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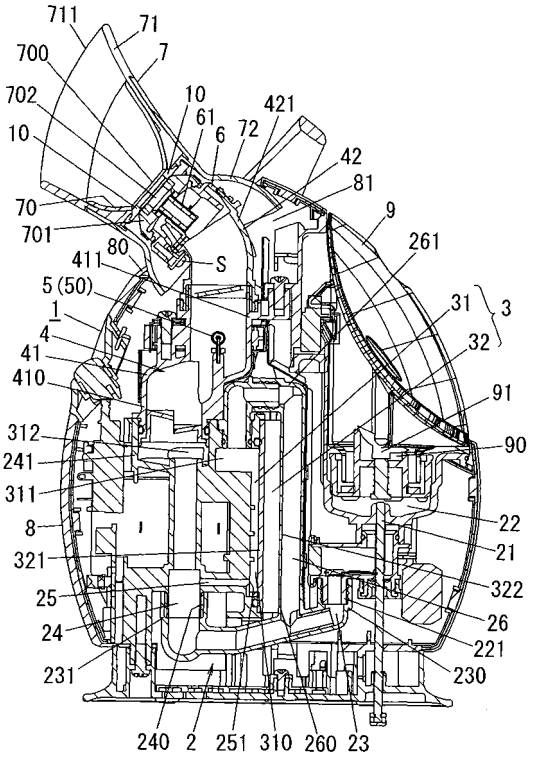
(54) Mist spray apparatus

(57) The mist spray apparatus has a mist generator (3) configured to generate high-temperature mist, and a nozzle (6) that has an orifice (61) and is configured to spray the mist through the orifice. The nozzle is covered with a nozzle cover (7). The apparatus further has an intake window (10). This intake window is configured to pull ambient air in the nozzle cover by negative pressure generated around the orifice when mist is sprayed from the orifice.

FIG. 1



EP 2 119 422 A1

Description

TECHNICAL FIELD

[0001] The invention relates to mist spray apparatus configured to spray mist over, for example, human skin for beauty care.

BACKGROUND ART

[0002] For example, Japanese Patent Application Publication No. 2007-260058A published on October 11, 2007 discloses steam beauty apparatus. The apparatus has an apparatus body including a mist generator (a heating mechanism), a long nozzle and so on. The mist generator is configured to generate high-temperature mist (steam), and includes, for example, a heater and a boiling chamber. The nozzle has an orifice and is configured to spray the mist through the orifice. The nozzle is a movable nozzle and is joined to a flexible duct (a bendable elasticity) in the apparatus body so as to stick out from the apparatus body.

[0003] In this steam beauty apparatus, high-temperature mist can be lowered to suitable temperature while it flows through the long nozzle. Since the apparatus also has the movable nozzle, suitable temperature mist can be surely sprayed over a desired region of a user, such as a face or the like.

[0004] However, since the apparatus has the long nozzle, there is a problem that the storage space of the apparatus becomes large. If the length of the nozzle is shortened in order to solve the problem, the orifice of the nozzle approaches the mist generator and consequently the temperature of mist sprayed from the orifice is raised. The distance between the orifice and a desired region of a user is lengthened, and accordingly it becomes difficult to surely spray mist over a desired region. In addition, mist can not be spayed over a desired region because the mist can be diffused before it reaches the desired region.

DISCLOSURE OF THE INVENTION

[0005] It is an object of the present invention to surely spray suitable temperature mist over a desired region of a user even if a nozzle is shortened.

[0006] The mist spray apparatus of the present invention comprises a mist generator, a nozzle, a housing and a cylindrical nozzle cover. The mist generator is configured to generate high-temperature mist. The nozzle has an orifice and is configured to spray the mist through the orifice. The housing incorporates the mist generator and the nozzle. The nozzle cover is configured to cover the nozzle and to control the direction of the mist sprayed from the orifice. In an aspect of the present invention, the apparatus further comprises an intake window configured to pull ambient air in the nozzle cover by negative pressure generated around the orifice when the mist is sprayed from the orifice.

[0007] In this invention, since ambient air is pulled in the nozzle cover by negative pressure generated around the orifice when mist is sprayed from the orifice, the temperature of the mist discharged from the nozzle cover can be lowered to suitable temperature. In addition, the suitable temperature mist can be surely sprayed over a desired region of a user with the nozzle cover.

[0008] In an embodiment, the orifice of the nozzle is a squeeze orifice and located at upstream of the intake window. In this embodiment, when mist is sprayed from the orifice, negative pressure can be effectively generated around the intake window.

