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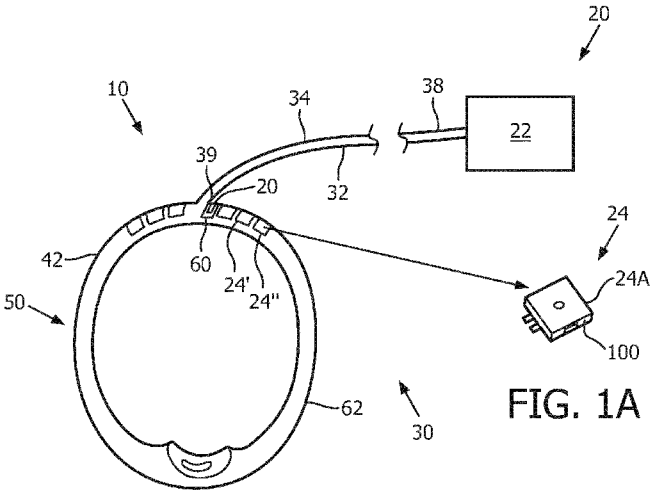

FIG. 1A

FIG. 1

(57) Abstract: A respiratory interface device is provided. The respiratory interface device includes a patient interface device, a patient circuit, and a pressure generating assembly. Pressure generating assembly includes a first pressure generating device and a second pressure generating device. Patient circuit includes a reduced conduit.

[Continued on next page]

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MASK WITH PRIMARY AND SECONDARY AIR DELIVERY

CROSS-REFERENCE TO RELATED APPLICATIONS

[01] This patent application claims the priority benefit under 35 U.S.C. § 119(e) of U.S. Provisional Application No. 62/433,286 filed on December 13, 2016, the contents of which are herein incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[02] The present invention relates to respiratory interface devices for transporting a gas to and/or from an airway of a user and, in particular, to a respiratory interface device that includes both primary and secondary air delivery.

2. Description of the Related Art

[03] There are numerous situations where it is necessary or desirable to deliver a flow of breathing gas non-invasively to the airway of a patient, *i.e.*, without intubating the patient or surgically inserting a tracheal tube in their esophagus. For example, it is known to ventilate a patient using a technique known as non-invasive ventilation. It is also known to deliver continuous positive airway pressure (CPAP) or variable airway pressure, which varies with the patient's respiratory cycle, to treat a medical disorder, such as sleep apnea syndrome, in particular, obstructive sleep apnea (OSA), or congestive heart failure.

[04] Non-invasive ventilation and pressure support therapies involve the placement of a patient interface device including a mask component on the face of a patient. The mask component may be, without limitation, a nasal mask that covers the patient's nose, a nasal cushion having nasal prongs that are received within the patient's nares, a nasal/oral mask that covers the nose and mouth, or a full face mask that covers the patient's face. The patient interface device interfaces the ventilator or pressure support device with the airway of the patient so that a flow of breathing gas can be delivered from a pressure/flow generating device to the airway of the patient. That is, the patient interface device is a part of a respiratory interface device that further includes a patient circuit and a pressure generating device. The pressure generating device is structured to

generate a pressure in a fluid, *i.e.*, in normal operation in the atmosphere the pressure generating device generates a flow of air. The patient circuit is structured to couple the pressure generating device to the patient interface device by elements such as, but not limited to, hoses or other conduits. Thus, the pressure generating device is coupled to, and in fluid communication with, the patient interface device via the patient circuit. The hose or conduit conventionally has a diameter of between 15 mm to 22 mm.

[05] A hose or conduit of this size may make the user aware of the hose during use. That is, the hose has a sufficient mass and bulk so that the user may feel the hose during use. Further, use of a smaller diameter hose is not an option because smaller hoses significantly increase the air velocity at a given flow rate. This increase in the air velocity at a given flow rate leads to high noise and a high pressure drop; both of which are undesirable.

[06] Accordingly, a need exists for a respiratory interface device that includes a patient circuit that is less noticeable to the user while not generating high noise and a high pressure drop.

