair brush 1B as a hair care device. Hair brush 1B includes at least charged particle supply unit (metal microparticle generators 30 and 40 and mist generator 50), voltage supply unit 70, and a controller (not illustrated), and voltage supply panel 77 is formed on grip section 1aB.

[0178] In addition, while the metal microparticle generator that generates metal microparticles and negative ions is disclosed as the ion generator in the exemplary embodiment described above, one that generates only negative ions without generating metal microparticles may be used.

[0179] Further, the present disclosure is also applicable to an ion generation device that generates positive ions. The generation of positive ions as described above is effective for hair having artificial hair such as a wig thereon. The artificial hair such as a wig is likely to be negatively charged. In view of this, positive ions are supplied thereto to prevent electrostatic generation.

[0180] In addition, while the exemplary embodiment describes the configuration in which the entire of exposed surface 77a serves as contact surface 85a, contact surface 85a may be formed on a portion of exposed surface 77a. For example, patterns or characters may be printed on a portion of contact surface 85a to form an insulating section on a portion of exposed surface 77a.

[0181] Alternatively, insulating section 91 can be formed on a portion of voltage supply panel 77.

[0182] Alternatively, shield section 90 having conductivity can be disposed inside of voltage supply panel 77.

[0183] In the exemplary embodiment described above, two metal microparticle outlet openings (ion discharge openings) are formed. However, three or more metal microparticle openings (ion discharge openings) can be formed.

[0184] While the above exemplary embodiment describes the configuration in which metal microparticles

and mist are blown through a branch stream, the metal microparticles and mist can be blown from corresponding outlet openings even if the branch stream is not formed.

[0185] In addition, the specifications (shape, size, layout, etc.) of covers, housings, and the other details can be modified.

[0186] The present disclosure provides a hair care device that can further enhance a hair care effect while suppressing degradation in design.

Claims

1. A hair care device comprising:

a housing that constitutes a contour; and
a voltage supply unit that supplies a voltage to a supply object,
wherein the voltage supply unit includes:

a voltage supply member which has an exposed surface exposed to the outside and is attached to the housing; and
a first conductive section electrically connected to the voltage supply member,

the voltage supply member has a visible light transmission section having visible light transparency,
the visible light transmission section has a second conductive section electrically connected to the first conductive section,
the second conductive section has a contact surface contacted by the supply object,
the contact surface is at least a portion of the exposed surface, and
a shield section that overlaps an entirety of the exposed surface and does not transmit visible light is provided inward of the exposed surface.

2. The hair care device according to claim 1, wherein the shield section is located between the first conductive section and the visible light transmission section.

3. The hair care device according to claim 1 or 2, wherein
the shield section has an insulating section, and
the second conductive section and the first conductive section are electrically connected to each other without having the insulating section interposed therebetween.

4. The hair care device according to claim 3, wherein the shield section is an inner wall projecting from the housing.

5. The hair care device according to claim 4, wherein a conductive path leading to the contact surface from the first conductive section has a bypass path that bypasses the inner wall.

6. The hair care device according to any one of claims 1 to 5, wherein the shield section has a third conductive section.

7. The hair care device according to claim 6, wherein the second conductive section and the first conductive section are electrically connected to each other through the third conductive section.

8. The hair care device according to any one of claims 1 to 7, wherein
the housing has a grip section and a grip-side housing constituting a contour of the grip section, and
the voltage supply member is provided on the grip-side housing.

9. The hair care device according to claim 8, wherein the voltage supply member is pressed against the first conductive section when the grip section is held.

10. The hair care device according to any one of claims 1 to 9, further comprising a charged particle supply unit that supplies charged particles to the supply object.

11. The hair care device according to claim 10, wherein the charged particle supply unit discharges charged fine water droplets including the charged particles.

12. The hair care device according to any one of claims 1 to 11, wherein the hair care device is a dryer, a hair iron, or a hair brush.