[0009] In an embodiment, the nozzle cover comprises an inner partition or an inner ring flange. The inner partition or the inner ring flange comprises a hole leading to the orifice of the nozzle. The intake window comprises a slit, or a plurality of slits or holes, located around the edge of hole of the inner partition or the inner ring flange. In this embodiment, turbulence can be prevented from generating by the mist sprayed from the orifice. The straightening property of the mist sprayed from the orifice can be also improved.

[0010] The housing may further comprise a vent hole leading to the intake window through the internal space of the housing. Also, the housing may further comprise a vent line, and a vent hole leading to the intake window through the vent line. In these instances, the area of the vent hole can be increased, and accordingly a large quantity of ambient air can be pulled in the nozzle cover.

[0011] In an embodiment, the intake window is formed on the nozzle cover. In this embodiment, ambient air can be pulled in the nozzle cover by simple structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Preferred embodiments of the invention will now be described in further details. Other features and advantages of the present invention will become better understood with regard to the following detailed description and accompanying drawings where:

FIG. 1 is a longitudinal sectional view of mist spray apparatus, in accordance with a first embodiment of the present invention;
FIG. 2 is a front view of the mist spray apparatus;
FIG. 3 is a longitudinal sectional view of essential parts of the mist spray apparatus;
FIG. 4 illustrates essential parts of an embodiment;
FIG. 5 is a schematic diagram of mist spray apparatus, in accordance with a second embodiment of the present invention; and
FIG. 6A is a schematic diagram of mist spray apparatus, in accordance with a third embodiment of the present invention, and FIG. 6B illustrates a varied example of the mist spray apparatus.

BEST MODE FOR CARRYING OUT THE INVENTION

FIRST EMBODEIMENT

[0013] FIGS. 1 and 2 show mist spray apparatus in accordance with a first embodiment of the present invention. The apparatus is, for example, beauty apparatus configured to spray mist over human skin for beauty care, and has an apparatus body 1 and a liquid tank 9. This liquid tank 9 is, for example, a water tank for holding water, and is detachably attached to the apparatus body 1, e.g., the posterior-superior part.

[0014] The apparatus body 1 includes a water-feed mechanism 2, a mist generator 3, a mist exhaust mechanism 4, a high voltage generator 5, a nozzle 6 and a cylindrical nozzle cover 7, and also has a housing 8 accommodating these components. This housing 8 is formed by combining a plurality of parts.

[0015] The water-feed mechanism 2 is configured to supply the mist generator 3 with the liquid (e.g., water) in the liquid tank 9. For example, the water-feed mechanism 2 includes a release pin 21, a reservoir 22, a first feeding channel 23, a second feeding channel 24, a continuous channel 25 and a preheating channel 26. The release pin 21 is used to open a drain outlet 90 of the liquid tank 9 closed with a stop cock 91 in the tank 9 attached to the apparatus body 1 by pushing up the stop cock 91 (and a pin). The reservoir 22 is located under the liquid tank 9 attached to the apparatus body 1. For example, the reservoir 22 includes a recess where the liquid from the liquid tank 9 is stored before it is used by the mist generator 3.

[0016] The first feeding channel 23 is joined to the bottom end 221 of the reservoir 22, and is located in an anterior inferior direction so that the tip 231 of the first feeding channel 23 is placed at the anterior inferior part in the housing 8. The second feeding channel 24 is joined to the tip 231 of the first feeding channel 23, and is located in a vertical direction so that the tip 241 of the second feeding channel 24 is placed above the root 240 of the second feeding channel 24.

[0017] The continuous channel 25 is formed between the root 240 of the second feeding channel 24 and the mist generator 3 (a boiling chamber 31 to be hereinafter described). The preheating channel 26 is joined between the root 230 and the tip 231 of the first feeding channel 23, and is located in a vertical direction so that the tip 261 of the preheating channel 26 is placed above the root 260 of the preheating channel 26. The tip 261 of the preheating channel 26 also leads to the output of the mist generator 3 (a mist generation part).

[0018] The mist generator 3 is configured to generate high-temperature mist. For example, the mist generator 3 includes a boiling chamber 31 and a heater 32. However, not limited to this, the mist generator of the present invention may be configured to convert a liquid into mist by ultrasonic waves to heat the mist, or may be configured to convert a liquid into mist by nozzle jet to heat the mist.