SUMMARY OF THE INVENTION

[07] One embodiment of the presently disclosed concept provides a respiratory interface device including a patient interface device, a patient circuit including a reduced, first conduit a pressure generating assembly including a first pressure generating device and a second pressure generating device. The first pressure generating device is structured to generate a first pressure and the second pressure generating device is structured to generate a second pressure. The first pressure generating device is coupled to, and in fluid communication, with the first conduit. The first conduit is coupled to, and in fluid communication, with the patient interface device. The second pressure generating device is coupled to, and in fluid communication, with the second conduit. The second conduit is coupled to, and in fluid communication, with the patient interface device.

BRIEF DESCRIPTION OF THE DRAWINGS

[08] FIG. 1 is a partially schematic isometric view of one embodiment of the disclosed concept. FIG. 1A is a detail view of a pressure generating device;

[09] FIG. 2 is a partially schematic isometric view of another embodiment of the disclosed concept;

[10] FIG. 3 is a partially schematic isometric view of another embodiment of the disclosed concept;

[11] FIG. 4 is a partially schematic cross-sectional side view of another embodiment of the disclosed concept;

[12] FIG. 5 is a side view of a second pressure generating device housing assembly;

[13] FIG. 6 is a partially schematic isometric view of another embodiment of the disclosed concept; and

[14] FIG. 7 is a partially schematic isometric view of another embodiment of the disclosed concept. FIG. 7A is a detail view of a second pressure generating device housing assembly.

[15] FIG. 8 is a flow chart of the disclosed method.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[16] As used herein, the singular form of "a," "an," and "the" include plural references unless the context clearly dictates otherwise. As used herein, the statement that two or more parts or components are "coupled shall mean that the parts are joined or operate together either directly or indirectly, *i.e.*, through one or more intermediate parts or components, so long as a link occurs. As used herein, "directly coupled" means that two elements are directly in contact with each other. As used herein, "fixedly coupled" or "fixed" means that two components are coupled so as to move as one while maintaining a constant orientation relative to each other.

[17] As used herein, the word "unitary" means a component is created as a single piece or unit. That is, a component that includes pieces that are created separately and then coupled together as a unit is not a "unitary" component or body. As employed

herein, the statement that two or more parts or components "engage" one another shall mean that the parts exert a force against one another either directly or through one or more intermediate parts or components. As employed herein, the term "number" shall mean one or an integer greater than one (*i.e.*, a plurality).

[18] Directional phrases used herein, such as, for example and without limitation, top, bottom, left, right, upper, lower, front, back, and derivatives thereof, relate to the orientation of the elements shown in the drawings and are not limiting upon the claims unless expressly recited therein.

[19] As used herein, a "reduced" hose, conduit, or similar construct, is a construct that is coupled to, and in fluid communication with a patient interface device that is also in fluid communication with two separate pressure generating devices. That is, a "reduced" hose has a smaller diameter relative to a hose in fluid communication with a patient interface device and a single pressure generating device. It is understood that such a hose, in an exemplary embodiment, has a smaller diameter than would be required for a hose operating with a single pressure generating device.

[20] FIGS. 1 and 1A show a respiratory interface device 10. Respiratory interface device 10 includes a pressure generating assembly 20, a patient circuit 30, and a patient interface device 50. Pressure generating assembly 20 includes a plurality of pressure generating devices; as shown, a number of first pressure generating devices 22 and a number of second pressure generating devices 24, it is, however, understood that pressure generating assembly 20 is not limited to two pressure generating devices. For example, as shown in FIG. 1, a plurality of second pressure generating devices 24', 24'', which are similar to each other are shown directly coupled to patient interface device 50. In an exemplary embodiment, there is a single first pressure generating device 22 and a plurality of second pressure generating devices 24', 24''.

