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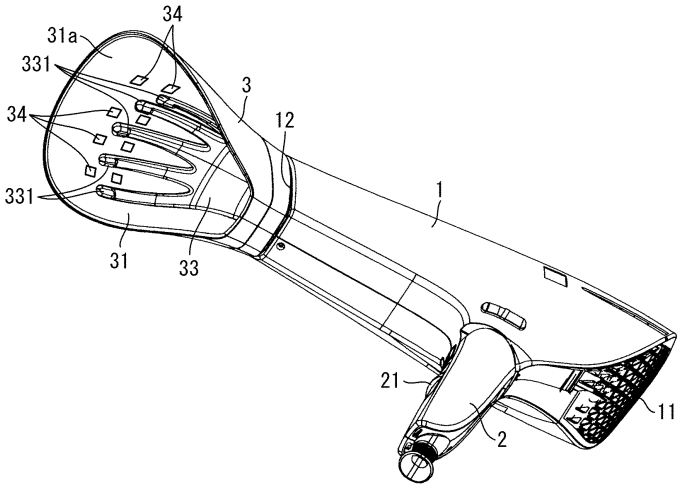
(54) HAIR DRYER

(57) To provide a hair drier capable of improving the scalp environment, a cover body (3) has an opening section (31) and covers at least a portion of the head of the user in such a manner that the opening section (31) faces the head, and a facing surface (31a) facing the head is provided with a plurality of LED light-emitting sections (34) configured to emit LED light to the scalp of the head and is made of a highly reflective member.

FIG. 2



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Description

Technical Field

[0001] The present invention relates to a hair drier.

Background Art

[0002] It has already been known to emit red LED light to the scalp to improve the scalp environment (see, for example, Patent Literature 1).

Citation List

[Patent Literature]

[0003] [Patent Literature 1]
Japanese Patent Publication No. 6129392 (Registration date: April 21, 2017)

Summary of Invention

Technical Problem

[0004] While Patent Literature 1 discloses that emitting red LED light to the scalp is effective in improving the scalp environment, it neither discloses nor suggests how to emit red LED light to the scalp efficiently.

[0005] An aspect of the present invention has been accomplished in view of the above issue. It is an object of an aspect of the present invention to provide a hair drier configured to emit red LED light to the scalp efficiently.

Solution to Problem

[0006] In order to attain the above object, a hair drier in accordance with an aspect of the present invention a cover body that is provided at an air outlet of a blower main body having an air inlet and the air outlet and that is configured to cover at least a portion of a head of a user, the cover body having a facing surface that faces the head of the user in a state where the cover body is covering at least the portion of the head of the user, the facing surface being (i) provided with at least one LED light-emitting section configured to emit LED light to a scalp of the head and (ii) made of a highly reflective member.

Advantageous Effects of Invention

[0007] An aspect of the present invention allows red LED light to be emitted to the scalp efficiently, and can thereby improve the scalp environment.

Brief Description of Drawings

[0008]

Fig. 1 is a side view of a hair drier in accordance with Embodiment 1 of the present invention.

Fig. 2 is a perspective view of the hair drier illustrated in Fig. 1.

Fig. 3 is a side cross-sectional view of the hair drier illustrated in Fig. 1, illustrating the internal structure of the hair drier.

Fig. 4 is a side cross-sectional view of a cover body of the hair drier illustrated in Fig. 1, illustrating the internal structure of the cover body.

Fig. 5 is a side cross-sectional view of (i) a portion of the cover body of the hair drier illustrated in Fig. 1 at which portion LED light-emitting sections are provided and (ii) a portion of the cover body which portion is near the above portion.

Fig. 6 is a drawing schematically illustrating an example of how the hair drier illustrated in Fig. 1 can be used.

Fig. 7 is a side cross-sectional view of, as another example, (i) a portion of the cover body of the hair drier illustrated in Fig. 1 at which portion LED light-emitting sections are provided and (ii) a portion of the cover body which portion is near the above portion.

Fig. 8 is a side cross-sectional view of, as another example, (i) a portion of the cover body of the hair drier illustrated in Fig. 1 at which portion LED light-emitting sections are provided and (ii) a portion of the cover body which portion is near the above portion.

Fig. 9 is a side view of a hair drier in accordance with Embodiment 2 of the present invention.

Fig. 10 is a perspective view of the hair drier illustrated in Fig. 9.

Fig. 11 is a side cross-sectional view of a cover body of the hair drier illustrated in Fig. 9, illustrating the internal structure of the cover body.

Fig. 12 is a drawing schematically illustrating an example of how the cover body of the hair drier illustrated in Fig. 9 can be used.

Fig. 13 is a side view of a hair drier in accordance with Embodiment 3 of the present invention.

Fig. 14 is a side cross-sectional view of a cover body of the hair drier illustrated in Fig. 13, illustrating the internal structure of the cover body.

Fig. 15 is a diagram schematically illustrating an example of an LED provided at a tip portion of a bar-shaped body of a head stimulating body.

Description of Embodiments

Embodiment 1

[0009] The description below deals with an embodiment of the present invention in detail.

(Overview of hair drier)

[0010] Fig. 1 is a side view of a hair drier in accordance with the present embodiment. Fig. 2 is a perspective view of the hair drier illustrated in Fig. 1.

[0011] The hair drier is, as illustrated in Fig. 1, structured to include a barrel-shaped housing 1 and a grip 2 attached to the housing 1. The housing 1 has an air inlet 11 at one end and an air outlet 12 at the other end. The housing 1 has an air flow path inside. The air inlet 11 is provided with an air inlet cover attached thereto in the shape of a wave plate. Air is sucked into the housing 1 through the air inlet cover at the air inlet 11. The air inlet 11 may alternatively be present at a side surface of the housing 1. The grip 2 is provided with an operation section 21 that the user operates to cause the hair drier to operate. The grip 2 is also provided with a power supply cord (not shown) connected thereto. The hair drier is supplied with electric power from outside through the power supply cord. The hair drier includes a cover body 3 configured to cover at least a portion of the head of the user to improve the scalp environment of the user. The hair drier includes at least the cover body 3 and a control section 17 configured to control light emission of each LED light-emitting section 34 (described later).

(Internal structure of hair drier)

[0012] Fig. 3 is a side cross-sectional view of the drier illustrated in Fig. 1, illustrating the internal structure of the drier.

[0013] The housing 1, as illustrated in Fig. 3, contains a blower 14 configured to blow air in the direction of the barrel length of the housing 1. Fig. 3 illustrates an example of the blower 14 being an axial fan. When the blower 14 is in operation, external air is sucked through the air inlet 11 to cause an airflow through the inside of the housing 1 as an air flow path, and the airflow is then discharged through the air outlet 12. The housing 1 contains, between the blower 14 and the air outlet 12, a heater 15 configured to warm air. The heater 15 is, for example, structured to include (i) a support plate inside the housing 1 and (ii) a heating wire wound around the support plate. The heater 15 is configured to warm air inside the housing 1 so that airflow to be discharged through the air outlet 12 is warm.

[0014] The hair drier includes an ion generating unit (electrically charged particle generating section) 16 configured to generate air ions (electrically charged particles) in the atmosphere. The ion generating unit 16 is contained in the housing 1. The ion generating unit 16 includes a needle-shaped discharge electrode and a ring-shaped induction electrode around the discharge electrode. Voltage is applied between the discharge electrode and the dielectric electrode to generate corona discharge, which generates air ions around the discharge electrode. The ion generating unit 16 includes two pairs of the discharge electrode and the dielectric electrode to generate both positive air ions such as $H^+(H_2O)_m$ and negative air ions such as $O_2^-(H_2O)_n$. The ion generating unit 16 generates positive and negative air ions in the air inside the housing 1. Air ions generated by the ion generating unit 16 are mixed with air inside the housing 1, so that airflow containing air ions is discharged through the air outlet 12.

[0015] The hair drier includes a control section 17 configured to control how each section is operated. The control section 17 is connected to the operation section 21, the blower 14, the heater 15, and the ion generating unit 16. The control section 17 controls the respective operations of the blower 14, the heater 15, and the ion generating unit 16 in accordance with the user's operation accepted by the operation section 21.

[0016] The control section 17 is also configured to control light emission of each LED light-emitting section 34 provided on the cover body 3. The control section 17 may be configured to keep the blower 14 and the ion generating unit 16 out of operation while the control section 17 keeps the heater 15 out of operation.

(Structure of cover body)

[0017] Fig. 4 is a side cross-sectional view of the cover body 3, illustrating the internal structure of the cover body 3. Fig. 5 is a side cross section of (i) a portion of the cover body 3 at which portion LED light-emitting sections 34 are provided and (ii) a portion of the cover body 3 which portion is near the above portion.

[0018] As illustrated in Fig. 4, the cover body 3 is substantially in the shape of a barrel and has an opening section 31. The cover body 3 forms an air flow path inside the opening section 31. The cover body 3 includes, inside the air flow path, a head stimulating body 33 configured to stimulate the head of the user. The head stimulating body 33 is similar in shape to a human hand. The head stimulating body 33 includes a plurality of bar-shaped bodies 331 each similar in shape to a finger. The plurality of bar-shaped bodies 331 are each oriented to extend beyond the opening section 31 so that the tip thereof protrudes from the cover body 3. The head stimulating body 33 is configured to come into contact with the head H of the user. Specifically, the bar-shaped bodies 331 of the head stimulating body 33 rake through hair of the head H so that the respective tips of the bar-shaped bodies 331 come into contact with the scalp to stimulate the scalp. The head stimulating body 33 is thus capable of stimulating the head of the user.