[0019] The boiling chamber 31 is joined to the tip 251 of the continuous channel 25, and is located in a vertical direction so that the top end 311 of the boiling chamber 31 is placed above the bottom end 310 of the boiling chamber 31, coupled to the tip 251. The top end 311 of the boiling chamber 31 is the output of the mist generator 3, namely the mist generation part, and leads to the tip 241 of the second feeding channel 24 via at least one U-shaped channel 312. The heater 32 has a heating surface 321 and a radiating surface 322, and is located between the boiling chamber 31 and the preheating channel 26 so that the heating surface 321 forms one side of the boiling chamber 31 and the radiating surface 322 forms one side of the preheating channel 26. That is, each of the boiling chamber 31 and the preheating channel 26 is a flat shape. In the mist generator 3, the heater 32 boils the water in the boiling chamber 1 by the heat from the heating surface 321, and also preheats the water in the preheating channel 26 by the heat from the radiating surface 322. Thereby, the water from the reservoir 22 is preheated in the preheating channel 26 and then boiled in the boiling chamber 31, and accordingly the water from the reservoir 22 can be effectively boiled.

[0020] The mist exhaust mechanism 4 is configured to lead high-temperature mist generated through the mist generator 3 to an opening 80 formed at the anterior superior part of the housing 8. For example, the mist exhaust mechanism 4 includes a mist duct 41 and a flexible duct 42. The mist duct 41 is joined to the tip 241 of the second feeding channel 24, and is located so that the tip 411 of the mist duct 41 is placed above the root 410 of the mist duct 41. The flexible duct 42 is joined to the tip 411 of the mist duct 41, and is located so that the tip 421 of the flexible duct 42 is placed in the opening 80.

[0021] The high voltage generator 5 is configured to apply an electrostatic charge to the mist in the mist exhaust mechanism 4 to produce electrostatic mist. For example, the high voltage generator 5 is located in the mist duct 41 so as to apply high voltage to the mist in the mist exhaust mechanism 4.

[0022] The nozzle 6 is joined to the tip 421 of the flexible duct 42. This nozzle 6 has an orifice 61 and is configured to spray the mist (electrostatic mist) from the mist generator 3 through the orifice 61. For example, the nozzle 6 is a button type nozzle of which thickness is remarkably short in comparison with the length of the nozzle in the aforesaid steam beauty apparatus. The thickness is set, but not limited to, e.g., within 2 cm. The orifice 61 is also a squeeze orifice having an outside dimension shorter than the inside dimension of the flexible duct 42.

[0023] The nozzle cover 7 is configured to cover the nozzle 6 and to control the direction of the mist sprayed from the orifice 61 of the nozzle 6. In the example of FIG. 1, the nozzle cover 7 is formed of a plurality of parts, and has an inner partition 70. The nozzle cover 7 is divided into an anterior part 71 and a posterior part 72 by the inner partition 70. The anterior part 71 is in the shape of a bugle, and the posterior part 72 is in the shape of a

parabola. The inner partition 70 has an inner surface that becomes gradually wider forwards from the edge of its own center hole 700, and a holder 701 for joining the nozzle 6 and the nozzle cover 7. The holder 701 has a hole 702 leading to the orifice 61 of the nozzle 6, and is fixed to the inside of the nozzle cover 7 through joints (not shown) so that an intake window 10 is formed between the edge of the hole 700 and the outer edge of the holder 701. In short, the intake window 10 is formed of slits around the edge of the hole 700, and these slits are divided by the joints. Each width of the slits is set to at least 1mm. The nozzle 6 is fixed to the posterior part of the holder 701 with screws (S), while the nozzle cover 7 is inserted into the opening 80 of the housing 8 so that the outer peripheral surface of the posterior part 72 closes the opening 80 from the inside of the housing 8. Thereby, the orifice 61 of the nozzle 6 can be moved back to the posterior part of the holder 701. A part of the nozzle cover 7 (the anterior part 71 and a part of the posterior 72) is also stuck out of the opening 80 of the housing 8.

[0024] The housing 8 further has vent holes (not shown) leading to the intake window 10 via the interior space 81 of the housing 8. In the embodiment, the vent holes are gaps among the parts constituting the housing 8. Thus, the intake window 10 is formed, and the orifice 61 is located close behind the hole 702 of the holder 701 and located close at upstream of the center of the intake window 10. Thereby, ambient air can be pulled in the nozzle cover 7 by negative pressure generated around the orifice 61 when mist is sprayed from the orifice 61. In short, the mist spray apparatus has the intake window 10 for pulling ambient air in the nozzle cover 7 by negative pressure generated around the orifice 61 when mist is sprayed from the orifice 61. The nozzle cover 7 also has the parabola shaped posterior part 72, and thereby if the nozzle cover 7 fixed to the nozzle 6 is moved, the opening 80 of the housing 8 can be closed with the outer peripheral surface of the posterior part 72. In an example, the vent holes may be through holes formed in the vicinity of the opening 80 of the housing 8.

