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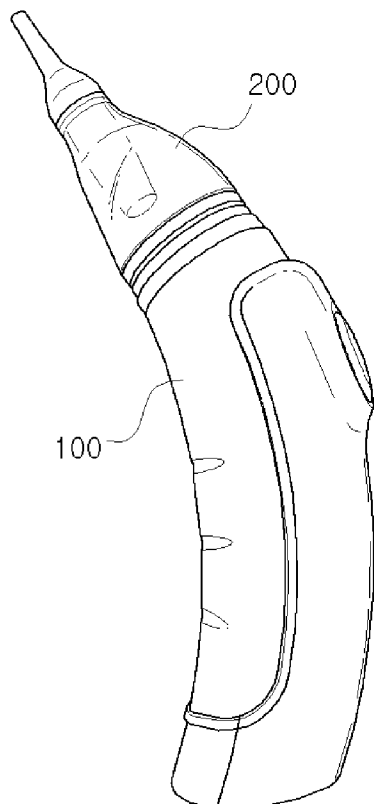
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(54) Title: BREATHING RELIEF KIT

[Fig. 1]



(57) Abstract: The present invention relates to a breathing relief kit including a body portion (100) and a sucking portion (200), in which the body portion (100) includes a housing, a battery pack (106) arranged in the housing, a rolling pump (107) which generates a vacuum pressure, a power circuit board (105), a switch circuit board (104), an adaptive packing (108), and decorative covers (110, 111) coupled to the exterior of the housing, and in which the sucking portion (200) includes a tank cap (206) detachably coupled to the adaptive packing (108) in a sealed manner, a suction tank (210) coupled to the tank cap (206) in a twisted manner and provided with a barrier wall (202) in an inside thereof in order to form an air pocket preventing the intrusion of liquids and an opening (204) in an end thereof, and a suction tip (208) detachably coupled to the opening (204).

Description

BREATHING RELIEF KIT

Technical Field

- [1] The present invention relates to a breathing relief kit that is based on intake and exhaustion operations of a pneumatic pump and is useful in treating nose ailments, and more particularly to a breathing relief kit for sucking mucous and spraying liquid, which has a good appearance, is easy to use and manage, and generates negligible vibration and noise.

Background Art

- [2] As is well known, infants, children, the aged, and feeble people easily catch diseases due to their poor resistance (weak immune system) and easily come to suffer from viral diseases, such as colds and the flu, due to their low ability to regulate their body temperature in winter or the turning point of the seasons.
- [3] Colds and the flu are representative respiratory ailments and are generally accompanied by symptoms of runny nose and nasal congestion. These symptoms can be alleviated by eliminating impurities and diminishing the inflammation in a nose, which is achieved by rinsing the inside of the nose using a saline solution and cooling the nose, respectively.
- [4] There is a plurality of methods for rinsing the inside of a nose. For example, a patient introduces a saline solution into his or her nose using a sprayer. Alternatively, a patient may directly inhale a saline solution through his or her nose and discharge the inhaled saline solution from his or her mouth. However, the latter method, in which a saline solution is directly inhaled through the nose and discharged through the mouth, has a problem in that it is painful and cannot be performed without training. Accordingly, the latter method is not a suitable treatment for infants or children. For this reason, the former method, in which a saline solution is sprayed into the nose and then sucked using a breathing relief kit, is recommended for children and infants as a runny nose treatment method.
- [5] In the case in which mucous attributable to nose ailments is blown and eliminated using tissues, such treatment can cause secondary pain and brings about inflammation of the mucous membrane of the nose. When the nose is inflamed, the patient may feel severe pain when blowing the mucous.
- [6] As for a known technique for treating runny nose, Korean Patent Registration No. 10-0367664 discloses an apparatus for treating nose ailments, entitled "Portable Runny Nose Suction Kit". The portable runny nose suction kit includes a casing having a storage space, a driving unit installed in the casing and driven by electric power from a

battery pack, a power transferring unit for converting rotational motion to linear motion, a vacuum generating unit connected to the power transferring unit, a mucous container connected to the vacuum generating unit via a tube, a mucous guide member communicating with the inside of the mucous container and guiding mucous to the mucous container, a suction hole provided to the outer portion of the mucous container, and an operation switching unit connected to the vacuum generating unit.

[7] When the portable runny nose suction kit is driven, negative pressure is created in the mucous container, and thus the mucous of a patient is sucked and guided to the mucous container along the mucous guide member.

[8] There is another known technique relating to an apparatus for treating runny noses. As an example thereof, Korean Utility Model No. 20-0209772 discloses a fluid blocking device for a mucous suction kit.

[9] The fluid blocking device for a mucous suction kit includes a main body configured to generate a constant suction force using driving force, and a mucous container detachably coupled to the end of the main body, and functions to suck mucous using suction force generated by the main body and storing the sucked mucous. According to this device, a fluid blocking device which prevents fluid, such as mucous, from entering the main body and also blocking the mucous contained in the mucous container from entering the main body when the mucous suction kit is inclined is provided in the mucous container. The fluid blocking device includes a fixed unit which is fixed to the inside of the lid of the mucous container in a distortion inserted manner while remaining spaced apart from a suction tube provided in the lid at a constant length, and which has an air passage therein, an opening and closing unit which is installed in an enlarged portion provided to the first end of the fixing unit so as to receive elastic restoring force from an elastic member, opens a suction passage configured to communicate with a suction hole of the main body when normally suctioning, and closes the suction passage using the suction force of the mucous suction kit when mucous is introduced, and a ball valve which is installed in a valve housing coupled to a second end of the fixing unit and moves according to the inclination of the runny nose suction kit so as to prevent the mucous contained in the mucous container from entering the main body of the runny nose suction kit.