[0019] As illustrated in Fig. 4, the cover body 3 has a facing surface 31a facing the head H on the side of the opening section 31. The facing surface 31a is provided with a plurality of LED light-emitting sections 34 each configured to emit LED light to the scalp of the head. The LED light-emitting sections 34 are, for instance, each positioned on the facing surface 31a of the cover body 3 so that the LED light is not blocked by a bar-shaped body 331 of the head stimulating body 33 as illustrated in Fig.

2. While Fig. 2 illustrates eight LED light-emitting sections 34 as an example, the number of LED light-emitting sections 34 is not limited to any particular number.

[0020] The LED light-emitting sections 34, as illustrated in Fig. 5, each include an LED 34a inside an opening 31b in the facing surface 31a at the opening section 31 of the cover body 3. The LED 34a is a red LED configured to emit red LED light. The red LED is, for example, an LED configured to generate red light having a peak wavelength within a range of 630 nm to 660 nm. The red LED light emitted by the LED 34a travels through an opening 31b to strike the scalp of the head H with which the bar-shaped bodies 331 of the head stimulating body 33 are in contact.

[0021] The facing surface 31a of the cover body 3 is made of highly reflective member. The facing surface 31a is, for example, produced from a highly reflective polycarbonate (PC) or by aluminum vapor deposition for a high-reflectance function. The facing surface 31a may alternatively be provided with a high-reflectance function by a method other than the production from a highly reflective PC or aluminum vapor deposition.

(Use example)

[0022] Fig. 6 is a drawing schematically illustrating an example of how the hair drier in accordance with Embodiment 1 can be used. The user holds the hair drier in such a manner that the opening section 31 faces the head of the user and that the cover body 3 covers a portion of the head of the head. When the user is holding the hair drier as above, the opening section 31 is in contact with or near the head H of the user. In this state, the head stimulating body 33, which is provided at the opening section 31 of the cover body 3, is in contact with the head H of the user. Specifically, the bar-shaped bodies 331 of the head stimulating body 33 rake through hair so that the respective tips of the bar-shaped bodies 331 come into contact with the scalp to stimulate the scalp. The head stimulating body 33 is thus capable of stimulating the head H of the user.

[0023] When the cover body 3 is pressed down against the head H of the user, the hair drier discharges, through the air outlet 12, unheated air containing electrically charged particles. The air then passes through the air flow path inside the cover body 3 and touches the head H of the user.

[0024] While the cover body 3 is being pressed down against the head H of the user, the LED 34a of each LED light-emitting section 34 emits red LED light to the scalp of the head H of the user.

[0025] Thus, when the cover body 3 is pressed down against the head H of the user, and the LED 34a of each LED light-emitting section 34 emits red LED light, the hair drier discharges, through the air outlet 12, unheated air containing air ions. The air then passes through the air flow path inside the cover body 3 and touches the head H of the user. The air discharged is not dissipated immediately, and remains inside the cover body 3 (which is covering a portion of the head of the user) for a certain time period. The air ions contained in the air are thus not dissipated and remain inside the cover body 3, thereby acting locally on that portion of the head of the user which is covered by the cover body 3. As the air ions act locally, hair and scalp at that portion which is covered by the cover body 3 are acted on by air ions at a density higher than conventional. As the air ions remain inside the cover body 3, hair and scalp are acted on by air ions for a time period longer than conventional.

[0026] Air containing air ions touches the head while the plurality of bar-shaped bodies 331 of the head stimulating body 33 have raked through hair. This allows air ions to come into contact with hair and scalp efficiently, so that the air ions act on the hair and scalp with a high efficiency. This in turn makes it possible to improve the environment of hair and scalp by, for example, removing static electricity and bacteria from the hair and scalp and retaining moisture on the hair and scalp. Further, air ions act on the scalp of the user while the head stimulating body 33 is stimulating the scalp. This is expected to improve the scalp environment.

[0027] The LED 34a of each LED light-emitting section 34 emits red LED light to the scalp while the plurality of bar-shaped bodies 331 of the head stimulating body 33 have raked through hair. This is expected to improve the environment of hair and scalp.

[0028] As described above, in a case where the LED 34a of each LED light-emitting section 34 of the cover body 3 emits light, the heater 15 does not warm air, and no warmed air is discharged from the air outlet 12. If air has been warmed, warmed air will continue to locally touch a portion of the head of the user, so that heat will not be dissipated easily from the surface that the air touches. The present embodiment is configured to not warm air in the case where the LED 34a of each LED light-emitting section 34 of the cover body 3 emits light. This allows unwarmed air to touch the head of the user, so that heat is dissipated easily from the surface that the air touches.

[0029] In a case where the LED 34a of each LED light-emitting section 34 emits red LED light with a higher brightness, the red LED light improves the scalp environment further. That is the reason why the facing surface 31a at the opening section 31 of the cover body 3 is made of a highly reflective member as described above. This allows the scalp of the head H to be irradiated with (i) direct light from each LED 34a and (ii) light emitted by each LED 34a and reflected by the facing surface 31a as a highly reflective member. This allows the scalp of the head H to be irradiated with red LED light with a high illuminance.

[0030] Improving the scalp environment also involves emitting red LED light over a wide area of the scalp or emitting red LED light to a spot on the scalp with a high irradiation intensity. For such an arrangement, a convex lens or concave lens may be fitted in each opening 31b

at the opening section 31 of the cover body 3.

(Lenses)

[0031] For instance, a convex lens 35 may be fitted in each opening 31b in the facing surface 31a of the cover body 3 as illustrated in (a) of Fig. 7. This allows red LED light to be emitted to a spot on the scalp with a high irradiation intensity.

[0032] Alternatively, a concave lens 36 may be fitted in each opening 31b in the facing surface 31a of the cover body 3 as illustrated in (b) of Fig. 7. This allows red LED light to be emitted over a wide area of the scalp.

[0033] The lenses (namely, the convex lens 35 and the concave lens 36) are simply each provided for each LED light-emitting section 34. Only a convex lens 35 may be fitted in each opening 31b, only a concave lens 36 may be fitted in each opening 31b, or both convex lenses 35 and concave lenses 36 may be fitted in the openings 31b.

[0034] Providing a lens (namely, a convex lens 35 or concave lens 36) for each LED light-emitting section 34 as described above allows red LED light from each LED light-emitting section 34 to diverge or converge. This makes it possible to set the area of irradiation of red LED light as appropriate in accordance with the scalp environment of the user. Specifically, the above arrangement makes it possible to emit LED light to a wide area for a portion of the scalp and also emit LED light to a narrow area (that is, a spot) for another portion of the scalp. For instance, in a case where the user wants red LED light to be emitted locally to a portion of the scalp of the head H, the user can simply fit a convex lens 35 in the opening 31b at each corresponding position. In a case where the user wants red LED light to be emitted to a wide area for the remaining portion, the user can simply fit a concave lens 36 in the opening 31b at each corresponding portion. The user can simply select, according to the purpose of use, how many convex lenses 35 and/or concave lenses 36 to use and where to fit those convex lenses 35 and/or concave lenses 36 as described above.

[0035] In a case where a convex lens 35 or concave lens 36 is fitted in each opening 31b as illustrated in (a) and (b) of Fig. 7, it is difficult to attach and detach the lens. Thus, in the case illustrated in (a) and (b) of Fig. 7, the user needs to prepare a cover body 3 for each purpose of use. Specifically, the user will have different cover bodies 3 such as a cover body 3 provided with convex lenses 35 attached thereto and a cover body 3 provided with concave lenses 36 attached thereto.

[0036] In view of the above, a first support plate (lens supporting plate) 351 may, for example, be used that includes convex lenses 351a integrated with each other and that is made of a transparent resin as illustrated in (a) of Fig. 8. The convex lenses 351a are each so positioned as to coincide with an opening 31b when the first support plate 351 has been brought into contact with the facing surface 31a.

[0037] Alternatively, a second support plate (lens supporting plate) 361 may be used that includes concave lenses 361a integrated with each other and that is made of a transparent resin as illustrated in (b) of Fig. 8. The concave lenses 361a are each so positioned as to coincide with an opening 31b when the second support plate 361 has been brought into contact with the facing surface 31a.

[0038] The first support plate 351 and the second support plate 361 can each be attached to and detached from the facing surface 31a. This eliminates the need for the user to prepare a cover body 3 for each purpose of use. The user can simply attach either the first support plate 351 or the second support plate 361 to a single cover body 3 to achieve the purpose of use. Specifically, the user can simply attach the first support plate 351 to the cover body 3 in a case where the user wants red LED light to be emitted to a spot on the scalp with a high irradiation intensity or the second support plate 361 to the cover body 3 in a case where the user wants red LED light to be emitted to a wide area of the scalp.