[21] Further, in one embodiment, first pressure generating device 22 is the primary pressure generating device and second pressure generating device 24 is a secondary pressure generating device. That is, as used herein, the "primary" pressure generating device(s) is structured to generate a greater volume of fluid flow relative to a number of "secondary" pressure generating device(s). In one embodiment, primary

pressure generating device 22 is coupled to patient interface device 50 by a "reduced" conduit 32 while second pressure generating device 24 is directly coupled to patient interface device 50.. In an alternate embodiment, primary pressure generating device 22 is directly coupled to patient interface device 50 while secondary pressure generating device 24 is coupled to patient interface device 50 by reduced conduit 32.

[22] For purposes of the present disclosure, pressure generating assembly 20 includes any device capable of generating a flow of breathing gas or providing gas at an elevated pressure. Examples of such pressure generating systems include a ventilator, CPAP device, or variable pressure device, *e.g.*, an auto-titrating device, proportional assist ventilation (PAV.RTM.) device, proportional positive airway pressure (PPAP) device, C-Flex.TM. device, Bi-Flex.RTM. device, or a BiPAP.RTM. device manufactured and distributed by Philips Respironics of Murrysville, PA, in which the pressure provided to the patient varies with the patient's respiratory cycle so that a higher pressure is delivered during inspiration than during expiration, or other pressure support device. In an exemplary embodiment, primary pressure generating device 22 is such a device. In an exemplary embodiment, first pressure generating device 22 is structured to generate a pressure of between about 4 cmH2O and 50 cmH2O, and second pressure generating device 24 is structured to generate a pressure of between about 4 cmH2O and 30 cmH2O. Thus, it is noted that the combined flow rate/pressure of first pressure generating device 22 and second pressure generating device 24 generally corresponds to the flow rate/pressure of a prior art pressure generating device.

[23] Second pressure generating device 24, in an exemplary embodiment, is smaller, *i.e.*, second pressure generating device 24 has any of a smaller size, footprint, volume and/or operating characteristics, than first pressure generating device 22 and is coupled, directly coupled, or fixed to patient interface device 50 or to first conduit 32, as discussed below. Second pressure generating device 24 is selected from the group including, or consisting of, a piezoelectric micro blower 24A (FIG. 1), a diaphragm blower 24B (FIG. 2), and a centrifugal blower 24C (FIG. 3).

[24] In one exemplary embodiment, as shown in FIGS. 4-5, second pressure generating device 24 includes a housing assembly 100, a micro-blower 102 (shown

schematically), and a pressure sensor 104. Second pressure generating device housing assembly 100 defines a substantially enclosed space (not shown). Second pressure generating device micro-blower 102 is structured to be, and is, disposed in second pressure generating device housing assembly enclosed space. Further, second pressure generating device housing assembly 100 defines an inlet 110 and an outlet 112. Second pressure generating device micro-blower 102 is structured to be, and is, in fluid communication with second pressure generating device housing assembly inlet 110 and second pressure generating device housing assembly outlet 112. Thus, in operation, second pressure generating device micro-blower 102 is structured to, and does, create a fluid flow from second pressure generating device housing assembly inlet 110 to second pressure generating device housing assembly outlet 112. In this embodiment, second pressure generating device housing assembly inlet 110 is second conduit 34, discussed below, and is, in an exemplary embodiment, a first tubular extension 114 on second pressure generating device housing assembly 100. It is noted that second conduit 34 does not have to exist as a visible construct, such as tubular extension 114, but rather second conduit 34 is, in an exemplary embodiment, defined as a passage in housing assembly 100.

[25] Further, second pressure generating device housing assembly 100 is structured to be coupled, directly coupled, or fixed to patient interface device 50 or to first conduit 32 (shown in FIGS. 7 and 7A). Second pressure generating device housing assembly inlet 110 is disposed outside of patient interface device interior surface 60 or first conduit 32. Thus, second pressure generating device housing assembly inlet 110 is exposed to the atmosphere. Further, in this embodiment, second pressure generating device housing assembly outlet 112 is a second tubular extension 116 on second pressure generating device housing assembly 100. Second pressure generating device housing assembly outlet 112 is structured to, and does, extend through patient interface device 50 or first conduit 32 so as to provide fluid communication between the area near patient interface device interior surface 60, *i.e.*, within the space defined by the user's face and patient interface device 50, or, interior of first conduit 32.