[10] With such a structure, it is possible to prevent the mucous in the mucous container from entering the main body of the runny nose suction kit.

[11] However, the known techniques are disadvantageous in that the runny nose suction kit has only a simple function of sucking mucous, and is composed of parts having a complicated structure. Further, it is inconvenient to cleanse and manage the known runny nose suction kit after use.

[12] Still further, the known runny nose suction kits do not have a good appearance

because they are developed taking into consideration only their primary function of sucking mucous. Yet further, the known runny nose suction kits generate strong vibrations and noises attributable to interactions between complicated parts when they are used.

- [13] Accordingly, the known runny nose suction kits must be improved from the viewpoints of exterior design, reduction of vibrations and noises, and rationalized layout of parts, taking the exterior design into consideration.

Disclosure of Invention

Technical Problem

- [14] The present invention has been made in view of the above problems. According to one aspect of the invention, there is provided a breathing relief kit having a good design and generating less vibration and noise, by which it is possible to easily eliminate foreign matter from the nose of an infant or a patient using a pneumatic pump and to spray or introduce a saline solution into the nose of an infant or a patient in order to cleanse the inside of a nose of an infant or a patient.

Technical Solution

- [15] In order to solve the various problems encountered in the known art, and in order to achieve the above described advantageous effects and features, in accordance with one aspect of the invention, there is provided a breathing relief kit including a body portion and a sucking portion, in which the body portion includes a housing which is a combined body of a front cover and a back cover, a power supply battery pack installed in a space provided in the housing, a rolling pump which sucks and exhausts air in order to generate vacuum pressure, a power circuit board, a switch circuit board, an adaptive packing installed on the upper portion of the rolling pump, and decorative covers coupled to both outer sides of the housing, and in which the sucking portion includes a tank cap detachably coupled to the adaptive packing in a sealed manner and provided with a penetrating pipe which is aligned with a suction groove of the adaptive packing, a suction tank coupled to the tank cap in a twisted manner so as to provide a storage space for sucked liquid therein, provided with a barrier wall which forms an air pocket preventing the intrusion of liquid into the inside thereof, and provided with an opening in an end portion thereof, and a suction tip detachably coupled to the opening.
- [16] According to another aspect of the invention, there is provided a breathing relief kit including a body portion and a spraying portion, in which the body portion includes a housing which is a body combining a front cover and a back cover, a power supply battery pack installed in a space provided in the housing, a rolling pump which sucks and exhausts air in order to generate a vacuum pressure, a power circuit board, a switch circuit board, an adaptive packing installed on the upper portion of the rolling

pump, and decorative covers coupled to both outer sides of the housing, and in which the spraying portion includes a spray tank, which is a transparent body coupled to a nozzle assembly at a front end thereof and to a tank cover having an opening at a back end thereof, a tank cap coupled to the spray tank in a twisted manner so as to close and seal the opening of the tank cover and functioning to connect an exhaustion groove of the adaptive packing of the body portion with an extension pipe of a nozzle assembly using an air pipe, decorative covers coupled to both outer sides of the spray tank, and a nozzle cover fixed and coupled to flanges provided to upper portions of the decorative covers.

Advantageous Effects

- [17] The breathing relief kit according to the invention can easily eliminate foreign matter from the nose of an infant and a patient without stimulating the inside of the nose, and can effectively treat nose ailments by introducing a saline solution or a chemical which has a function of rinsing the inside of the nose into the nose.
- [18] The breathing relief kit according to the invention can spray liquid deep inside a nose by preliminarily atomizing a saline solution, a physician's prescription, or another chemical into particulates, which leads to a rapid medical effect.
- [19] The breathing relief kit according to the invention is useful in keeping the mucous membrane of a nose humid to an appropriate degree and healthy.
- [20] The breathing relief kit according to the invention can prevent respiratory ailments, such as colds, congestion, runny noses, snoring, rhinitis, and allergies, and prevents chronic fatigue, lack of concentration, lack of enthusiasm, and lack of appetite.
- [21] The breathing relief kit according to the invention can easily eliminate mucous and foreign matter from the nose because it is optimally designed taking into consideration safety and ease of use.
- [22] People are not reluctant to use the breathing relief kit according to the invention, a spraying portion or sucking portion of which can be easily cleansed.
- [23] The breathing relief kit according to the invention generates negligible vibration and noise and has a good appearance due to its mechanical design, in which human factors are considered, and compact structure for supporting inner parts.

Brief Description of the Drawings

- [24] FIG. 1 is a photographic picture illustrating a breathing relief kit (mucous sucking apparatus) according to one embodiment of the invention;
- [25] FIG. 2 is a photographic picture illustrating a breathing relief kit (liquid spraying apparatus) according to another embodiment of the invention;
- [26] FIG. 3 is an exploded perspective view illustrating a body portion of the breathing relief kit;

- [27] FIG. 4 is an exploded perspective view illustrating a sucking portion of the breathing relief kit;
- [28] FIG. 5 is an exploded perspective view illustrating a spraying portion of the breathing relief kit;
- [29] FIG. 6 is a schematic sectional view explaining the sucking operation of the breathing relief kit; and
- [30] FIG. 7 is a schematic sectional view explaining the spraying operation.