FIG. 1

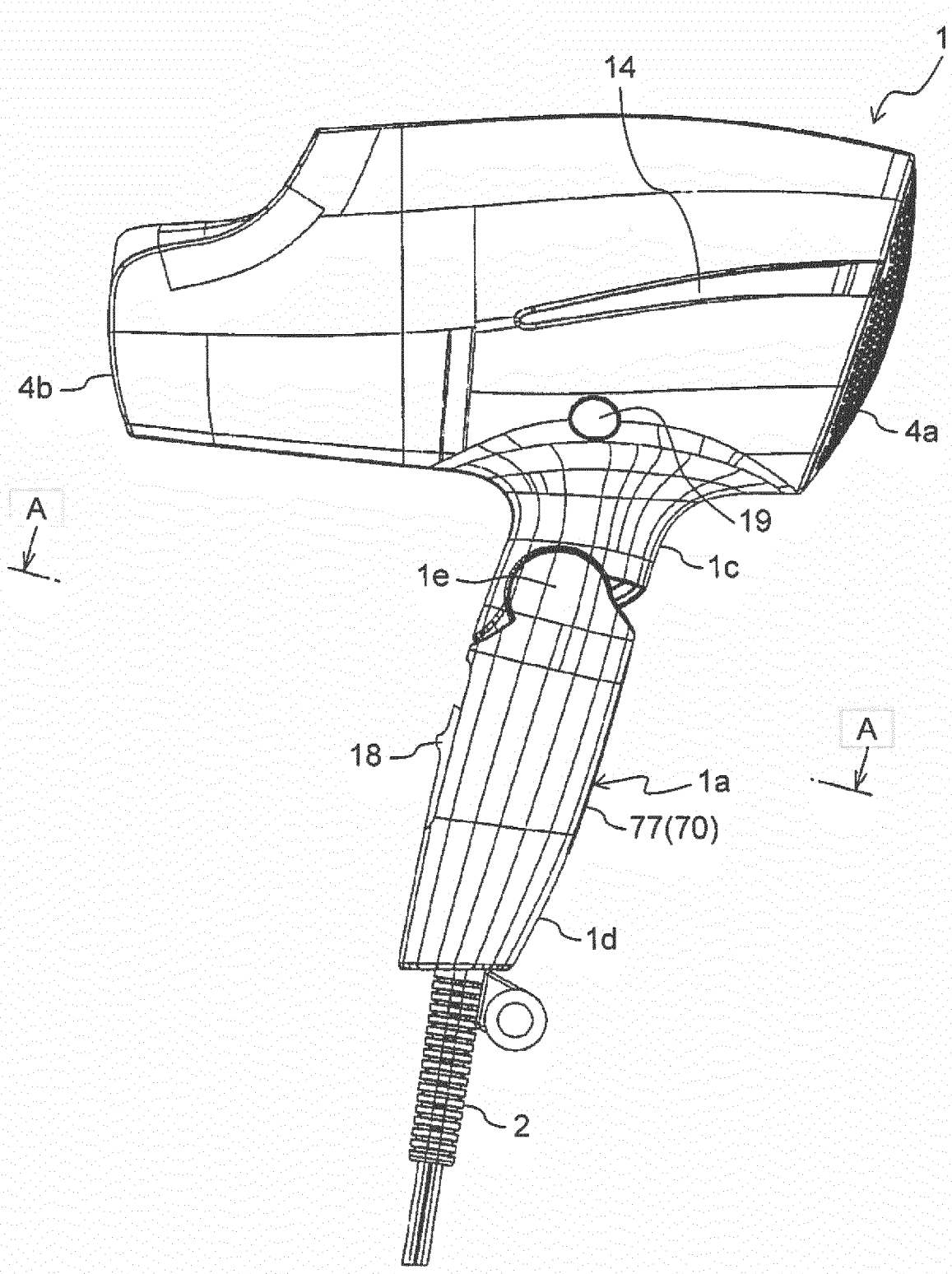


FIG. 2

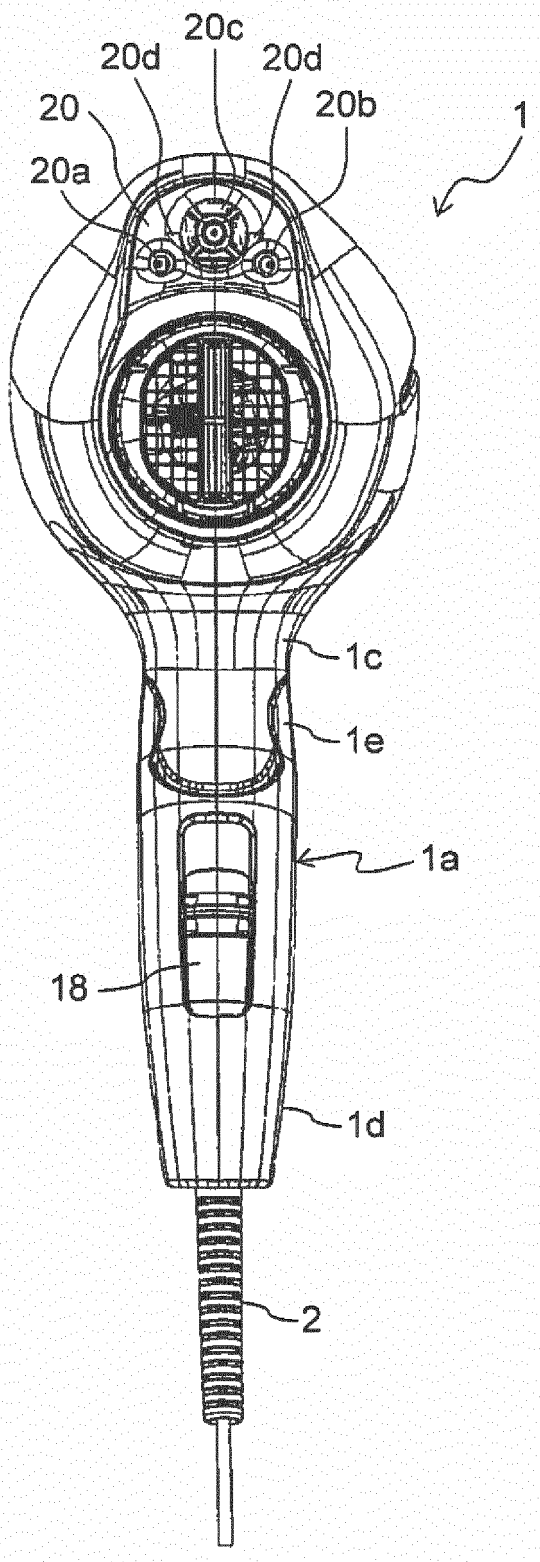
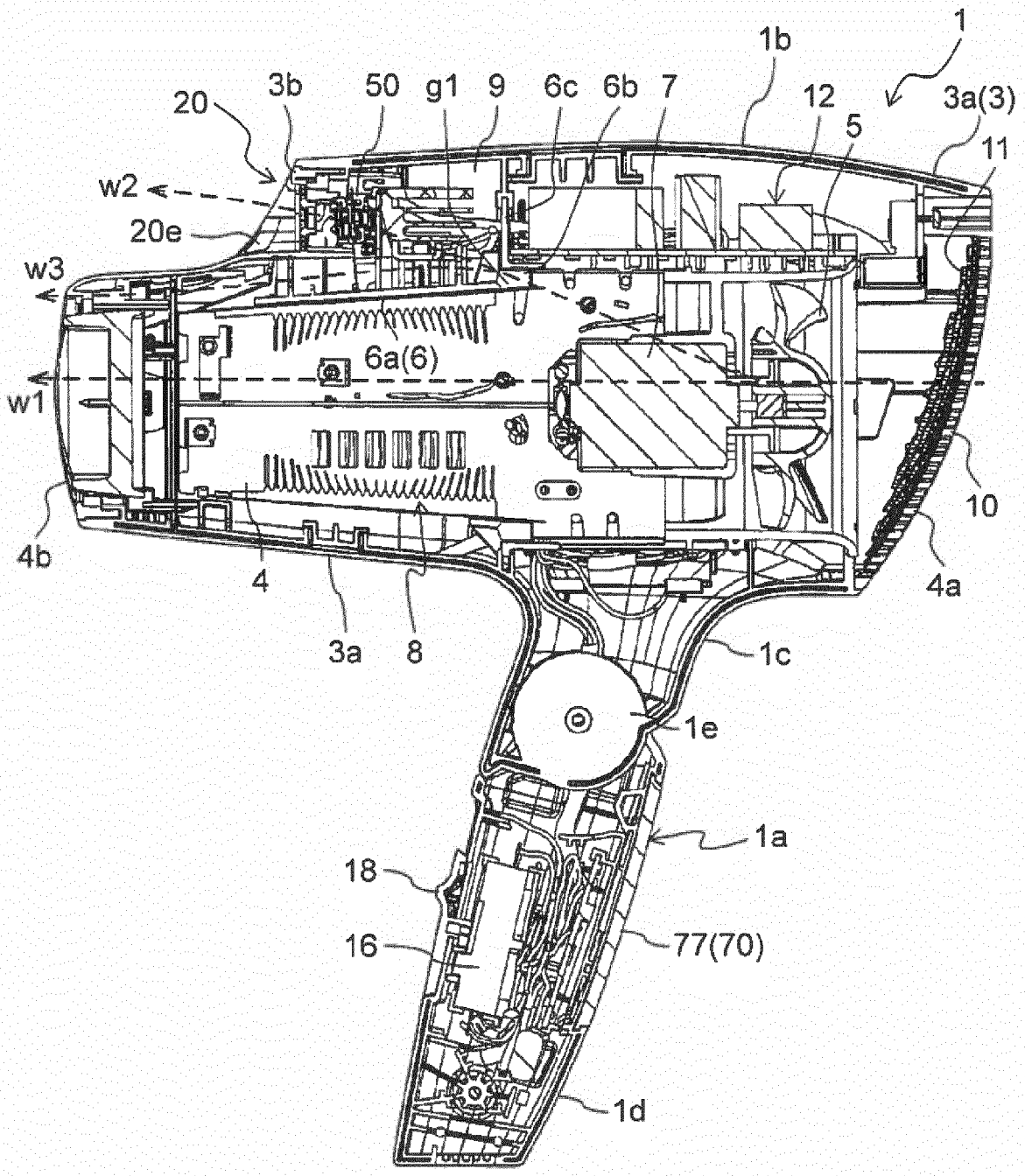


FIG. 3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50
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w3
6a(6)
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16
77(70)
1d