[26] Further, second pressure generating device housing assembly 100, in an exemplary embodiment, defines a pressure sensor mounting 120. In one embodiment, pressure sensor mounting 120 is a hollow tube 118 structured to, and does, extend through patient interface device 50 or first conduit 32 so as to provide fluid communication between the area near patient interface device interior surface 60 or interior of first conduit 32. In this configuration, pressure sensor 104 is disposed within second pressure generating device housing assembly 100 and is exposed to the fluid pressure adjacent the user's face via pressure sensor mounting 120. In another exemplary embodiment, pressure sensor mounting 120 is a substantially solid member 119 structured to, and does, extend through patient interface device 50 or first conduit 32. In this embodiment, pressure sensor 104 is disposed on pressure sensor mounting 120. If needed, a wire or similar conductor (not shown) extends through pressure sensor mounting 120 to allow for communication between pressure sensor 104 and a control unit (not shown). In another embodiment, pressure sensor 104 is disposed within patient interface device 50 or first conduit 32. As is known, pressure sensor 104 is structured to measure pressure and to produce a signal including data representing the measured pressure.

[27] In this embodiment, pressure generating assembly 20 includes control unit 26 as well as a number of conductors 28. Pressure generating assembly conductors 28 are structured to transmit a current that is used to power second pressure generating device 24 and/or pressure sensor 104, or, to transmit a current that is used to transmit a data signal. Further, in this embodiment, pressure generating assembly conductors 28 extend through patient circuit conduit(s) 32, 34, discussed below. That is, pressure generating assembly conductors 28 are coupled, directly coupled, or fixed to patient circuit conduit(s) 32, 34.

[28] Patient circuit 30 is structured to provide fluid communication between each pressure generating device 22, 24, of pressure generating assembly 20 and patient interface device 50. Patient circuit 30 includes a number of conduits 32, 34 (shown and discussed below), hoses, tubes, pipes, or other constructs that define passages (none

shown). At least one of patient circuit conduit 32, 34, (or hoses, tubes, pipes, or other constructs that define passages) is a "reduced" conduit 32, 34 as defined above.

[29] In an exemplary embodiment, patient circuit 30 includes first conduit 32 and second conduit 34. First patient circuit conduit 32 includes a generally flexible, hollow body 36 with a first end 38 and a second end 39. At least one of first conduit 32 and second conduit 34 has a diameter between about 4 mm and 22 mm, or between about 4 mm and 14 mm, or less than 15 mm. Conduits with a diameter that is smaller than the prior art along with a system that provide a total pressure comparable to the prior art solve the problems stated above. It is understood that conduits 32, 34 having a circular cross-section are exemplary and that conduits of any shape are included. That is, as used herein, the recitation of a conduit with a "diameter" also includes any conduit having a cross-sectional area similar to a conduit of the stated diameter.

[30] Further, in an exemplary embodiment, first conduit 32 has a first length and second conduit 34 has a second length. In an exemplary embodiment, the second length is physically shorter than the first length. As used herein, the "physical" length of a conduit means the length when the conduit is extended to a maximum. That is, it is understood that a conduit may be made from a flexible material that can be bent, coiled, or otherwise manipulated so as to have a length that is shorter than the maximum length. Thus, the "physical" length of a conduit means the length when the conduit is extended to a maximum. In an exemplary embodiment, second conduit 34 has a second length of between about 0.0 inches to 24.0 inches. As used herein, when a pressure generating device housing assembly is directly coupled to patient interface device 50, the second length is always zero; this is true even if second pressure generating device housing assembly 100 includes a tubular extension 116 as second pressure generating device housing assembly outlet 112. In the alternative embodiment, first pressure generating device 22 is directly coupled to patient interface device 50 and first conduit 32 has a first length of about 0.0 inches while second conduit 34 is a reduced conduit as defined above. It is noted that a conduit having a length that is smaller than a prior art hose solves the problems stated above.