Best Mode for Carrying Out the Invention

- [31] Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings.
- [32] FIG. 1 is a photographic picture showing a breathing relief kit (mucous sucking apparatus) according to one embodiment of the invention, and FIG. 2 is a photographic picture showing a breathing relief kit (liquid spraying apparatus) according to another embodiment of the invention.
- [33] With reference to FIG. 1, the breathing relief kit includes a body portion 100 and a sucking portion 200, and the breathing relief kit performs a mucous sucking function. With reference to FIG. 2, the breathing relief kit includes a body portion 100 and a spraying portion 300, and the breathing relief kit performs a liquid spraying function.
- [34] FIG. 3 is an exploded perspective view illustrating the inner structure of the body portion. The body portion 100 is a housing having an almost cylindrical shape, the exterior of which defines an arc, and the body portion 100 includes a housing which is a combination of a front cover 109 and a back cover 101.
- [35] Inside the housing, a battery pack 106 serving as a power source is installed. In addition, a rolling pump 107 producing vacuum pressure by performing suction and exhaustion of air and an adaptive packing coupled to a head portion of the rolling pump 107 are also installed inside the housing. For this, a suction hole 113 and an exhaustion hole 114 formed in the head portion of the rolling pump are arranged so as to be precisely aligned with a suction hole 115 and an exhaustion hole 116 of the adaptive packing 108.
- [36] A power circuit board 105 generating voltage for charging the battery pack 106, which receives external power, is arranged on the lower portion of the inside of the housing, which is the combination of the front cover 109 and the back cover 101. A switch circuit board 104, on which a power switch controlling the operation of the rolling pump and an LED displaying the operation condition of the rolling pump are mounted is arranged on the upper portion of the inside of the housing. The LED on the switch circuit board displays power-on and power-off conditions through an LED lens 103 and the power switch is coupled to a switch knob 102 provided outside the body

portion.

- [37] A pair of decorative covers 110 and 111 are coupled to and arranged on both outer sides of the housing, which is the combination of the front cover 109 and the back cover 101, in order to decorate the exterior of the breathing relief kit according to the invention so that the breathing relief kit has a good appearance. Two semicircular flanges 117 and 118 provided to upper end portions of the decorative covers 110 and 111 are securely coupled to each other using a decoration ring 112 in a manner such that the decoration ring 112 covers the flanges 117 and 118.
- [38] As shown in FIG. 4, the sucking portion 200 includes a tank cap 206, which is detachably coupled to the adaptive packing 108 in a sealed manner and provided with a penetrating pipe 207 which is aligned with and inserted into the suction groove 115 of the adaptive packing 108, a suction tank 201 coupled to the tank cap 206 in a twisted manner so as to provide a liquid storage space therein and provided with a barrier wall 202 which forms an air pocket limiting the flow of sucked liquid inside thereof, and provided with an opening 204 in a leading end thereof, and a suction tip 208 detachably coupled to the opening 204.
- [39] An O-ring may be arranged between the suction tank 201 and the tank cap 206 in order to ensure a secure seal.
- [40] Hereinafter, the operation of the breathing relief kit having the above structure will be described.
- [41] First, the suction tank 201 and the tank cap 206 are coupled to each other in a twisted manner. At this time, the penetrating pipe 207 of the tank cap 206 is precisely aligned in the air pocket formed by the barrier wall 202 in the suction tank 201. In this state, the suction tip 205 is coupled to the opening 204. In this manner, the sucking portion 202 is assembled.
- [42] The body portion 100 is assembled in a manner such that the battery pack 106, the rolling pump 107, which generates a vacuum pressure, the power circuit board 105, the switch circuit board 104 and the adaptive packing 108 mounted at the upper end of the rolling pump are arranged inside the housing formed by combining the front cover 109 and the back cover 101. Next, the decorative covers 110 and 111 are coupled to the outer sides of the housing. Next, the decoration ring 112 covers the exteriors of upper portions of the decorative covers 110 and 112.
- [43] Next, the penetrating pipe 202, provided to the tank cap 206 of the sucking portion 200, is aligned with the suction groove 115 of the adaptive packing 108 of the body portion 100, and then the body portion 100 and the sucking portion 200 are coupled to each other. After that, when the switch knob 102 is moved to the ON-state position so as to turn on the power switch, the LED on the switch circuit board 104 is lit up and light from the LED is emitted through the LED lens 103 so as to be visible. At this

time, the suction or exhaustion operation of the rolling pump 107 starts up.

[44] As shown in FIG. 6, the suction or exhaustion operations of the rolling pump 107 generate a negative pressure in the suction tank 201 of the sucking portion 200, and thus foreign matter in a patient's nose is rapidly introduced into the suction tank 201 through the suction tip 205, thereby eliminating the foreign matter from the patient's nose and cleaning the inside of the patient's nose.

[45] Vacuum pressure generated by the rolling pump 107 and transferred to the suction tank 201 through the penetrating pipe 207 sucks the foreign matter from the patient's nose via the air pocket formed by the barrier wall 202. Accordingly, there is no probability of the foreign matter, such as mucous, introduced through the suction tip 205, entering the suction hole 113 of the rolling pump 107 through the penetrating pipe 207.

[46] The foreign matter collected in the sucking portion 200 is discharged, either through the opening 204 to which the suction tip 205 is coupled or by detaching the tank cap 206.

[47] FIG. 5 shows a structure of the spraying portion 300, which is coupled to the body portion 100 and which can spray a given liquid into the nose.

[48] With reference to FIG. 5, a tank cover 305 having an opening 306 is formed in the back end of a spray tank 301, which is a transparent body, with a nozzle assembly 311 in the tip thereof. The tank cover 305 is wrapped in a cover packing 307 made of silicon. The cover packing 307 also has an opening 308 corresponding to the opening 306. A saline solution or another medical chemical to be sprayed into the nose can be introduced into the spray tank 301.