FIG. 4

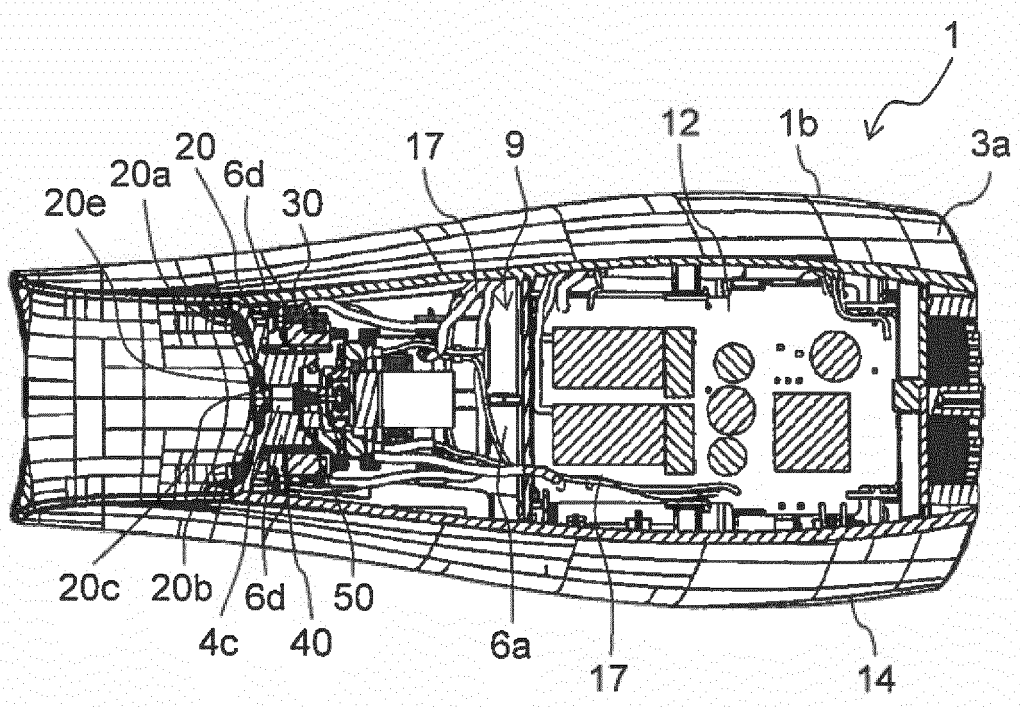


FIG. 5