[0025] The operation of the embodiment is explained. If the water in the liquid tank 9 is fed to the boiling chamber 31 of the mist generator 3 through the water-feed mechanism 2, the water in the boiling chamber 31 is boiled with the heater 32 and then high-temperature mist is generated at the output of the mist generator 3 (mist generation part), i.e., the top end 311. The mist has an electrostatic charge by the high voltage from the high voltage generator 5 until it reaches the nozzle 6 through the mist exhaust mechanism 4, and subsequently is sprayed from the orifice 61 of the nozzle 6.

[0026] Concretely, when the mist is sprayed from the orifice 61 as shown in "A" of FIG. 3, ambient air is pulled in the nozzle cover 7 through the interior space 81 and the intake window 10 from the vent holes of the housing 8 by Venturi effect as shown in "B" of FIG. 3. Each of the mist sprayed from the orifice 61 and the air pulled in the nozzle cover 7 is subsequently carried to the exterior while receiving control of its own direction from the nozzle cover 7. In this instance, the temperature of the mist sprayed from the orifice 61 is lowered by the air pulled in the nozzle cover 7, and accordingly the temperature of the mist discharged from the opening 711 of the nozzle cover 7 can be lowered to suitable temperature (e.g., but not limited to, within a range from 36°C to 46°C). Since ambient air is also pulled in the nozzle cover 7 so as to surround the mist sprayed from the orifice 61, turbulence can be prevented from generating by the mist sprayed from the orifice 61. Therefore, it is possible to surely spray suitable temperature mist over a desired region of a user even if the nozzle 6 is short. The straightening property of the mist sprayed from the orifice 61 can be also improved, and pulsatory motion and fluctuation of the mist can be prevented. Since the orifice 61 is located close behind the hole 702 of the holder 701 and located close at upstream of the center of the intake window 10 in particular, negative pressure can be effectively generated in the vicinity of the intake window 10.

[0027] In an embodiment, as shown in FIG. 4, the mist spray apparatus has the intake window 10 formed of one ring-shaped slit. In this embodiment, the holder 701 is fixed to the inside of the nozzle cover 7 through joints (not shown) located at positions where the joints do not divide the intake window 10. However, not limited to this, the intake window of the present invention may be formed of holes around the edge of the hole 700. In an example, the nozzle cover 7 may have an inner ring flange. This inner ring flange has a hole 700 like the inner partition 70, but does not have the holder 701. The inner ring flange is fixed to the nozzle 7 or the flexible duct 42 through joints so that the intake window 10 is formed between the edge of the inner ring flange and the outer edge of the nozzle 6.

SECOND EMBODEIMENT

[0028] FIG. 5 shows mist spray apparatus in accordance with a second embodiment of the present invention. This apparatus is formed in the same way as the first embodiment, and further includes vent lines 811. In the example of FIG. 5, each vent line 811 is located between the intake window 10 and a vent hole 82 that becomes gradually wider from the end of a corresponding vent line 811 to its own opening. In the second embodiment, compared with the vent holes of the first embodiment (the gaps among the parts), a large quantity of ambient air can be effectively pulled in the nozzle cover 7 from the intake window 10.

THIRD EMBODEIMENT

[0029] FIG. 6A shows mist spray apparatus in accordance with a third embodiment of the present invention. This apparatus is formed in the same way as the first embodiment except the intake window 10, and is characterized by the intake window 10 formed on the nozzle

cover 7. In the example of FIG. 6A, the intake window 10 is formed of holes or slits located at the posterior part of the peripheral side of the nozzle cover 7. Preferably, holes or slits constituting the intake window 10 are located so that it surrounds close at upstream of the orifice 61 of the nozzle 6. The width of the intake window 10 in the axis direction of the cylindrical nozzle cover 7 is set within the range of at least 0.5mm and 2mm. In the third embodiment, ambient air can be pulled in the nozzle cover 7 by simple structure.

[0030] In an example, as shown in FIG. 6B, the intake window 10 may include a hole formed from the front end to the rear end in the peripheral side of the nozzle cover 7.

[0031] Although the present invention has been described with reference to certain preferred embodiments, numerous modifications and variations can be made by those skilled in the art without departing from the true spirit and scope of this invention.

Claims

1. Mist spray apparatus, comprising:

a mist generator (3) configured to generate high-temperature mist;
a nozzle (6) that has an orifice (61) and is configured to spray the mist through the orifice (61);
a housing (8) that incorporates the mist generator (3) and the nozzle (6); and
a cylindrical nozzle cover (7) configured to cover the nozzle (6) and to control the direction of the mist sprayed from the orifice (61);

characterized in that the apparatus further comprises an intake window (10) configured to pull ambient air in the nozzle cover (7) by negative pressure generated around the orifice (61) when the mist is sprayed from the orifice (61).