[0039] The lens supporting plates (namely, the first support plate 351 and the second support plate 361) may each include only convex lenses 351a, only concave lenses 361a, or both convex lenses 351a and concave lenses 361a. This also makes it possible to set the area of irradiation of red LED light as appropriate in accordance with the scalp environment of the user as described above. Specifically, the above arrangement makes it possible to emit LED light to a wide area for a portion of the scalp and also emit LED light to a narrow area (that is, a spot) for another portion of the scalp. For instance, in a case where the user wants red LED light to be emitted locally to a portion of the scalp of the head H, a convex lens 351a is formed that faces the opening 31b at each corresponding position. In a case where the user wants red LED light to be emitted to a wide area for the remaining portion, a concave lens 361a is formed that faces the opening 31b at each corresponding position. It is possible to, according to the purpose of use, form any number of convex lenses 351a and/or concave lenses 361a each coinciding with an opening 31b as described above.

[0040] For the present embodiment, the user attaches the cover body 3 to the housing 1 for use as illustrated in Fig. 6. The embodiment below is an example of the cover body 3 being used on its own.

Embodiment 2

[0041] The description below deals with another embodiment of the present invention. For convenience of explanation, any member of the present embodiment that is identical in function to a corresponding member of any embodiment above is assigned a common reference sign, and is not described here.

(Overview of hair drier)

[0042] Fig. 9 is a side view of the hair drier as the cover

body 3 has been separated from the housing 1. Fig. 10 is a perspective view of the hair drier as the cover body 3 has been separated from the housing 1.

[0043] The cover body 3 is structured to be attachable to and detachable from the housing 1 as illustrated in Fig. 9. The cover body 3 has, at one end of the air flow path thereof, a connection opening 32 configured to be connected with the air outlet 12 when the cover body 3 is attached to the housing 1. The cover body 3 has, at the other end of the air flow path thereof, an opening section 31 larger than the air outlet 12. With the cover body 3 attached to the housing 1, air discharged from the air outlet 12 travels through the air flow path inside the cover body 3 to be discharged from the opening section 31.

[0044] The hair drier, as illustrated in Fig. 4, includes press-down switches 13 configured to be pressed down in a case where the cover body 3 has been attached to the housing 1. The press-down switches 13 are positioned to face the cover body 3 to be attached to the housing 1. The press-down switches 13 are in a pressed state in the case where the cover body 3 has been attached to the housing 1, and are in an unpressed state in a case where the cover body 3 is not attached to the housing 1. The press-down switches 13 are connected to the control section 17 described above. The control section 17 keeps the heater 15 out of operation in a case where the press-down switches 13 are in a pressed state. The control section 17 allows the heater 15 to operate in a case where the press-down switches 13 are in an unpressed state. As described above, the hair drier is arranged such that the heater 15 does not warm air while the cover body 3 is attached to the housing 1.

[0045] The hair drier is also arranged such that in a case where the cover body 3 has been attached to the housing 1, and the press-down switches 13 have been pressed down, electric power is supplied from inside the housing 1 to the LED light-emitting sections 34 of the cover body 3.

(Structure of cover body)

[0046] Fig. 11 is a side cross-sectional view of the cover body 3, illustrating the internal structure of the cover body 3.

[0047] The housing 1 includes an electricity transmitting section (electric power supplying section) 50, whereas the cover body 3 includes an electricity receiving section 51 as illustrated in Fig. 11. While the cover body 3 is attached to the housing 1, the electric power receiving section (electric power supplying section) 51 receives electric power from the electricity transmitting section 50 of the housing 1, so that the cover body 3 drives the LED light-emitting sections 34. When the cover body 3 has been detached from the housing 1, the electricity receiving section 51 receives electric power from an outside electric power source, so that the cover body 3 drives the LED light-emitting sections 34. The electricity receiving section 51 includes, for example, a terminal for connecting an AC adapter and/or a USB (registered trademark) terminal. The electricity receiving section 51 receives electric power from outside through an AC adapter or USB (registered trademark) cable.

[0048] The cover body 3 may alternatively include a storage battery to be capable of driving the LED light-emitting sections 34 with electric power from the storage battery in a case where the cover body 3 has been detached from the housing 1.

(Use example)

[0049] Fig. 12 is a drawing schematically illustrating an example of how the cover body 3 in accordance with Embodiment 2 can be used. The user holds the cover body 3 in such a manner that the opening section 31 faces the head of the user and that the cover body 3 covers a portion of the head of the head. This allows the head stimulating body 33 to stimulate the head H of the user, and also allows the LED 34a of each LED light-emitting section 34 to emit red LED light to the scalp of the head H of the user.

[0050] Unlike Embodiment 1, this case does not involve use of the cover body 3 as part of the hair drier. This makes it impossible to blow air ions to the scalp. This case, on the other hand, does not involve use of the housing 1, so that the user operates the cover body 3 alone. This can reduce the burden on the user when the user wants the LED light-emitting sections 34 to emit red LED light to the scalp. Specifically, improving the scalp environment requires ensuring that red LED light is emitted for a period of time (for example, 20 minutes). Thus, in a case where the cover body 3 is capable on its own of causing the LED light-emitting sections 34 to emit light, it can reduce the weight of the hair drier, thereby reducing the burden on the user.

[0051] The cover body 3 on its own does not cause air heated with the heater 15 inside the housing 1 to be discharged. This allows heat to be dissipated easily from that surface of the head of the user which air touches when the user is trying to improve the scalp environment with use of the cover body 3.

Embodiment 3

[0052] The description below deals with another embodiment of the present invention. For convenience of explanation, any member of the present embodiment that is identical in function to a corresponding member of any embodiment above is assigned a common reference sign, and is not described here.

(Overview of hair drier)

[0053] Fig. 13 is a side view of a hair drier in accordance with the present embodiment.

[0054] The hair drier, as illustrated in Fig. 13, differs from the hair drier of Embodiment 1 above in that the hair

drier includes a flexible connecting part 60 for connecting the cover body 3 with the housing 1.

(Structure of cover body)

[0055] Fig. 14 is a side cross-sectional view of the cover body 3, illustrating the internal structure of the cover body 3.

[0056] The connecting part 60 is preferably in the shape of, for example, an accordion-like pipe as illustrated in Fig. 14. In a case where the connecting part 60 for connecting the cover body 3 with the housing 1 is flexible as mentioned above, the cover body 3 is, when the cover body 3 has been brought into contact with the head H of the user, inclined with respect to the housing 1 due to the flexibility of the connecting part 60. This makes it easy to bring the head stimulating body 33 into contact with the head H in accordance with the shape of the head H. Even in a case where the head stimulating body 33 of the cover body 3 has been pressed against the head of the user with a force stronger than necessary, the pressing force is absorbed by the connecting part 60, so that the head is stimulated moderately. In addition to the moderate stimulation by the head stimulating body 33 to the head H, red LED light is emitted by the LED light-emitting sections 34 to the scalp. This can improve the scalp environment.

[0057] The hair drier may be arranged such that the inclination of the cover body 3 can be maintained. In this case, the pipe is preferably, for example, an accordion-like pipe made of metal or an accordion-like pipe made of vinyl chloride and containing wire.

[0058] The connecting part 60 may alternatively be a molded product of silicon resin other than an accordion-like pipe.

[Variation]

[0059] In Embodiments 1 to 3 above, the LED light-emitting sections 34 each include an LED 34a on the facing surface 31a of the cover body 3 as an example. The present invention is, however, not limited to such an arrangement. The LEDs 34a may alternatively be, for example, each provided at the tip of a bar-shaped body 331 of the head stimulating body 33 as illustrated in Fig. 15.

[0060] In this case, each LED 34a is provided at a position on a bar-shaped body 331 which position is closest to the scalp, whereas the bar-shaped body 331 contains an electricity transmitting pathway 34b for supplying electric power to the LED light-emitting section 34. The electricity transmitting pathway 34b is configured to supply the LED 34a with electric power from the above-described electricity receiving section 51 included in the cover body 3.

[0061] The above arrangement allows red LED light to be emitted to the scalp from an extremely small distance while allowing the head stimulating body 33 to stimulate the head H. This can improve the scalp environment further.

[0062] Aspects of the present invention can also be expressed as follows:

A hair drier in accordance with a first aspect of the present invention a cover body 3 that is provided at an air outlet 12 of a blower 14 main body having an air inlet 11 and the air outlet 12 and that is configured to cover at least a portion of a head H of a user, the cover body 3 having a facing surface 31a facing the head H in a state where the cover body is covering the portion of the head H of the user, the facing surface 31a being (i) provided with at least one LED light-emitting section 34 configured to emit LED light to a scalp of the head H and (ii) made of a highly reflective member.

[0063] With the above arrangement, LED light emitted by the at least one LED light-emitting section provided on the cover body partly directly strikes the scalp of the user, and partly is reflected by the facing surface (which is a highly reflective member) of the cover body before striking the scalp. This means that the above arrangement allows LED light with a high illuminance to be emitted to the scalp of the user. Irradiating the scalp of the user with LED light with a high illuminance as described above makes it possible to improve the scalp environment further with LED light.

[0064] Discharging air containing electrically charged particles from the air outlet of the blower main body causes the discharged air to remain inside the cover body. This allows the electrically charged particles contained in the air to act locally on that portion of the head of the user which is covered by the cover body. This can improve the scalp environment.

[0065] Thus, the hair drier arranged as above allows red LED light to be emitted to the scalp efficiently, and can thereby improve the scalp environment.

[0066] A hair drier in accordance with a second aspect of the present invention is arranged as in the first aspect and may be further arranged such that the cover body 3 is provided with a head stimulating body 33 configured to stimulate the head H of the user in a state where the cover body 3 is covering the head H of the user.