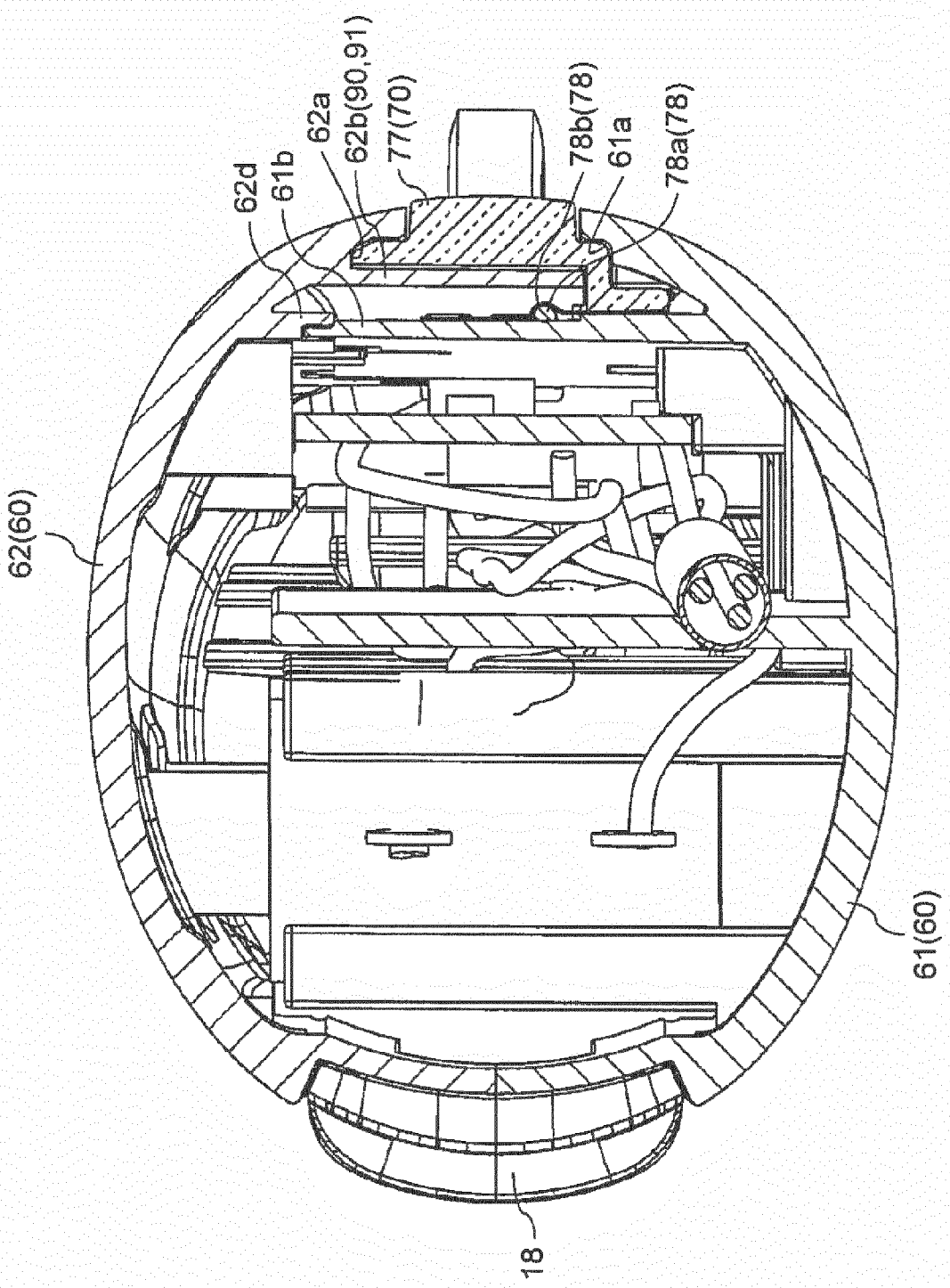
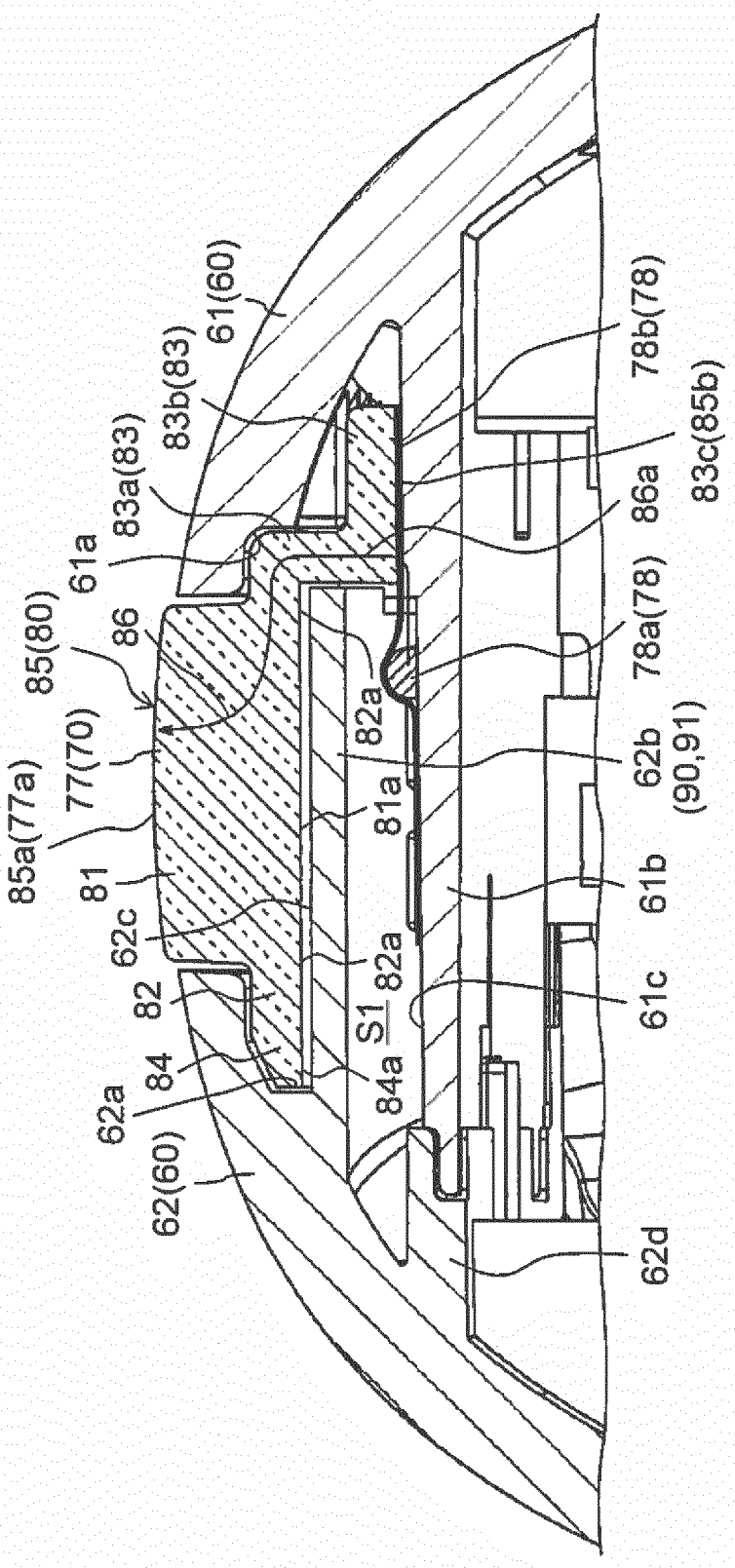