2. The mist spray apparatus of claim 1, wherein the orifice (61) of the nozzle (6) is a squeeze orifice and located at upstream of the intake window (10).

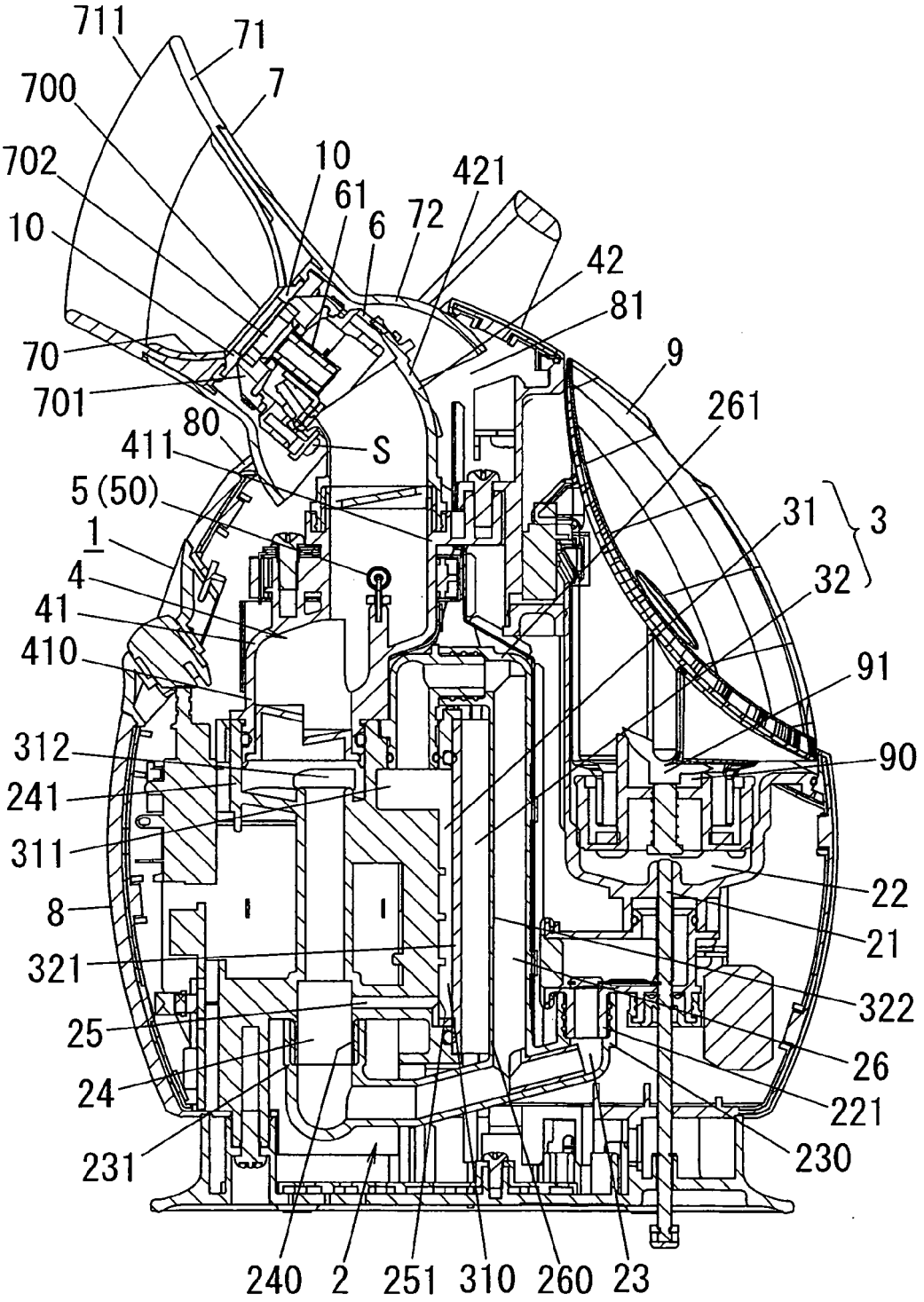
3. The mist spray apparatus of claim 2,
wherein the nozzle cover (7) comprises an inner partition (70) or an inner ring flange,
the inner partition (70) or the inner ring flange comprising a hole (700) leading to the orifice (61) of the nozzle (6),
wherein the intake window (10) comprises a slit, or a plurality of slits or holes, located around the edge of the hole (700).

4. The mist spray apparatus of claim 3, wherein the housing (8) further comprises a vent hole leading to the intake window (10) through the internal space (81) of the housing (8).