[0067] With the above arrangement, in a case where the head of the user is covered by the cover body, the bar-shaped bodies of the head stimulating body rake through hair and stimulate the scalp, and LED light is emitted to the scalp at the same time. This can improve the scalp environment further.

[0068] A hair drier in accordance with a third aspect of the present invention is arranged as in the first or second aspect and may further include at least one lens (convex lens 35, concave lens 36) configured to diverge or converge the LED light emitted by the at least one LED light-emitting section 34.

[0069] With the above arrangement, including the at least one lens allows LED light emitted by the at least one LED light-emitting section to diverge. This makes it possible to emit LED light over a wide area of the scalp.

Including the at least one lens allows LED light emitted by the at least one LED light-emitting section to converge. This makes it possible to emit LED light to a spot on the scalp. In other words, using either a lens for diverging light (concave lens) or lens for converging light (convex lens) allows LED light to be emitted to an area as desired by the user.

[0070] A hair drier in accordance with a fourth aspect of the present invention is arranged as in the third aspect and may be further arranged such that the at least one LED light-emitting section 34 includes a plurality of LED light-emitting sections 34, and the at least one lens (convex lens 35, concave lens 36) is provided for each of the plurality of the LED light-emitting sections 34.

[0071] With the above arrangement, providing a lens for each LED light-emitting section allows red LED light from each LED light-emitting section to diverge or converge. This makes it possible to set the area of irradiation of LED light as appropriate in accordance with the scalp environment of the user. Specifically, the above arrangement makes it possible to emit LED light to a wide area for a portion of the scalp and also emit LED light to a narrow area (that is, a spot) for another portion of the scalp.

[0072] A hair drier in accordance with a fifth aspect of the present invention is arranged as in the fourth aspect and may be further arranged such that the at least one lens (convex lens 351a, concave lens 361a) is provided on a lens supporting plate (first support plate 351, second support plate 361) supporting the at least one lens, and the lens supporting plate (first support plate 351, second support plate 361) is attachable to and detachable from the cover body 3.

[0073] With the above arrangement, a lens supporting plate on which the at least one lens is provided is attachable to and detachable from the cover body. This allows the user to easily replace lenses with each other that differ from each other in function. For instance, it is possible to prepare a convex lens supporting plate supporting a convex lens and a concave lens supporting plate supporting a concave lens, so that the concave lens supporting plate is attached to the cover body in a case where LED light is to be emitted to a wide area and that the convex lens supporting plate is attached to the cover body in a case where LED light is to be emitted to a narrow area (that is, a spot).

[0074] The lens supporting plate may support only convex lenses, only concave lenses, or both convex lenses and concave lenses.

[0075] A hair drier in accordance with a sixth aspect of the present invention is arranged as any one of the first to fifth aspects and may be further arranged such that the cover body 3 is attachable to and detachable from the blower 14 main body, and the cover body 3 is provided with an electric power supplying section (electricity receiving section 51) configured to supply electric power to the at least one LED light-emitting section 34 in a state where the cover body 3 is detached from the blower 14 main body.

[0076] The above arrangement makes it possible to bring the cover body into contact with the head of the user and cause the at least one LED light-emitting section to emit LED light while the cover body is detached from the blower main body. This reduces the weight as compared to the case where the cover body is attached to the blower main body for use, thereby reducing the burden on the user when LED light is emitted.

[0077] A hair drier in accordance with a seventh aspect of the present invention is arranged as any one of the first to sixth aspects and may be further arranged such that the cover body 3 and the blower 14 main body are connectable with each other with use of a flexible connection section (connecting part 60).

[0078] With the above arrangement, the connection section for connecting the cover body with the blower main body is flexible. This makes it possible to emit LED light to the scalp at a desired angle regardless of the shape of the head. The above arrangement also makes it possible to blow air containing electrically charged particles onto the scalp at a desired angle. This can improve the scalp environment.

[0079] The present invention is not limited to the embodiments, but can be altered by a skilled person in the art within the scope of the claims. The present invention also encompasses, in its technical scope, any embodiment derived by combining technical means disclosed in differing embodiments. Further, it is possible to form a new technical feature by combining the technical means disclosed in the respective embodiments.

Reference Signs List

[0080]

1 Housing
2 Grip
3 Cover body
11 Air inlet
12 Air outlet
13 Press-down switch
14 Blower
15 Heater
16 Ion generating unit
17 Control section
21 Operation section
31 Opening section
31a Facing surface
31b Opening
32 Connection opening
33 Head stimulating body
34 LED light-emitting section
34a LED
35 Convex lens
36 Concave lens
50 Electricity transmitting section (electric power supplying section)

51 Electricity receiving section (electric power supplying section)
60 Connecting part (connection section)
331 Bar-shaped body
351 First support plate (lens supporting plate)
351a Convex lens
361 Second support plate (lens supporting plate)
361a Concave lens

Claims

1. A hair drier, comprising:

   a cover body that is provided at an air outlet of a blower main body having an air inlet and the air outlet and that is configured to cover a portion of a head of a user,
   the cover body having a facing surface that faces the head of the user in a state where the cover body is covering at least the portion of the head of the user, the facing surface being (i) provided with at least one LED light-emitting section configured to emit LED light to a scalp of the head and (ii) made of a highly reflective member.

2. The hair drier according to claim 1, wherein
the cover body is provided with a head stimulating body configured to stimulate the head of the user in a state where the cover body is covering the head of the user.

3. The hair drier according to claim 1 or 2, further comprising:
at least one lens configured to diverge or converge the LED light emitted by the at least one LED light-emitting section.

4. The hair drier according to claim 3, wherein
the at least one LED light-emitting section includes a plurality of LED light-emitting sections, and
the at least one lens is provided for each of the plurality of the LED light-emitting sections.

5. The hair drier according to claim 4, wherein
the at least one lens is provided on a lens supporting plate supporting the at least one lens, and
the lens supporting plate is attachable to and detachable from the cover body.

6. The hair drier according to any one of claims 1 to 5, wherein
the cover body is attachable to and detachable from the blower main body, and
the cover body is provided with an electric power supplying section configured to supply electric power to the at least one LED light-emitting section in a state where the cover body is detached from the blower main body.

7. The hair drier according to any one of claims 1 to 6, wherein
the cover body and the blower main body are connectable with each other with use of a flexible connection section.