[49] The spray tank 301 and the tank cap 309 are coupled to each other in a twisted manner and the opening of the cover packing 307 covering the tank cover 305 is kept in a sealed condition. An air pipe 310 provided on the tank cover 305 is precisely aligned with an extension pipe 302 which extends from a nozzle assembly 311 to the inside of the spray tank 310.

[50] A nozzle is arranged in the center of the nozzle assembly 311, and the exterior of the nozzle is configured to release a pneumatic pressure through the extension pipe 302. When the pneumatic pressure is released, air density is decreased around the nozzle tip, which draws up the saline solution in the spray tank 301 and thus sprays the saline solution outside the spray tank 301.

[51] An air pin 304 which adjusts pressure is installed in the upper portion of the spray tank 310 in order to prevent the generation of bubbles and the backflow of the saline solution.

[52] Decorative covers 312 and 313 which function to decorate the exterior of the spray tank 301 and to provide coupling jaws to be coupled to the tank cap 309 in a twisted

manner are coupled to both outer sides of the spray tank 301. A nozzle cover 316 is coupled to the flanges 314 and 315 in a twisted manner.

[53] Hereinafter, the operation of the breathing relief kit (liquid spraying apparatus) having the above structure will be described.

[54] A chemical or a saline solution is charged into the spray tank 301 of the spraying portion 300, and the opening 308 of the cover packing 307 covering the tank cover 305 is sealed using the tank cap 309.

[55] The body portion 100 and the spraying portion 300 are coupled to each other in a manner such that the air pipe 310 provided to the tank cap 309 of the spraying portion 300 is securely coupled to the exhaustion groove 116 of the adaptive packing 108 of the body portion 100. Next, power is supplied to the breathing relief kit when the switch knob 102 is moved to the ON-state position so as to start the rolling pump 107. At this time, suction and exhaustion operations are performed through the suction hole 113 and the exhaustion hole 114.

[56] At this time, exhaustion pressure is transferred to the air pipe 310 provided to the tank cap 309 of the spraying portion 300 via the exhaustion hole 116 of the adaptive packing 108, and this exhaustion pressure is released around the nozzle tip of the nozzle assembly 311 via the extension pipe 302 of the spray tank 301.

[57] The release of compressed air around the nozzle tip lowers the air density around the nozzle assembly 311, which draws up the liquid, such as the saline solution, stored in the spray tank through the tube 303. As a result, the liquid is sprayed from the nozzle. This spraying operation is illustrated in FIG. 7.

[58] The air pin 304 performs a pressure adjusting function for preventing the backflow of the sprayed liquid.

Claims

- [1] A breathing relief kit, comprising:
a body portion; and
a sucking portion,
wherein the body portion includes:
a housing which is a body combining a front cover and a back cover;
a battery pack arranged in the housing and supplying power;
a rolling pump performing operations of air suction and air exhaustion in order to generate a vacuum pressure;
a power circuit board;
a switch circuit board;
an adaptive packing mounted at an upper portion of the rolling pump; and
decorative covers coupled to both outer sides of the front cover and the back cover of the housing; and wherein the sucking portion includes:
a tank cap detachably coupled to the adaptive packing of the body portion in a sealed manner and provided with a penetrating pipe which is aligned with a suction groove of the adaptive packing;
a suction tank coupled to the tank cap in a twisted manner so as to provide a liquid storage space therein, having a barrier wall in an inside thereof in order to form an air pocket which prevents liquid intrusion, and having an opening 204 in an end thereof; and
a suction tip detachably coupled to the opening.
- [2] The breathing relief kit according to claim 1, wherein the body portion is designed taking human factors into consideration and thus has an exterior having an arc shape, and a decorative ring is coupled to upper portions of the decorative covers combined with each other in a twisted manner.
- [3] A breathing relief kit, comprising:
a body portion; and
a spraying portion,
wherein the body portion includes:
a housing which is a body combining a front cover and a back cover;
a battery pack arranged in the housing and supplying power;
a rolling pump performing operations of air suction and air exhaustion in order to generate a vacuum pressure;
a power circuit board;
a switch circuit board;
an adaptive packing mounted in an upper portion of the rolling pump; and

decorative covers coupled to both outer sides of the front cover and the back cover; and wherein the spraying portion includes:

a spray tank, which is a transparent body, coupled to a nozzle assembly at a front end thereof and to a tank cover having an opening at a back end thereof;

a tank cap coupled to the spray tank in a twisted manner so as to close and seal the opening of the tank cover and functioning to connect an exhaustion groove of the adaptive packing of the body portion with the extension pipe of the nozzle assembly via the air pipe;