5. The mist spray apparatus of claim 3, wherein the housing (8) further comprises a vent line (811), and a vent hole (82) leading to the intake window (10) through the vent line (811).

6. The mist spray apparatus of claim 2, wherein the intake window (10) is formed on the nozzle cover (7).

FIG. 1


711
71
7
700
702
10
61
6
72
421
42
81
9
261
10
70
701
80
411
S
5 (50)
1
4
41
410
312
241
311
8
321
25
24
231
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2
251
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260
23
230
221
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21
22
90
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32
31
3

FIG. 2

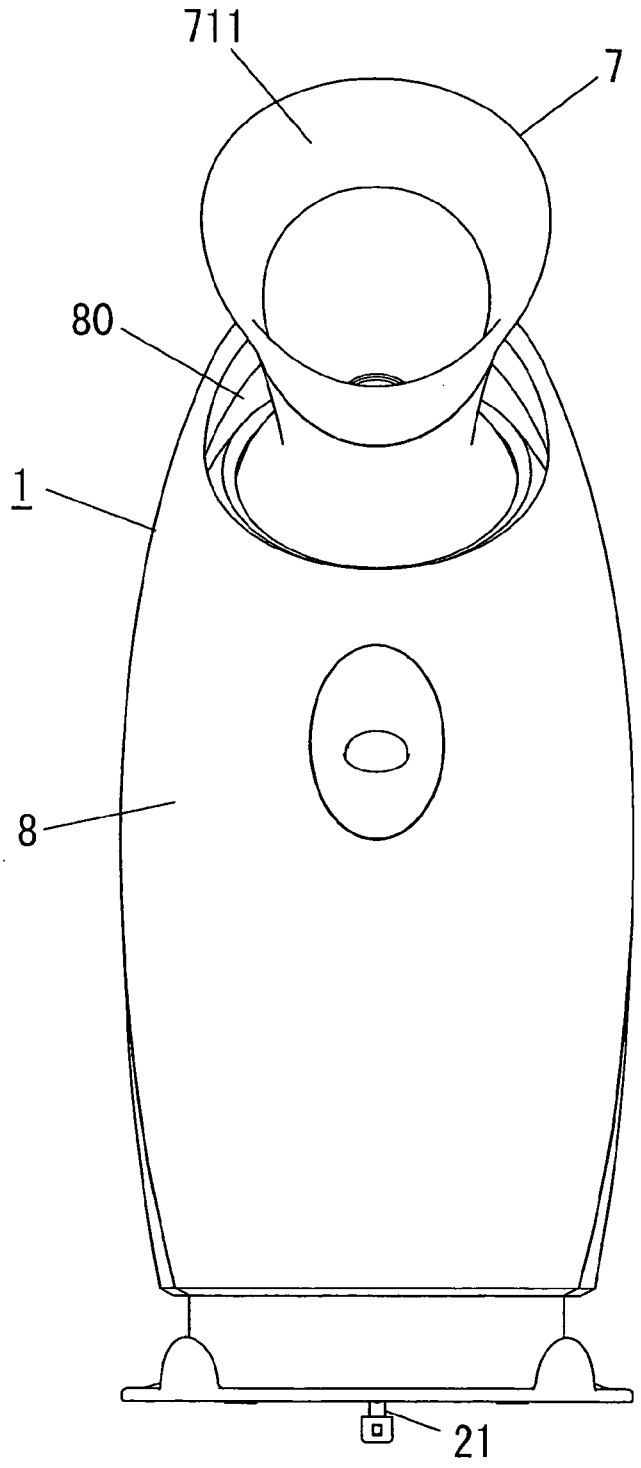


FIG. 3

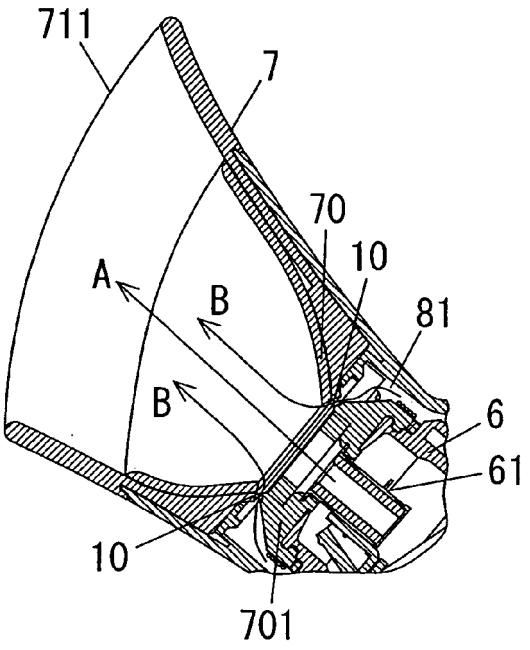


FIG. 4

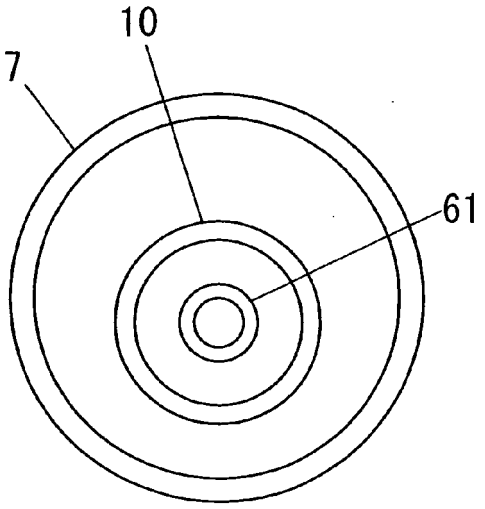


FIG. 5

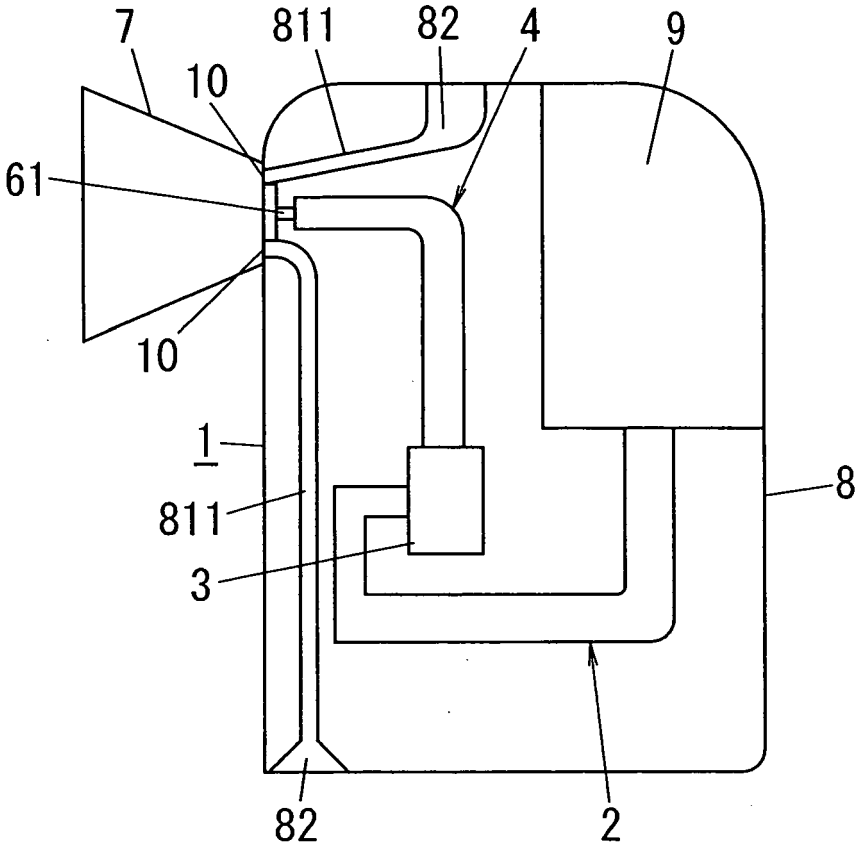


FIG. 6A

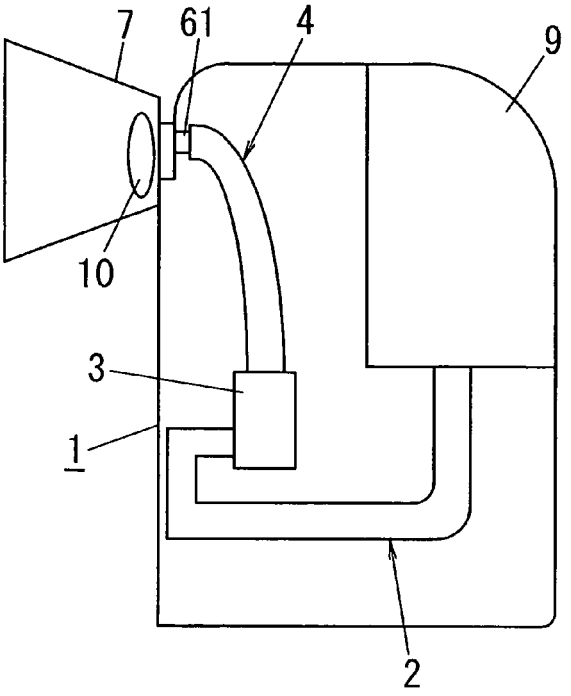
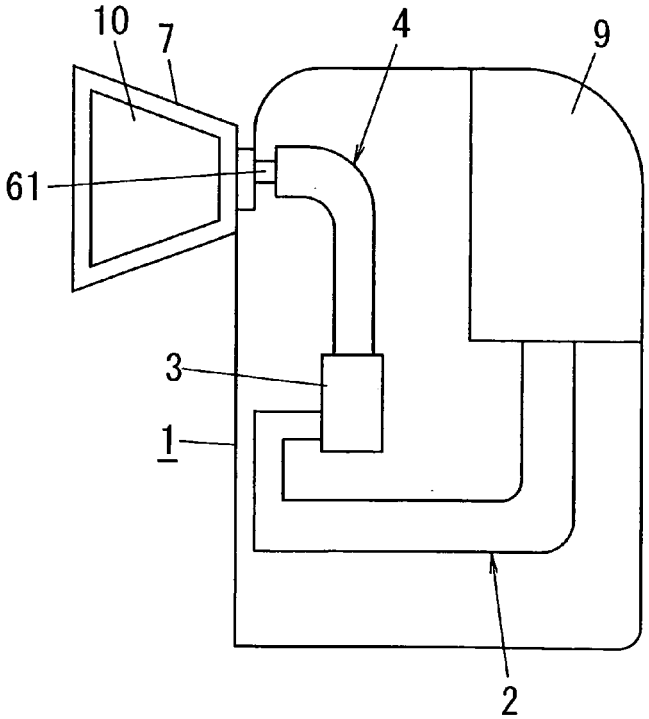


FIG. 6B



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EUROPEAN SEARCH REPORT