FIG. 1

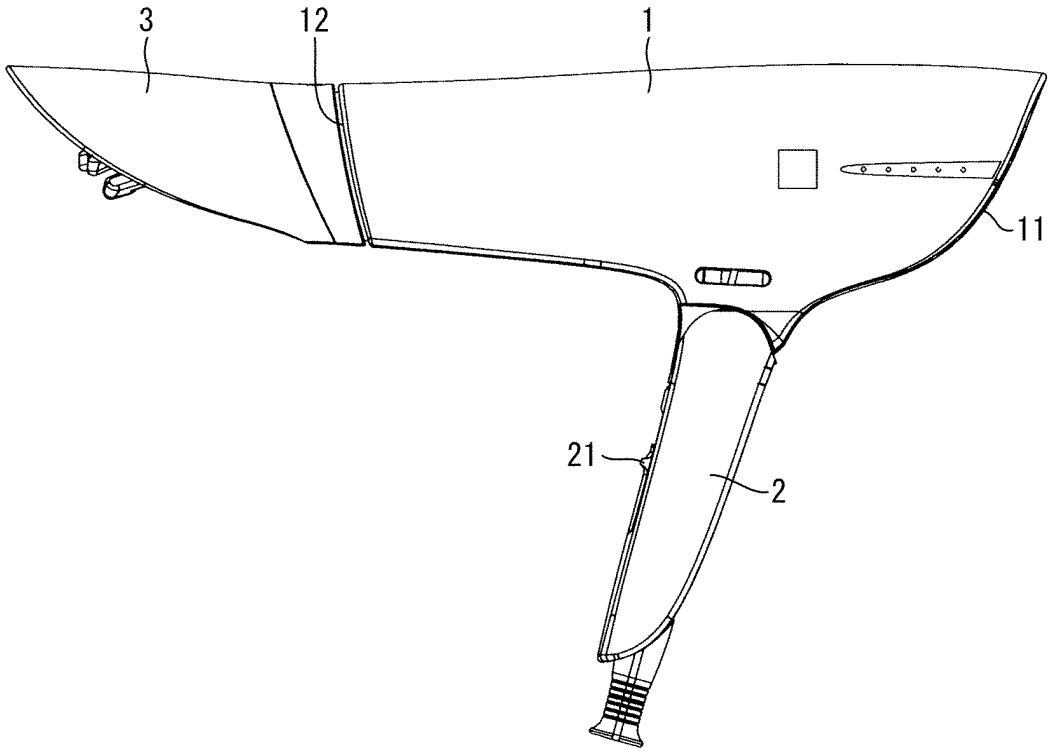


FIG. 2

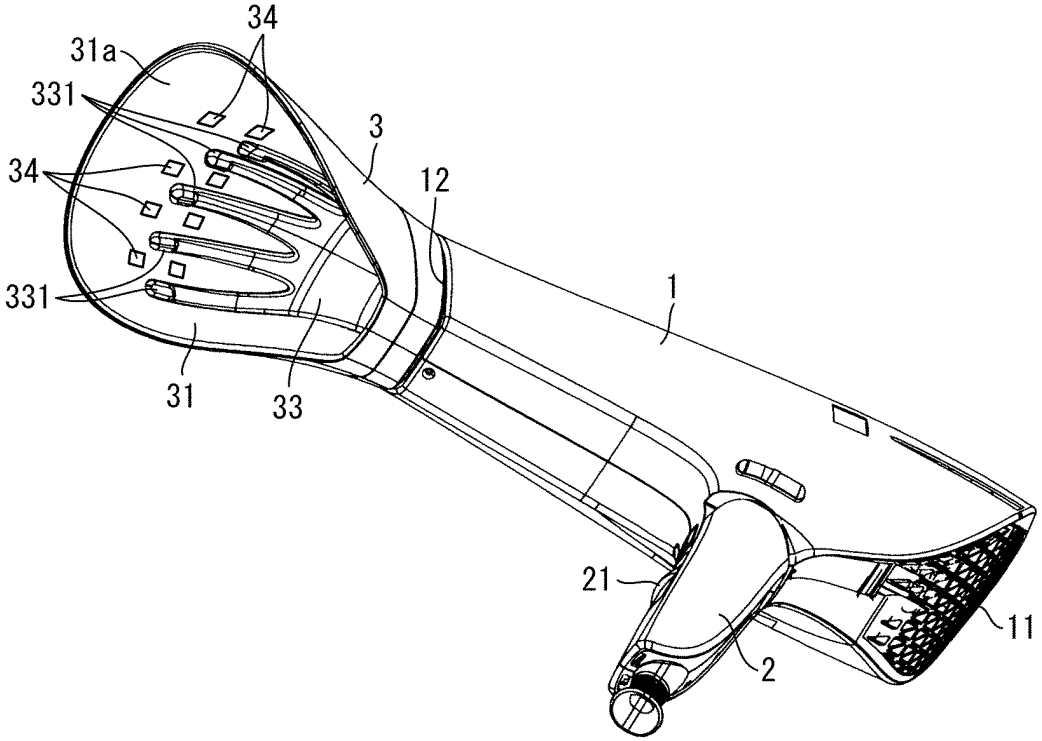


FIG. 3

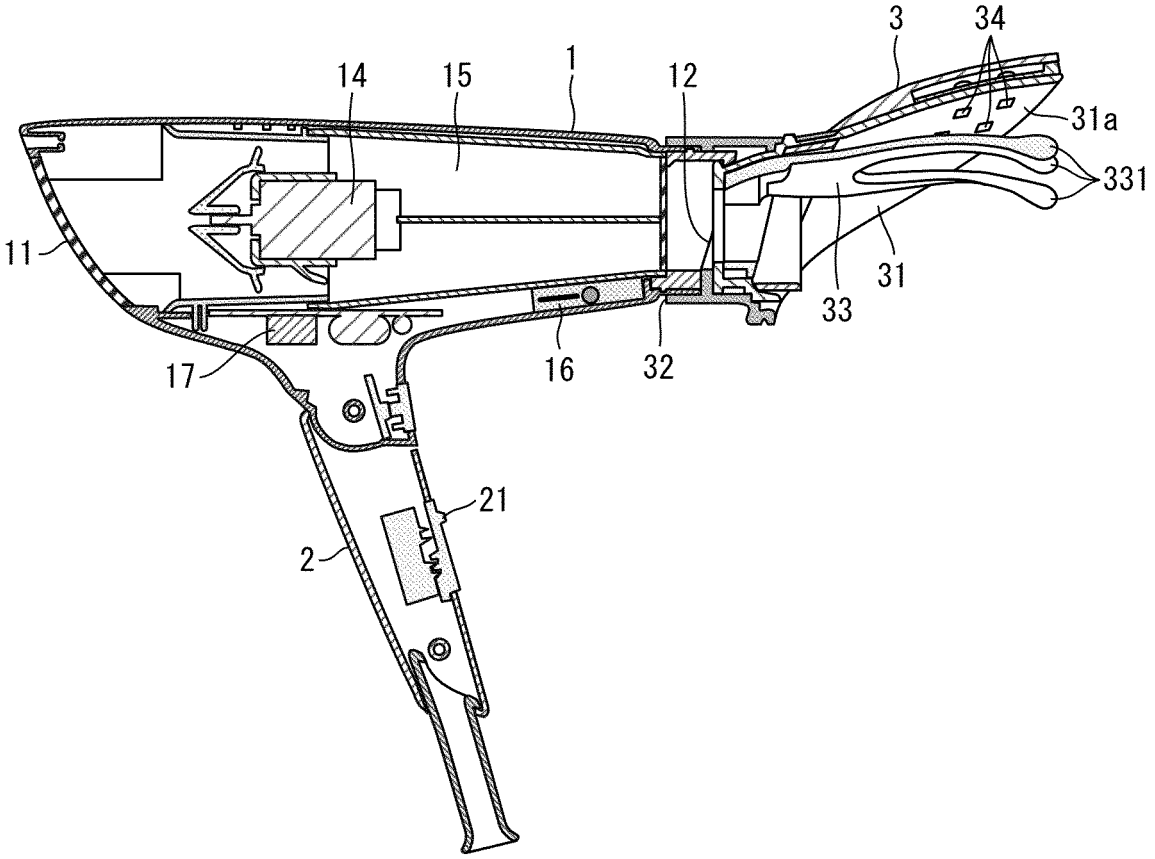


FIG. 4

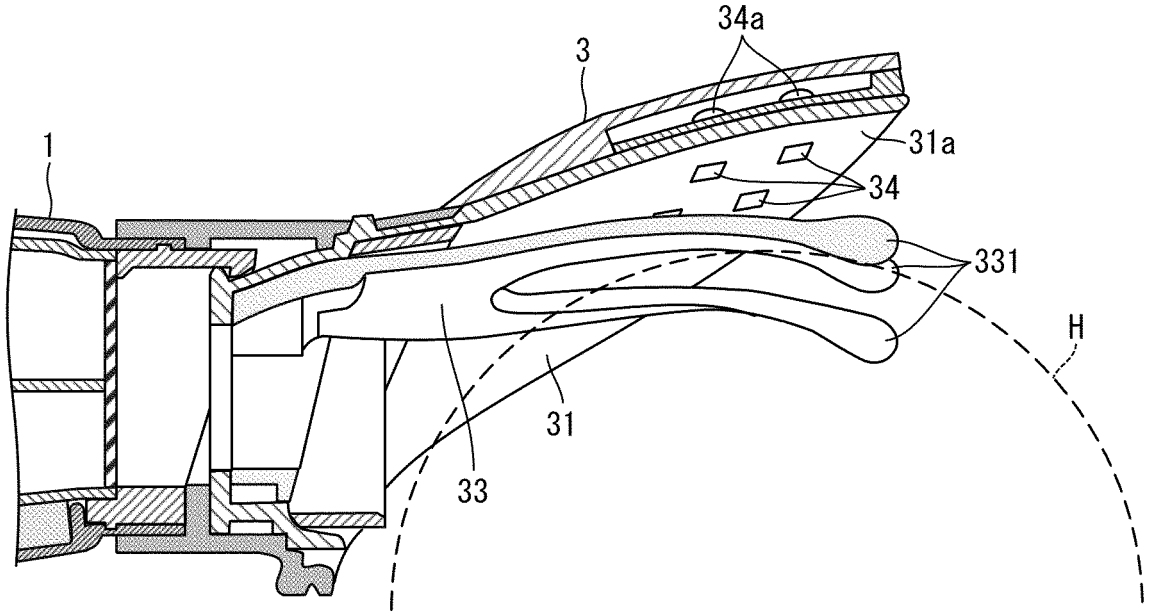