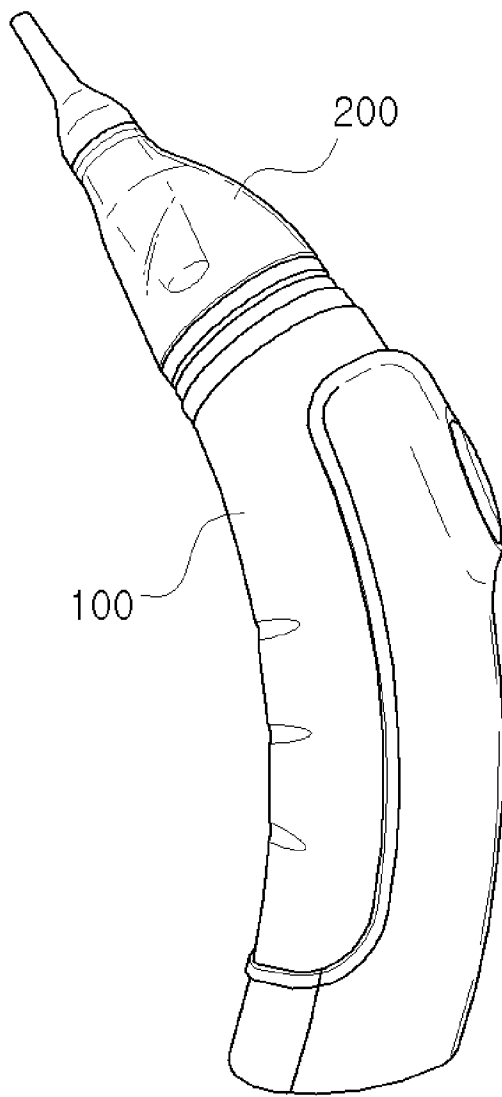
decorative covers coupled to both outer sides of the spray tank; and

a nozzle cover fixed and coupled to flanges provided to upper portions of the decorative covers.

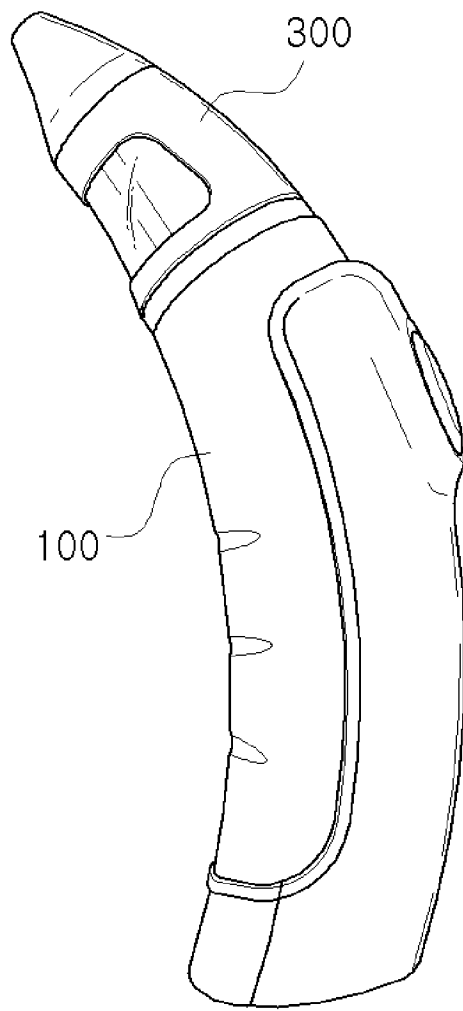
[4] The breathing relief kit according to claim 3, wherein the spray tank further includes an air pin which adjusts a pressure at an upper portion thereof in order to prevent backflow of a spray liquid.

[5] The breathing relief kit according to claim 3, wherein, in order to keep an inside of the tank cover in a sealed condition, the tank cover is wrapped in a cover packing having the same shape as the tank cover and an opening corresponding to the opening thereof.

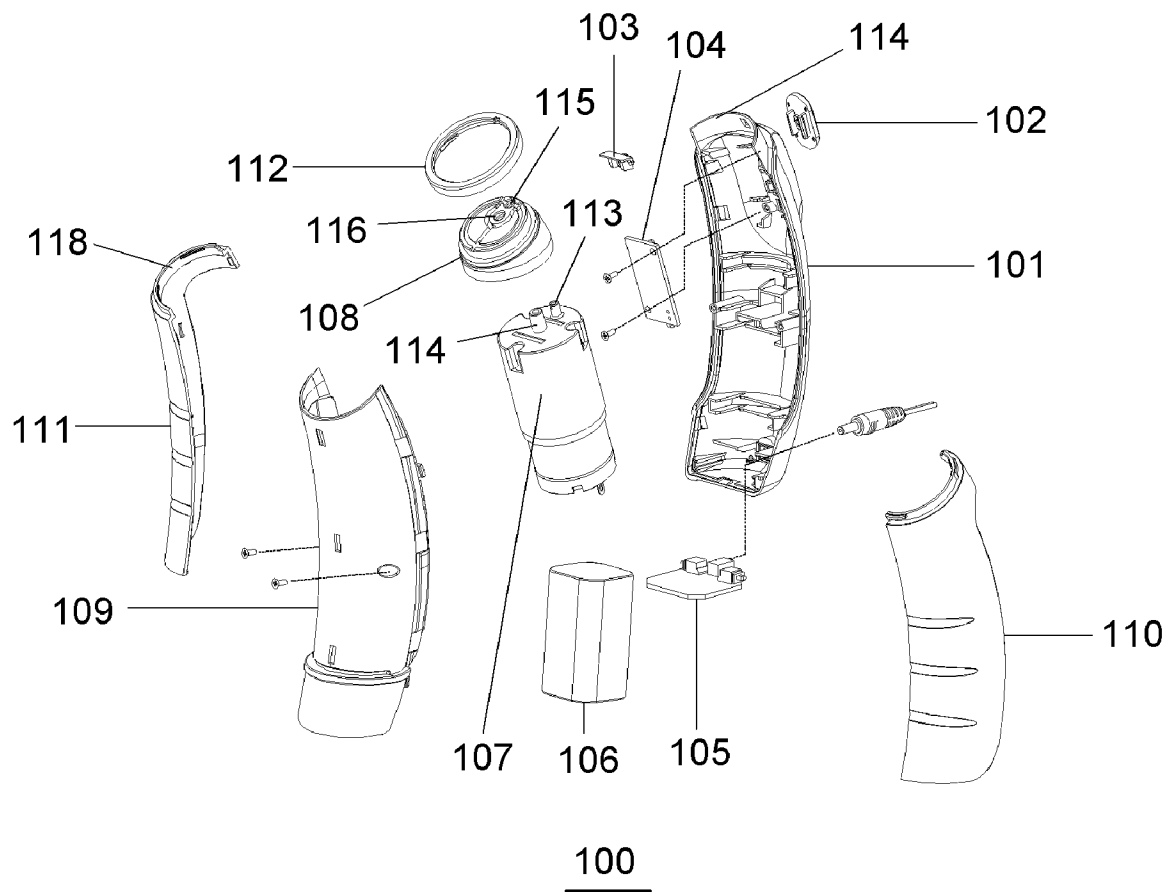
[Fig. 1]