Application Number
EP 09 00 5166

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 91 00 167 U1 (PLANETA HAUSGERAETE GMBH & CO ELEKTROTECHNIK KG, 8948 MINDELHEIM, DE) 11 July 1991 (1991-07-11) * page 4, paragraph 4 * * page 6, paragraphs 2,3,5; figure 1 *	1-6	INV. A61H33/12
X	US 3 351 737 A (LAWRENCE KATZMAN ET AL) 7 November 1967 (1967-11-07) * column 2, line 69 - column 3, line 5; figures 1-3 *	1-6	
X	US 4 635 630 A (NOIR DOMINIQUE [CH] ET AL) 13 January 1987 (1987-01-13) * column 2, lines 25-59; figures 1,2 *	1-6	
X	US 6 874 771 B2 (BIRDSELL WALTER G [US] ET AL BIRDSELL WALTER G [US] ET AL) 5 April 2005 (2005-04-05) * column 5, lines 1-19; figures 1,2,7 *	1-6	
X	US 2002/085839 A1 (GLUCKSMAN DOV Z [US]) 4 July 2002 (2002-07-04) * figures 7-9 *	1-6	TECHNICAL FIELDS SEARCHED (IPC) A61H A45D F24F
X	US 6 226 451 B1 (WONG JOHN YING MAN [HK]) 1 May 2001 (2001-05-01) * column 2, lines 28-33,41-45; figures 1,2 *	1-6	