FIG. 6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61a
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86
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82
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62a
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S1
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FIG. 7

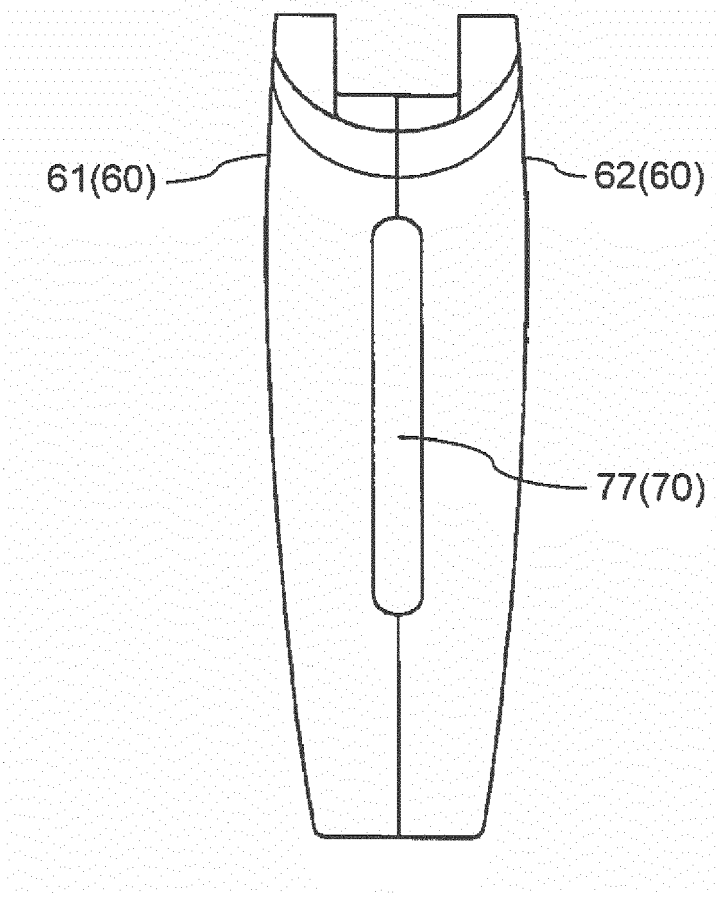
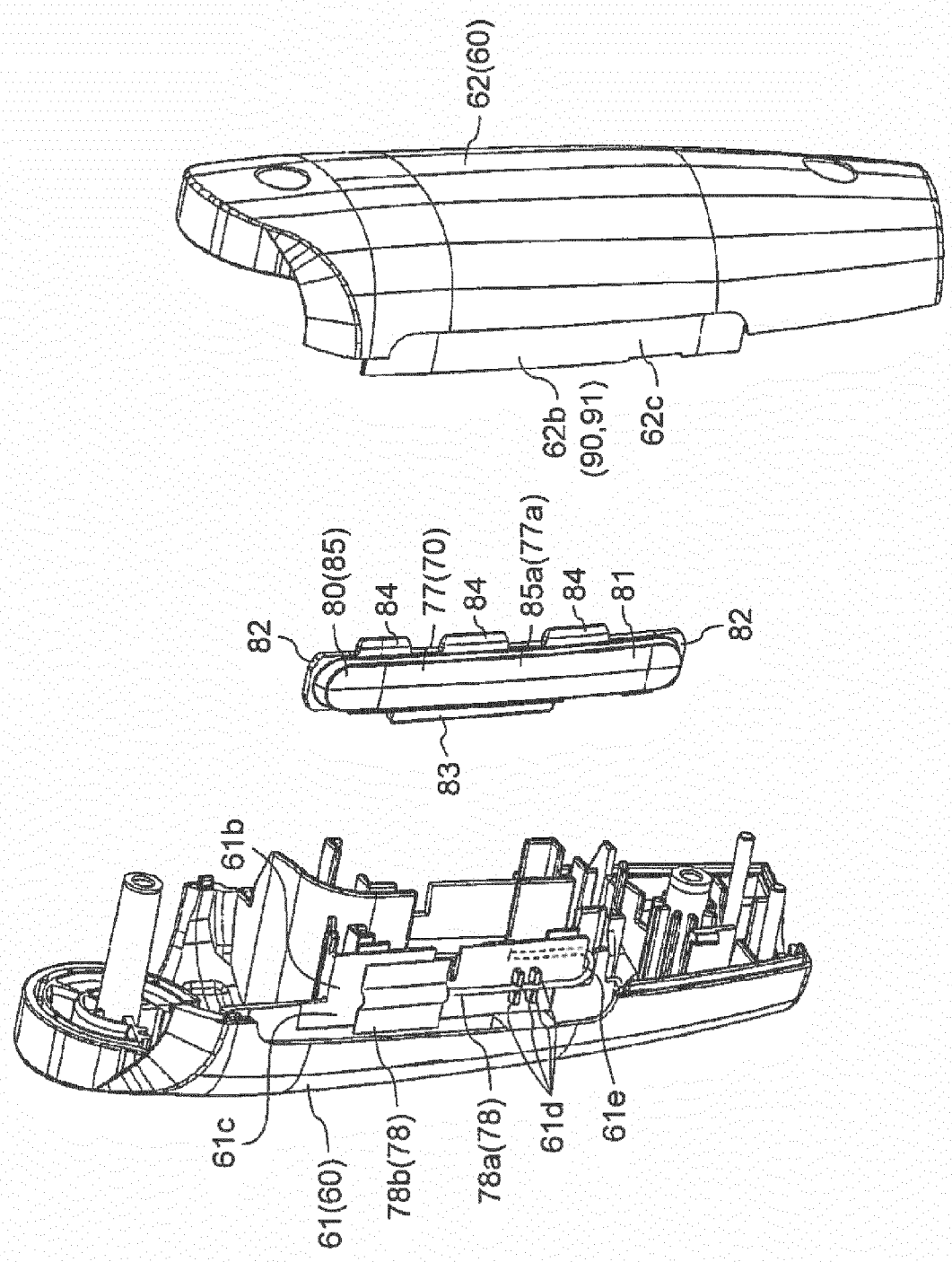


FIG. 8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83
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61c
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61d
61e