[31] Patient interface device 50 is shown as a nasal interface device 52. It is understood, however, that patient interface device 50 can include, without limitation, an oral/nasal mask, nasal pillows, or any other device that provides a suitable gas flow communicating function. Thus, as used herein, the term "patient interface device" shall refer to any of such devices. Patient interface device 50 is coupled to, and in fluid communication with, pressure generating assembly 20 via patient circuit 30. That is, patient interface device 50 is coupled to, and in fluid communication, with first conduit 32 and patient interface device 50 is coupled to, and in fluid communication, with second conduit 34. Further, as discussed above, second conduit 34 is, in one embodiment, incorporated into second pressure generating device 24 which is coupled, directly coupled, or fixed to patient interface device 50 or first conduit 32.

[32] Patient interface device 50 includes an interior surface 60. As shown, in a nasal interface device 52, patient interface device interior surface 60 is within a number of hollow tubes 62 that are structured to, and do, extend from first conduit 32 to an area adjacent a user's nose. In an oral/nasal mask 54 (Figure 7) patient interface device interior surface 60 is the surface of patient interface device 50 on an inner surface of a concave mask. In an exemplary embodiment, patient interface device 50 includes a pressure sensor 70.

[33] In another exemplary embodiment, patient circuit conduit 32 extends from first pressure generating device 22 to second pressure generating device 24. That is, first pressure generating device 22 is in direct fluid communication with second pressure generating device 24. As used herein, "direct fluid communication" between two pressure generating devices means that a fluid moves from an upstream pressure generating device to a downstream pressure generating device without passing through another construct, such as, but not limited to, a patient interface device. In an exemplary embodiment, of this configuration, primary, first pressure generating device 22 is not directly coupled to patient interface device 50, but rather is coupled thereto by a reduced conduit 32. Further, as before, secondary, second pressure generating device 24 is directly coupled to patient interface device 50. That is, for example, first pressure generating device 22 is disposed at a remote location, such as, but not limited to a

nightstand, and is coupled to, and in fluid communication with, second pressure generating device 24 via reduced conduit 32. Second pressure generating device 24 is directly coupled to, and is in fluid communication with, patient interface device 50. It is understood that fluid provided by first pressure generating device 22 passes through, and is combined with, the fluid generated by second pressure generating device 24. In an alternate embodiment, primary, first pressure generating device 22 is directly coupled to patient interface device 50 and secondary, second pressure generating device 24 is disposed at a remote location and coupled to first pressure generating device 22 via reduced conduit 32.

[34] In view of the above, a method of using a respiratory interface device 10, as described above, includes: providing 1000 a respiratory interface device 10, positioning 1002 patient interface device 50 in a use position, operating 1004 first pressure generating device, and operating 1006 second pressure generating device. As used herein, a "use position" is a position wherein the respiratory interface device 10 is structured to deliver a gas to a user. In an exemplary embodiment, when in the "use position" patient interface device 50, or a portion thereof, is generally sealed against the user's skin. Providing 1000 respiratory interface device 10 includes patient interface device 50, patient circuit including first conduit 32 and second conduit 34, and pressure generating assembly 20 including first pressure generating device 22 and second pressure generating device 24, first pressure generating device structured to generate a first pressure, second pressure generating device structured to generate a second pressure, first pressure generating device coupled to, and in fluid communication, with first conduit, first conduit coupled to, and in fluid communication, with the patient interface device, second pressure generating device coupled to, and in fluid communication, with second conduit, second conduit coupled to, and in fluid communication, with patient interface device.

[35] In an exemplary embodiment, respiratory interface device 10 includes a control assembly (not shown). Control assembly is structured to receive a signal from pressure sensor 104. Further, control assembly is structured to alter the operation of first and second pressure generating devices 22, 24. Accordingly, operating 1004 first

pressure generating device 22 and operating 1006 second pressure generating device 24 include detecting 1010 a characteristic of the generated pressure and altering 1012 the pressure generated by at least one of first pressure generating device 22 and operating 1006 second pressure generating device 24. As used herein, a "characteristic of the generated pressure" includes, but is not limited to, the total pressure generated by first pressure generating device 22 and operating 1006 second pressure generating device 24. In an exemplary embodiment, first pressure generating device 22 operates continuously while second pressure generating device 24 operates 1020 upon detection of a selected characteristic of the generated pressure.