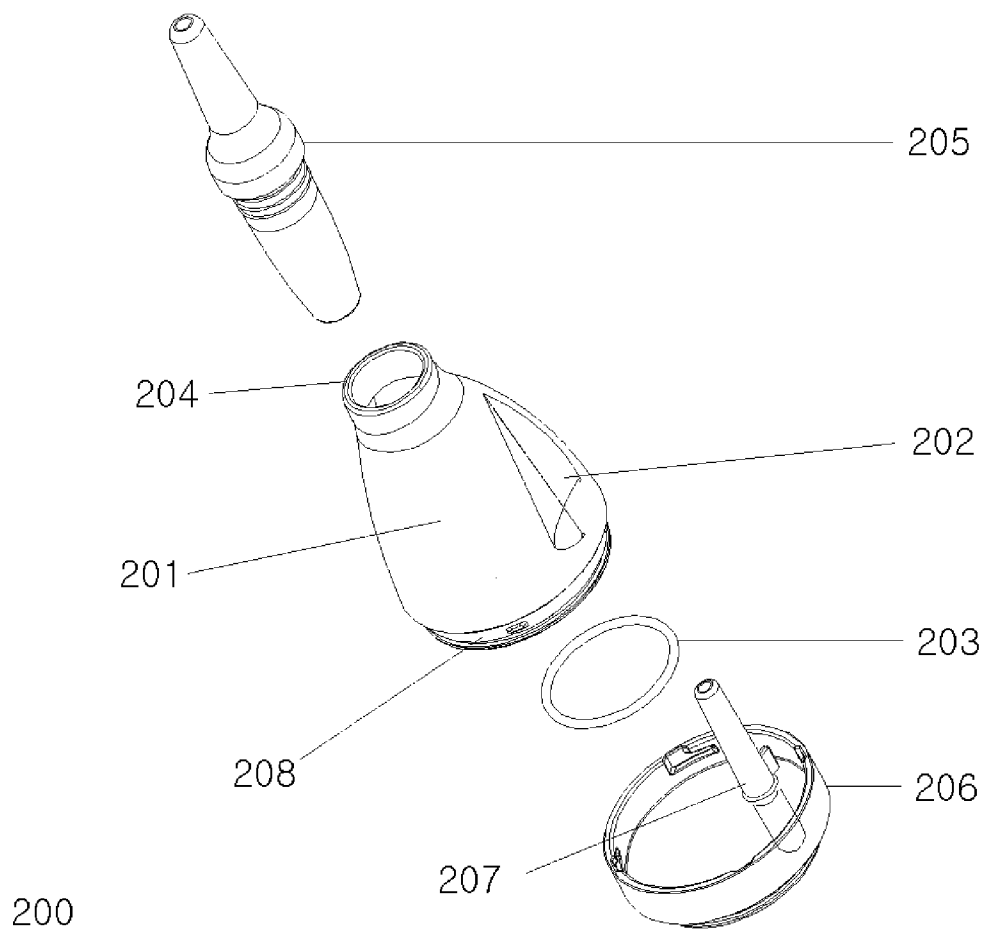
[Fig. 2]