FIG. 5

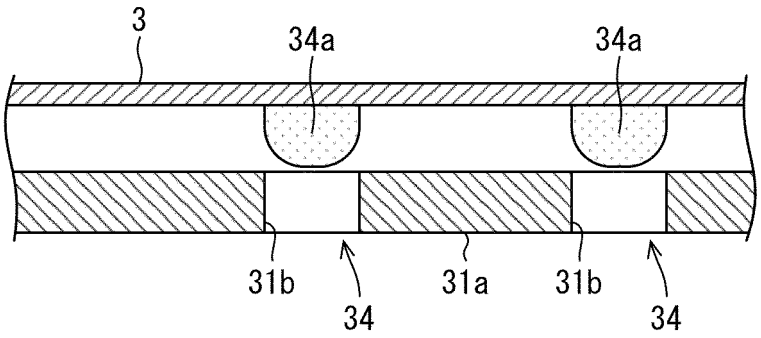


FIG. 6

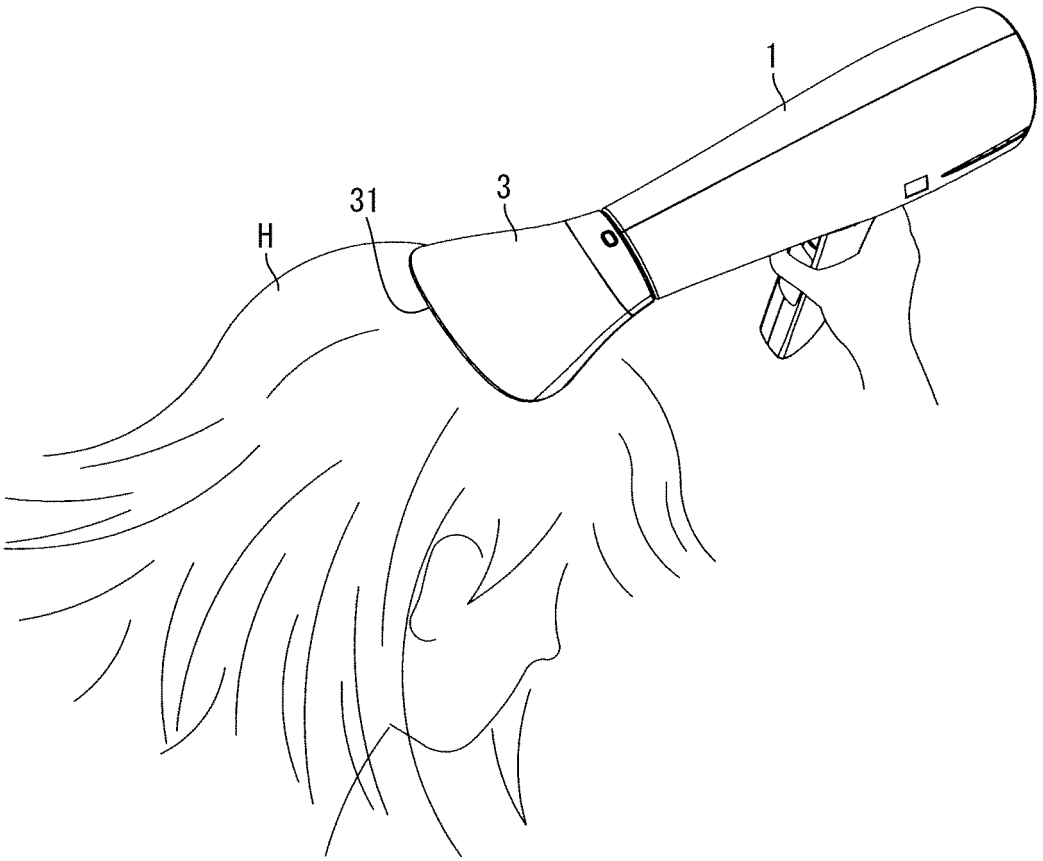


FIG. 7

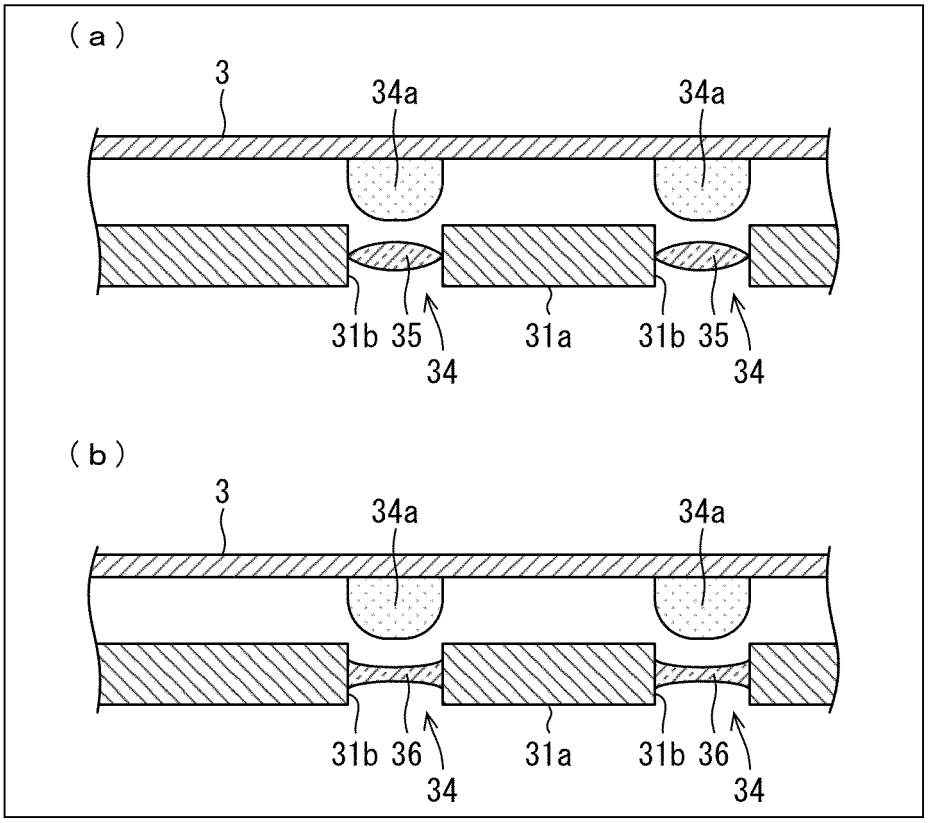
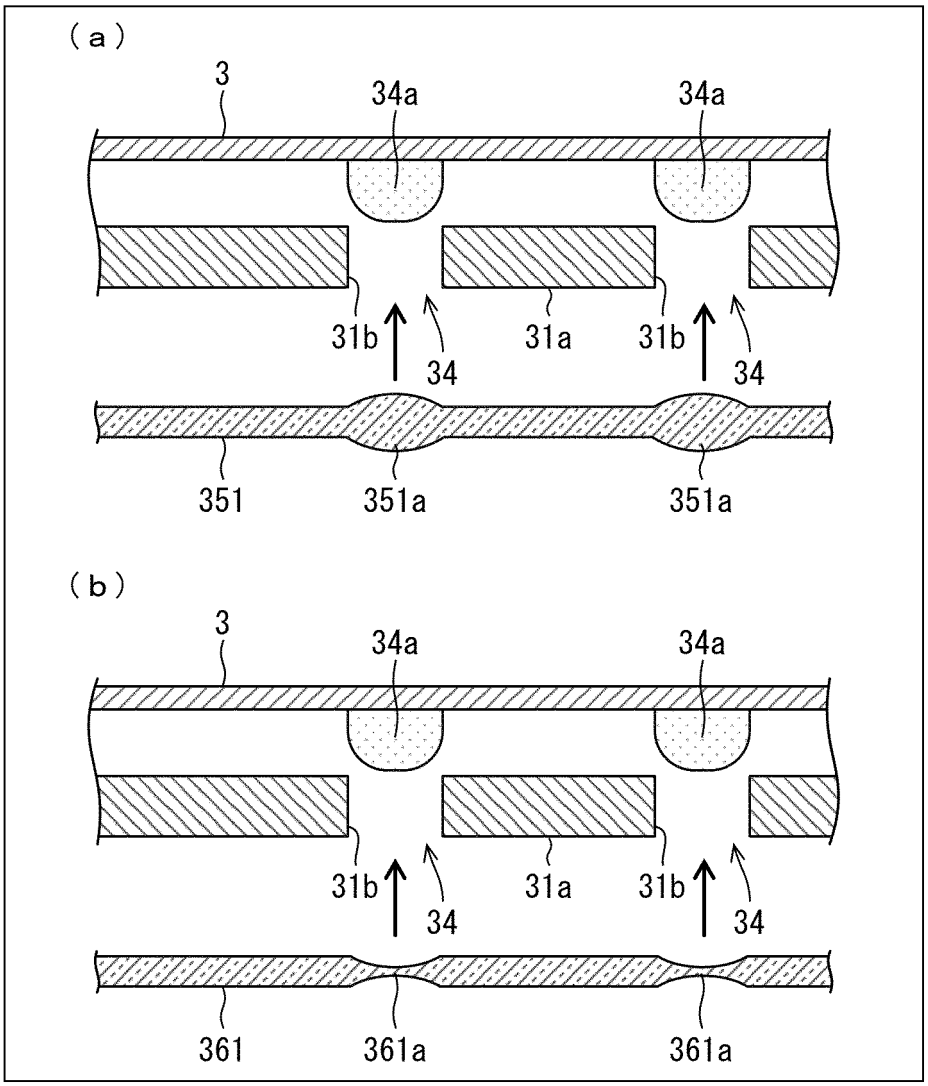