FIG. 9

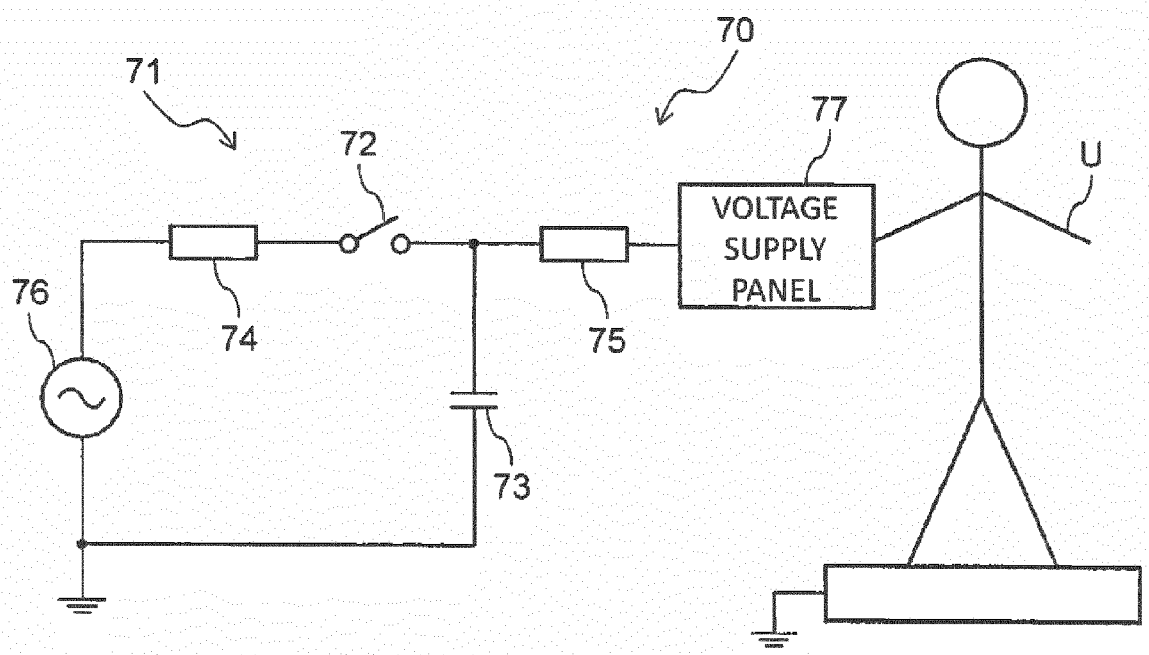
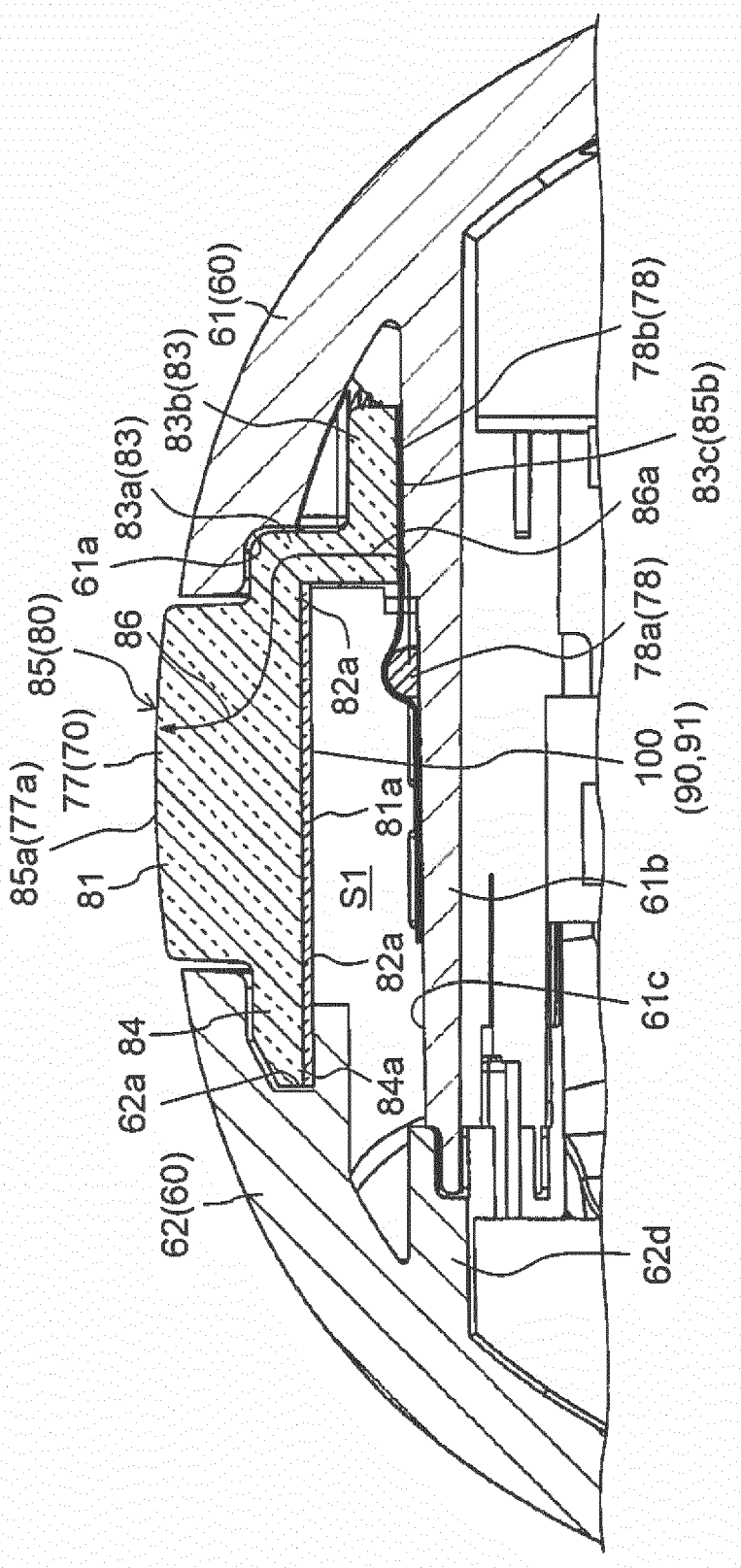