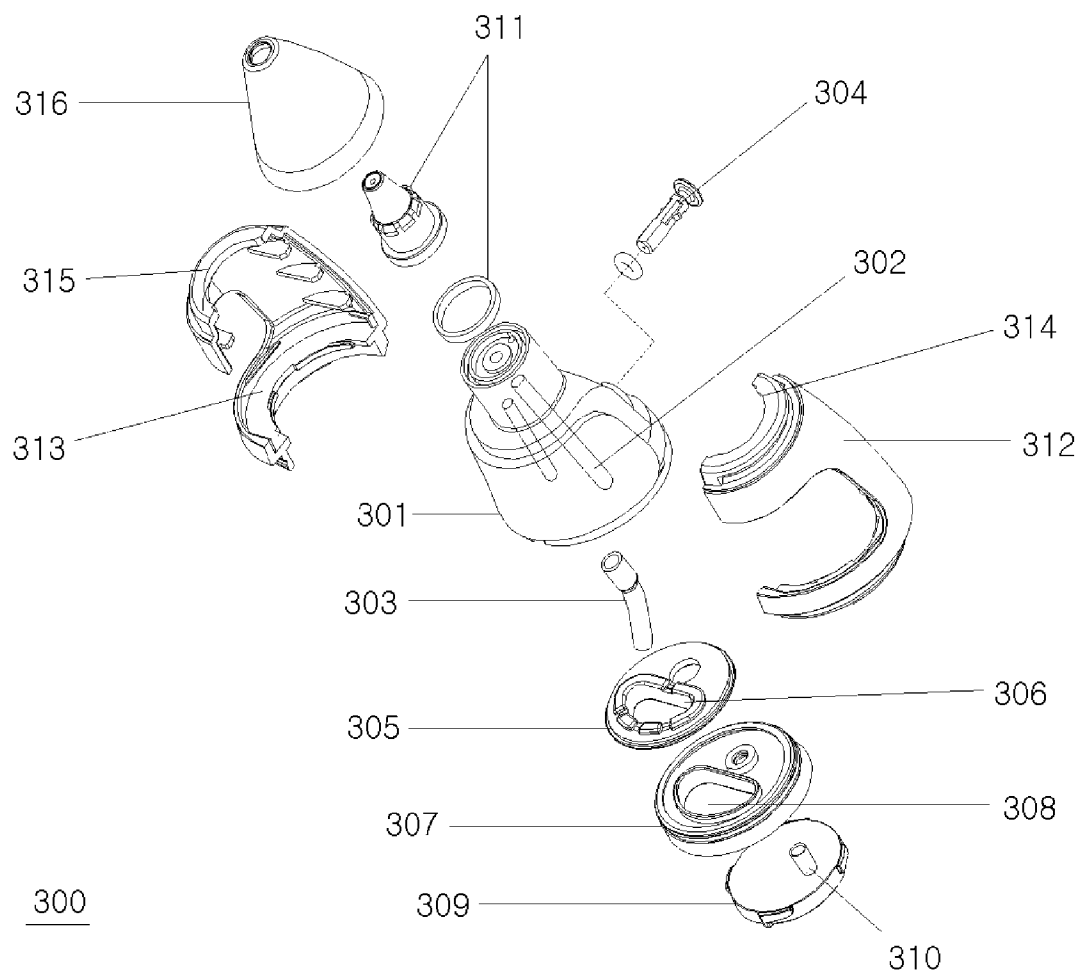
[Fig. 3]



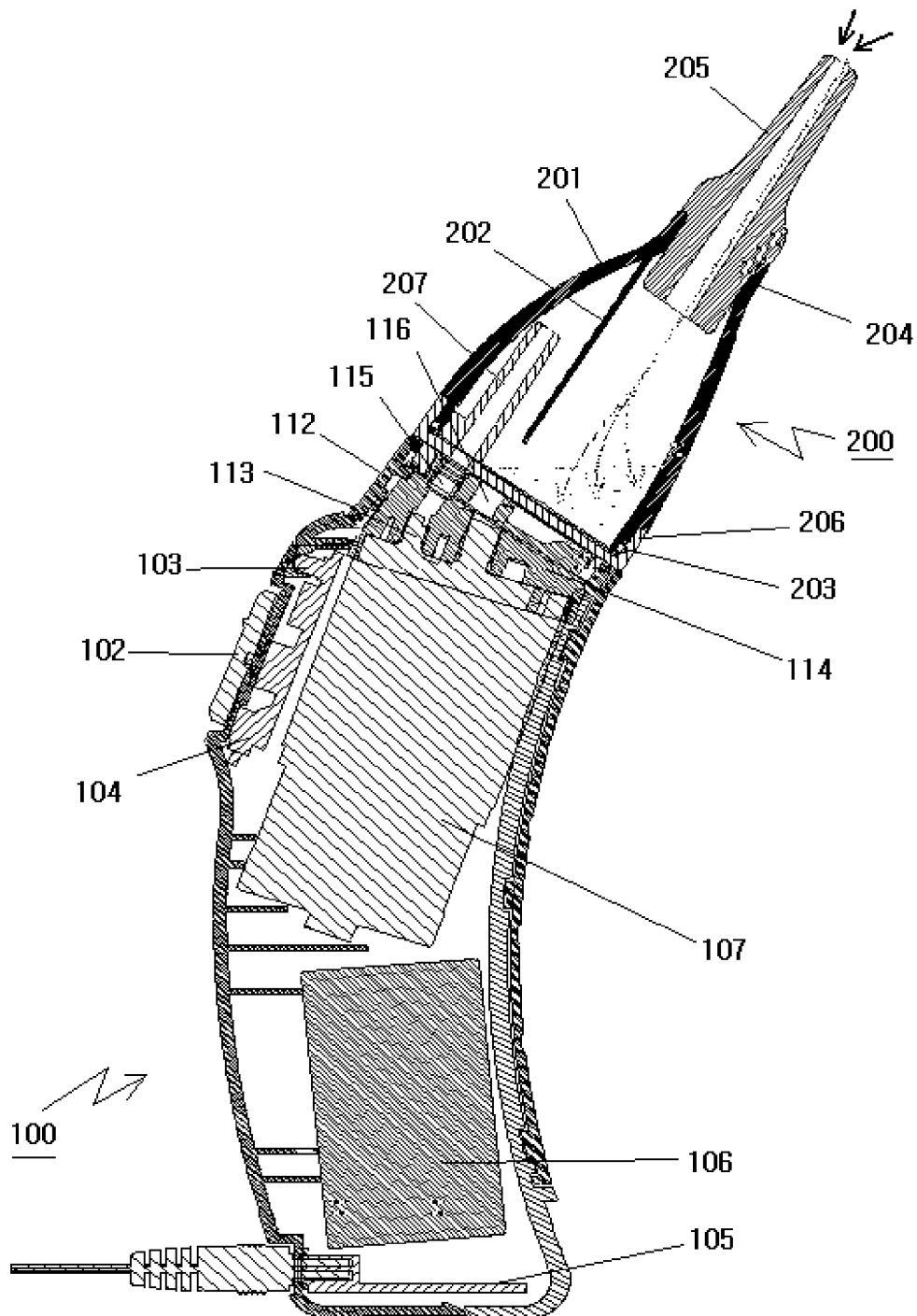
[Fig. 4]