X	US 3 949 743 A (SHANBROM EDWARD) 13 April 1976 (1976-04-13) * column 4, lines 38-43; figures 1-3 *	1-6	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 June 2009	Fischer, Elmar

CATEGORY OF CITED DOCUMENTS

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24-06-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9100167 U1	11-07-1991	NONE	
US 3351737 A	07-11-1967	DE 1491566 B1	20-07-1972
		FR 1511313 A	26-01-1968
		GB 1110140 A	18-04-1968
US 4635630 A	13-01-1987	AU 566640 B2	22-10-1987
		AU 3504484 A	07-05-1985
		CA 1260353 A1	26-09-1989
		CH 654213 A5	14-02-1986
		WO 8501661 A1	25-04-1985
		DE 3464851 D1	27-08-1987
		DK 274285 A	18-06-1985
		EP 0140838 A1	08-05-1985
		EP 0161267 A1	21-11-1985
		ES 8605995 A1	01-10-1986
		GR 80567 A1	30-10-1984
		IE 55759 B1	02-01-1991
		JP 2057431 B	04-12-1990
		JP 61500155 T	30-01-1986
US 6874771 B2	05-04-2005	US 2004026802 A1	12-02-2004
US 2002085839 A1	04-07-2002	NONE	
US 6226451 B1	01-05-2001	NONE	
US 3949743 A	13-04-1976	NONE	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2007260058 A **[0002]**