FIG. 10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61c
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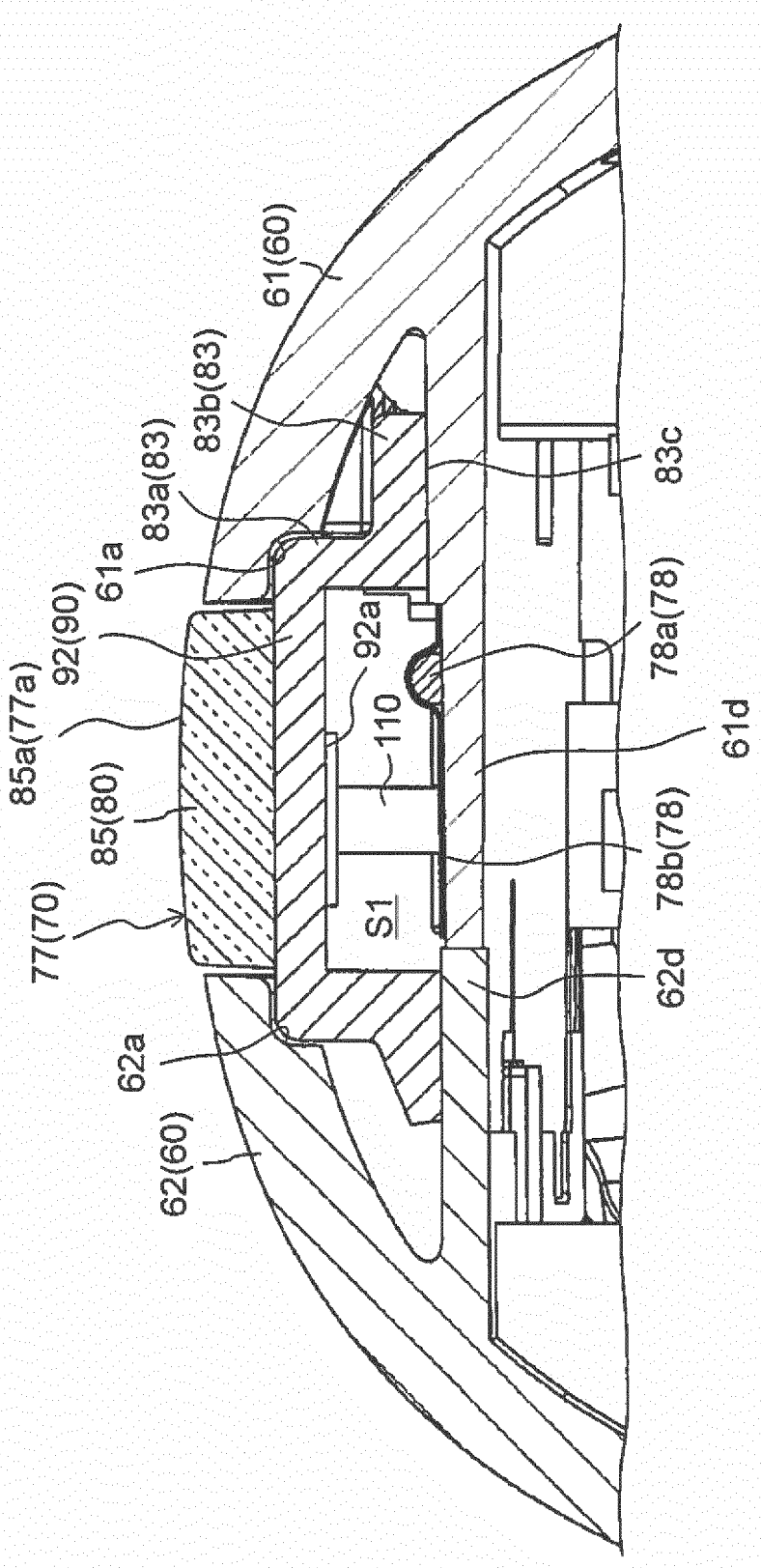
FIG. 11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92a
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S1
83c
78a(78)
61d
78b(78)
62d

FIG. 12

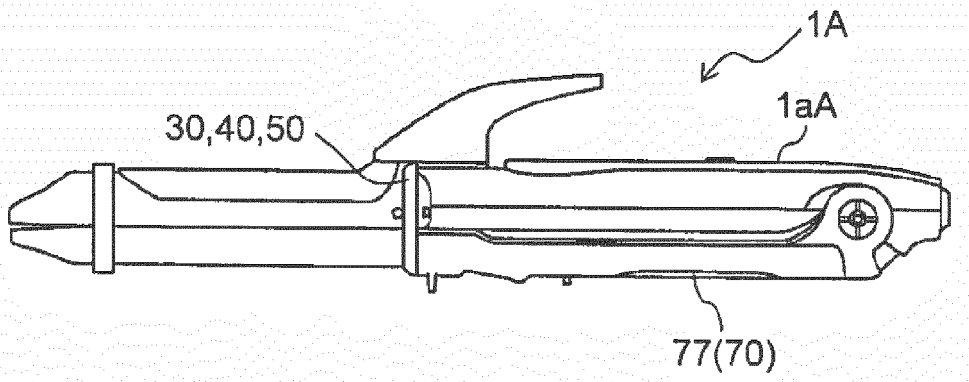
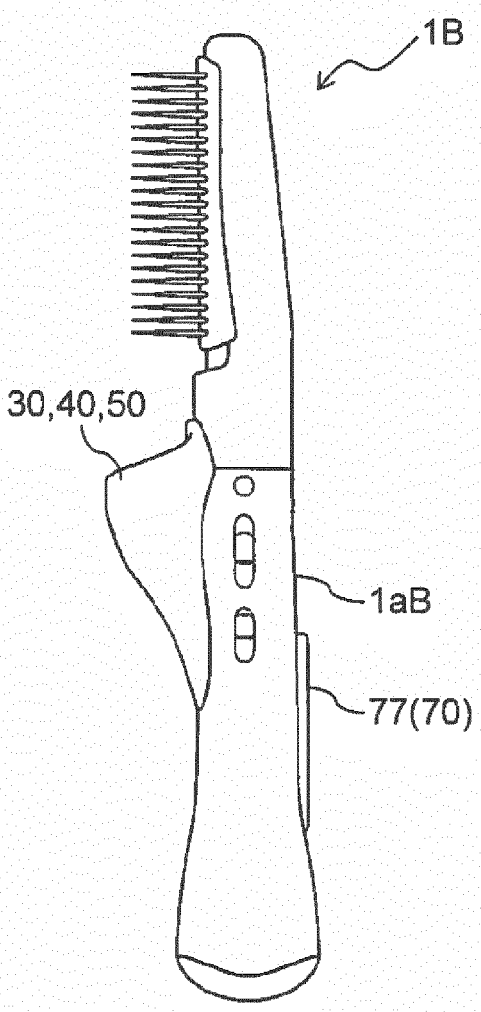


FIG. 13



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EUROPEAN SEARCH REPORT

Application Number
EP 17 15 8855

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 May 2017	Nicolás, Carlos

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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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