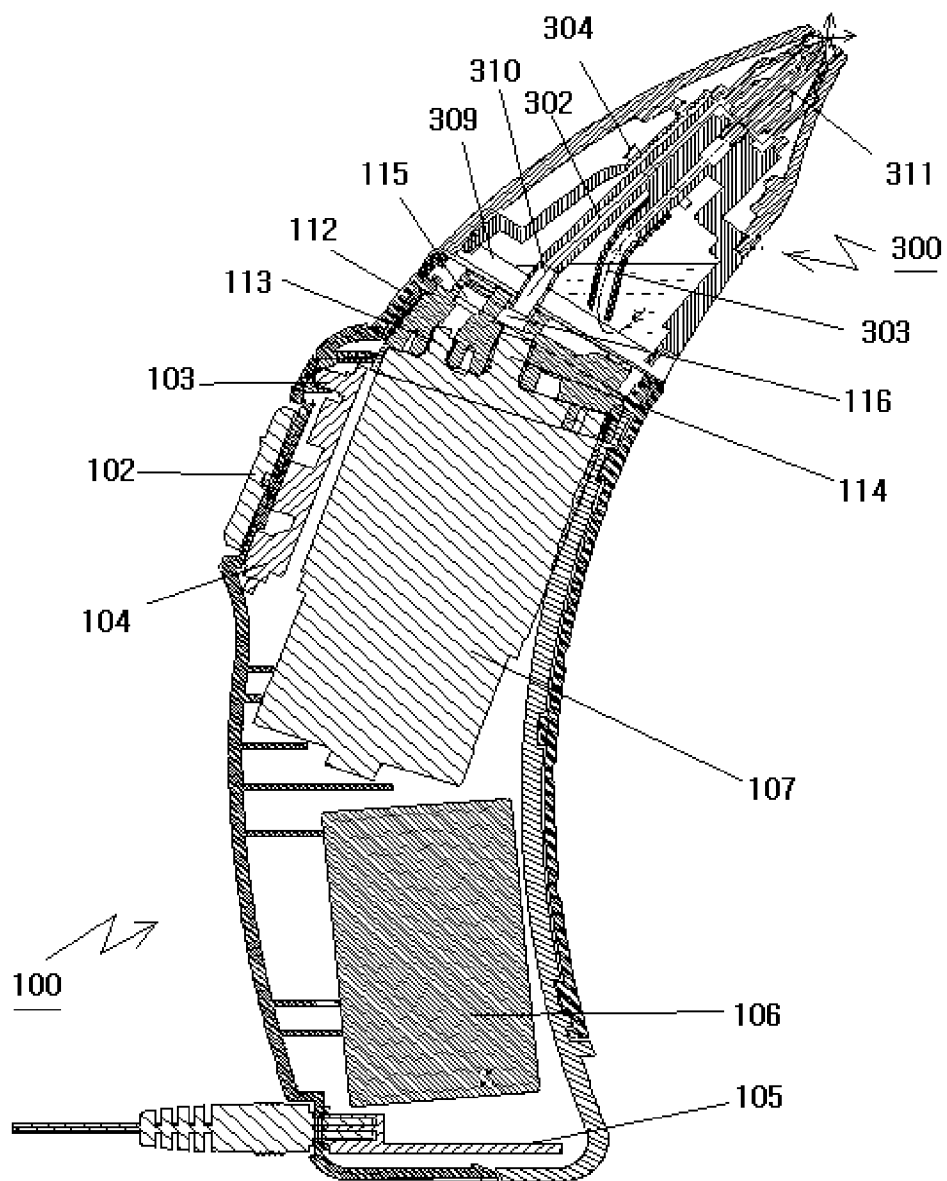
[Fig. 5]



[Fig. 6]



[Fig. 7]



A. CLASSIFICATION OF SUBJECT MATTER***A61M 27/00(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)

IPC 8 A61M 27/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models science 1975Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS, WPI, USPTO, PAJ "snot, nasal, nose, inhaler, washing, sprayer, secretion, aspiration, atomize, etc."**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 2001-0077778 A (G-Inteck Co., Ltd. KR) 20 Aug. 2001 See pp.2-5; Fig. 1.	1, 2
Y	KR 2002-0360605 B1 (G-Inteck Co., Ltd. KR) 18 Nov. 2002 See Figs. 7 and 8.	1, 2
A	See the whole document.	3-5
A	KR 2005-0390834 Y1 (Shin, Min Sook, KR) 28 Jul. 2005 See the whole document.	1-5
A	KR 2001-0224952 Y1 (Woo, Dae Sung, KR) 15 May 2001 See the whole document.	1-5
A	US 2005-0049620 A1 (Chang, H., TW) 3 Mar. 2005 See the whole document.	1-5
A	KR 2002-0266170 Y1 (Proteck Co., Ltd., KR) 27 Feb. 2002 See the whole document.	1-5



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

23 APRIL 2008 (23.04.2008)

Date of mailing of the international search report

23 APRIL 2008 (23.04.2008)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Heo, Joo-Hyung

Telephone No. 82-42-481-5026



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2007/004514**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Group I, claims 1 and 2, drawn to a breathing relief kit comprising a body portion and a sucking portion.

Group II, claims 3-5, drawn to a breathing relief kit comprising a body portion and a spraying portion.

The inventions listed as Group I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2 they lack the same or corresponding special technical features for the following reasons; they are separate inventions with distinct fields of search.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/004514

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