(a)
3
34a
34a
31b
35
34
31a
31b
35
34
(b)
3
34a
34a
31b
36
34
31a
31b
36
34

FIG. 8


(a)
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31b
34
34
361
361a
361a

FIG. 9

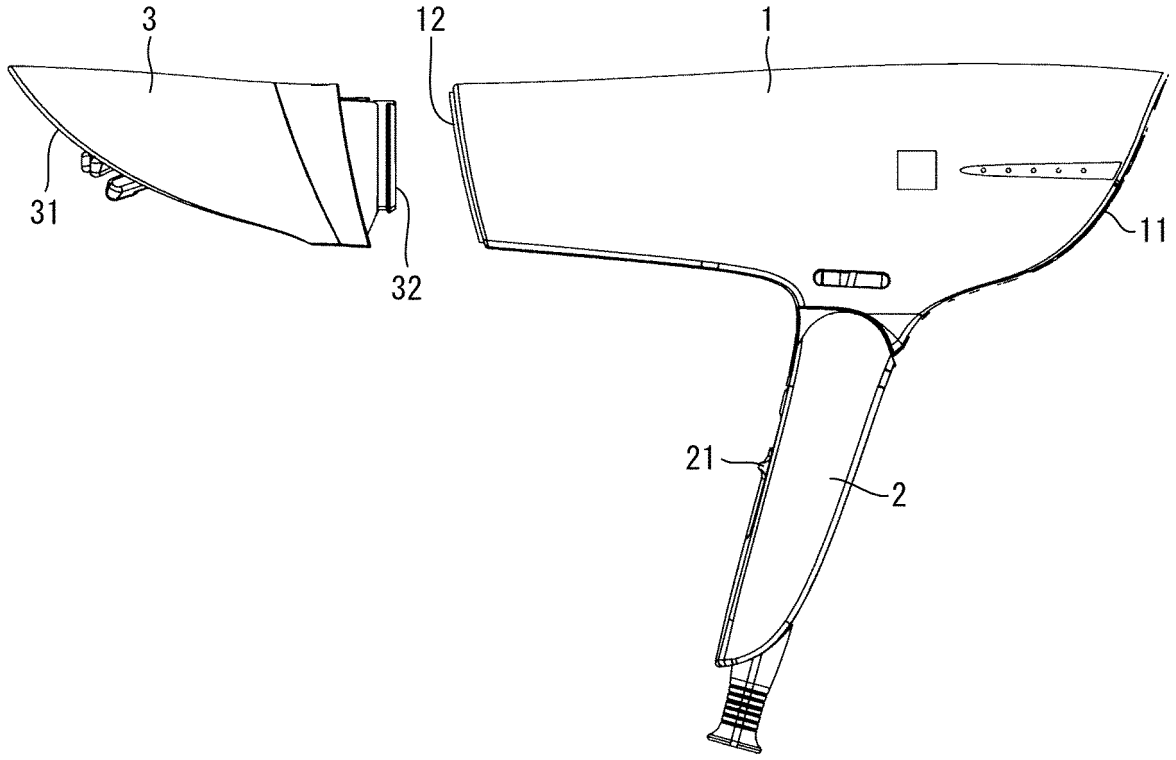


FIG. 10

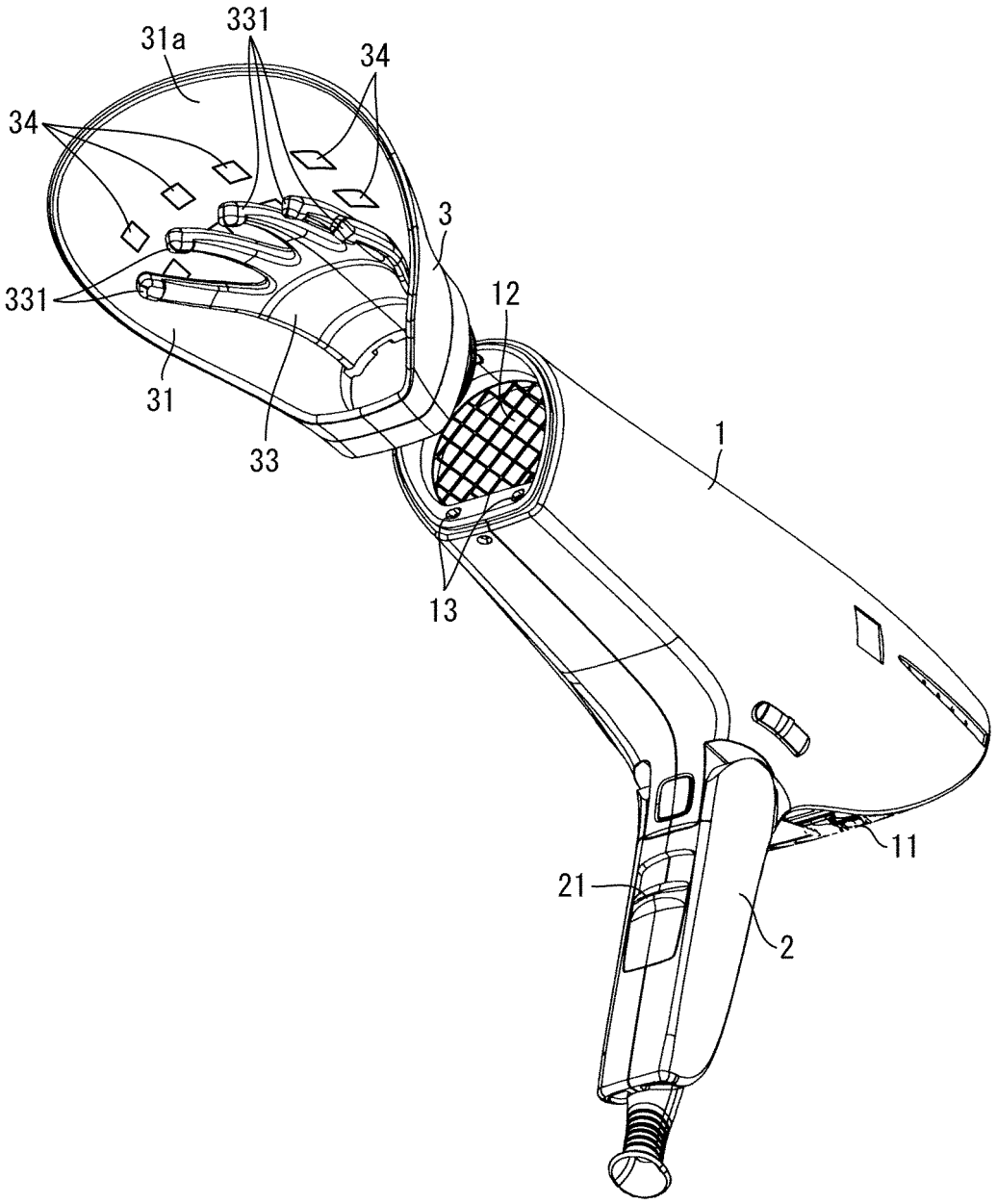


FIG. 11

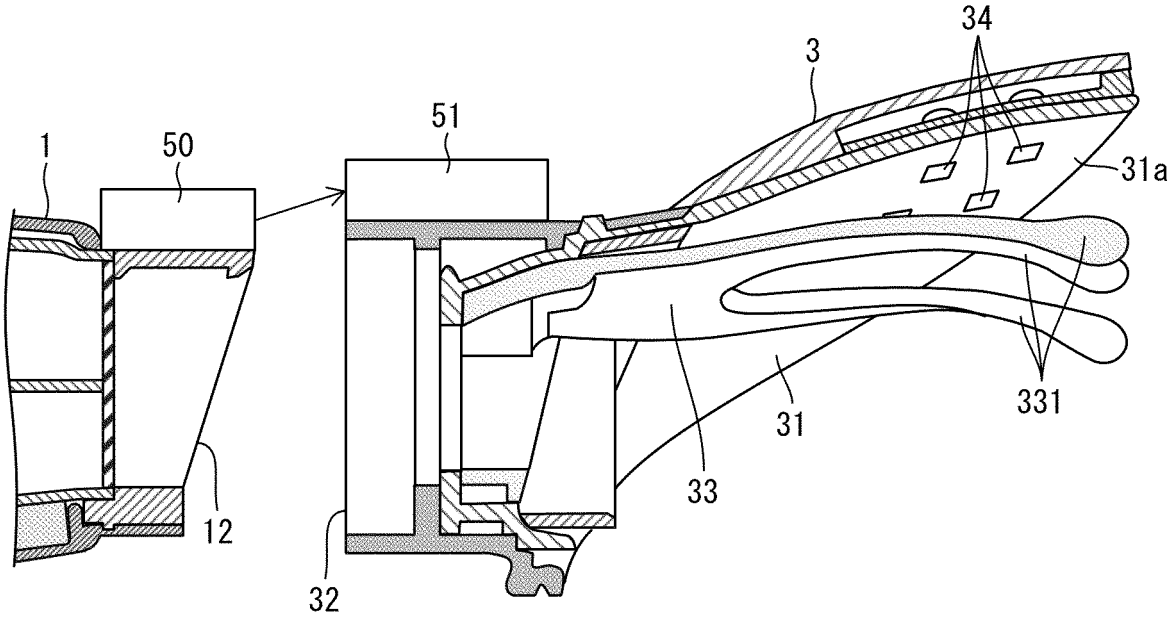


FIG. 12

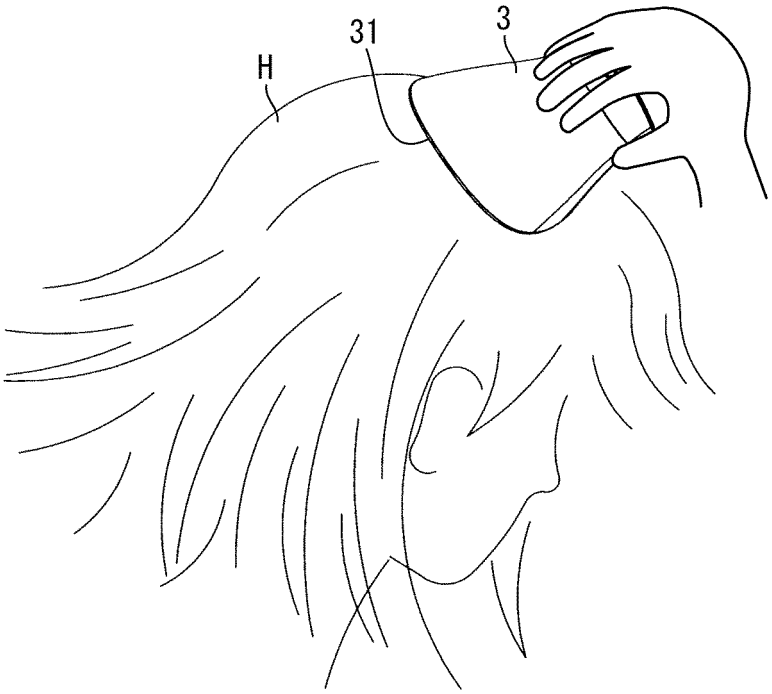


FIG. 13

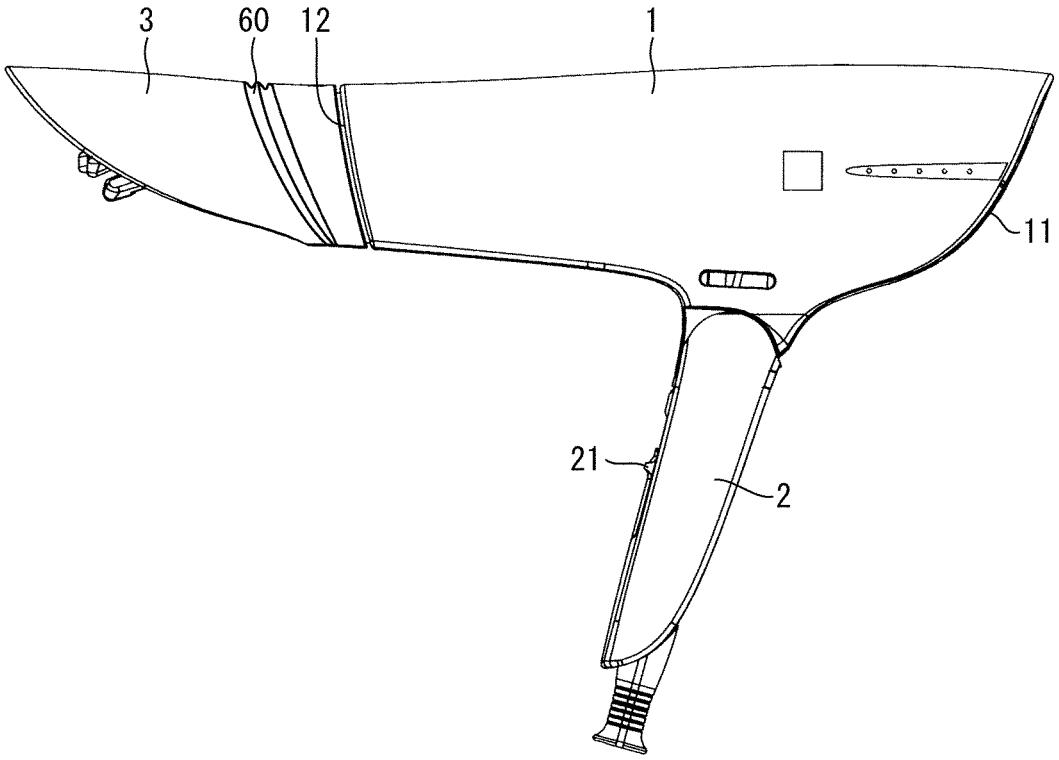


FIG. 14

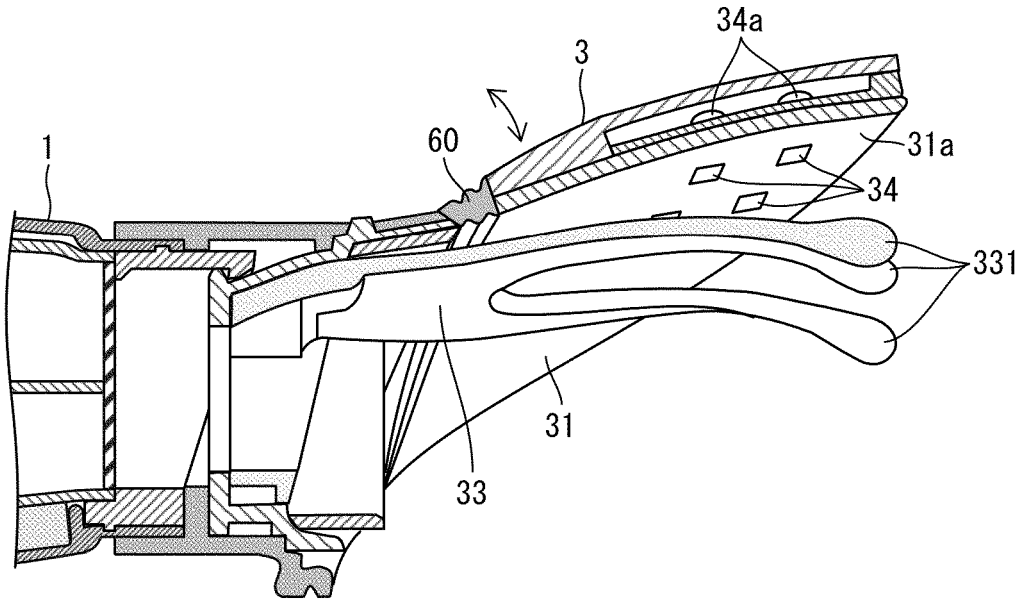
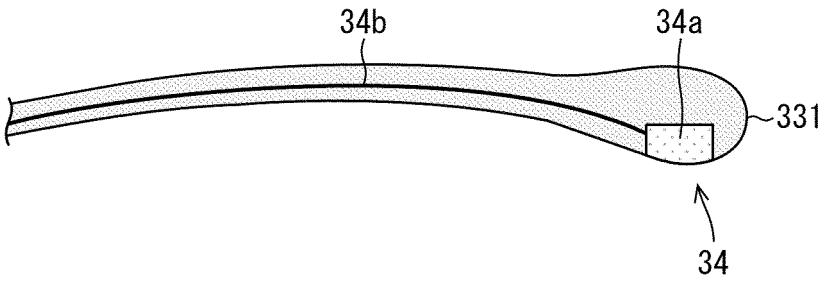


FIG. 15



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/030617

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. A45D20/12(2006.01)i, A45D20/10(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl. A45D20/12, A45D20/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2011/0197466 A1 (FAROUK SYSTEMS, INC.) 18 August 2011, paragraphs [0031]-[0043], fig. 1-6 & WO 2011/100711 A2	1-7
Y	JP 2013-81814 A (SYNERON BEAUTY LTD.) 09 May 2013, claims, fig. 1-3 & US 2009/0240310 A1, claims, fig. 1-3 & WO 2007/090256 A1 & EP 1986742 A1 & CA 2535276 A & KR 10-2008-0094715 A & CN 101495182 A & AU 2006338039 A	1-7

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 November 2018 (12.11.2018)	20 November 2018 (20.11.2018)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/030617

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2008-229176 A (CHIYODA BOSHOKU KK) 02 October 2008, paragraph [0020], fig. 1-2 (Family: none)	5-7
Y	JP 3002131 U (TETSUDO YOHIN SHOKAI KK) 20 September 1994, specification, paragraphs [0006], [0008], fig. 1-2 (Family: none)	5-7
Y	US 2014/0102470 A1 (LOMBARDI, Jack) 17 April 2014, paragraphs [0023], [0027], fig. 1-6 & WO 2012/012050 A2 & EP 2587957 A1 & AU 2011280108 A & CA 2803569 A1 & KR 10-2013-0033420 A & RU 2013103826 A	6-7
Y	JP 55-129009 A (N.V. PHILIPS' GLOEILAMPENFABRIEKEN) 06 October 1980, page 2, upper right column, line 13 to page 2, lower left column, line 12, fig. 1-4 & US 4391047 A, column 1, line 55 to column 2, line 23, fig. 1-4 & GB 2046089 A & DE 3010344 A & FR 2451723 A & NL 7902158 A & IT 1148856 A	7
A	JP 3193804 U (KATSUTA, Kuniharu) 23 October 2014, specification, paragraphs [0019]-[0029], fig. 1-3 (Family: none)	1-7
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 22882/1984 (Laid-open No. 134402/1985) (MATSUSHITA ELECTRIC WORKS, LTD.) 07 September 1985, specification, page 4, line 9 to page 6, line 15, fig. 1-7 (Family: none)	1-7
A	CD-ROM of the specification and drawings annexed to the request of Japanese Utility Model Application No. 57794/1993 (Laid-open No. 20104/1995) (YOKOKAWA, Junichi) 11 April 1995, specification, paragraph [0006], fig. 1-3 (Family: none)	1-7
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 119948/1977 (Laid-open No. 47587/1979) (BELMONT KESHOHIN KK) 02 April 1979, specification, page 6, line 4 to page 7, line 7, fig. 1-3 (Family: none)	1-7
A	JP 2006-25954 A (USHIO INC.) 02 February 2006, paragraphs [0008]-[0016], fig. 1-2 (Family: none)	1-7
A	US 2015/0122282 A1 (HADA, Joan) 07 May 2015, paragraphs [0023]-[0032], fig. 1-5 & WO 2013/158626 A1	1-7

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/030617

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2017-136436 A (METRAS, INC.) 10 August 2017, paragraphs [0041]-[0042], [0073], fig. 1-7 & JP 3207005 U & US 2018/0036553 A1 paragraphs [0045]-[0048], [0078], fig. 1-7 & WO 2016/175102 A1 & EP 3289912 A1 & CA 2983573 A & CN 107529865 A & KR 10-2017-0139520 A	1-7

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Patent documents cited in the description

- JP 6129392 B **[0003]**