[36] In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The word "comprising" or "including" does not exclude the presence of elements or steps other than those listed in a claim. In a device claim enumerating several means, several of these means may be embodied by one and the same item of hardware. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. In any device claim enumerating several means, several of these means may be embodied by one and the same item of hardware The mere fact that certain elements are recited in mutually different dependent claims does not indicate that these elements cannot be used in combination.

[37] Although the invention has been described in detail for the purpose of illustration based on what is currently considered to be the most practical and preferred embodiments, it is to be understood that such detail is solely for that purpose and that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover modifications and equivalent arrangements that are within the spirit and scope of the appended claims. For example, it is to be understood that the present invention contemplates that, to the extent possible, one or more features of any embodiment can be combined with one or more features of any other embodiment.

What is Claimed is:

1. A respiratory interface device comprising:

a patient interface device;

a patient circuit;

a pressure generating assembly including a number of first pressure generating devices and a number of second pressure generating devices;

the number of first pressure generating devices structured to generate a first pressure;

the number of second pressure generating devices structured to generate a second pressure;

the first pressure generating device coupled to, and in fluid communication, with the patient circuit;

the patient circuit coupled to, and in fluid communication, with the patient interface device; and

the second pressure generating device coupled to, and in fluid communication, with the patient interface device.

2. The respiratory interface device of claim 1, wherein the second pressure generating device is directly coupled to, and in fluid communication, with the patient interface device.

3. The respiratory interface device of claim 2, wherein first pressure generating device is coupled to the patient interface device by a reduced conduit.

4. The respiratory interface device of claim 2, wherein the first conduit has a diameter of between about 4 mm and 14 mm.

5. The respiratory interface device of claim 4, wherein the first conduit has a diameter of less than 15 mm.

6. The respiratory interface device of claim 2, wherein:

the first pressure generating device has a first set of operating characteristics;

the second pressure generating device has a second set of operating characteristics; and

the second set of operating characteristics is less than the first set of operating characteristics.

7. The respiratory interface device of claim 2, wherein:

the first conduit has a first length;

the second conduit has a second length; and

wherein the second length is physically shorter than the first length.

8. The respiratory interface device of claim 2, wherein the second pressure generating device is directly coupled to the patient interface device or the first conduit.

9. The respiratory interface device of claim 8, wherein:

the pressure generating assembly includes a number of conductors; and

wherein the conductors are directly coupled to the first conduit.

10. The respiratory interface device of claim 2, wherein the second pressure generating device is selected from the group including a piezoelectric micro blower, a diaphragm blower, and a centrifugal blower.

11. The respiratory interface device of claim 2, wherein:

the first pressure generating device has a first set of operating characteristics;

the second pressure generating device has a second set of operating characteristics; and

the first set of operating characteristics is less than the second set of operating characteristics.

12. The respiratory interface device of claim 11, wherein:

the first conduit has a first length;

the second conduit has a second length; and

wherein said the first length is physically shorter than the second length.

13. The respiratory interface device of claim 11, wherein the first pressure generating device is disposed on one of the patient interface device or the second conduit.

14. A method of using a respiratory interface device comprising:

providing a respiratory interface device including a patient interface device, a patient circuit including a first conduit and a second conduit, and a pressure generating assembly including a first pressure generating device and a second pressure generating device, the first pressure generating device structured to generate a first pressure, the second pressure generating device structured to generate a second pressure, the first pressure generating device coupled to, and in fluid communication, with the first conduit, the first conduit coupled to, and in fluid communication, with the patient interface device, the second pressure generating device coupled to, and in fluid communication, with the second conduit, the second conduit coupled to, and in fluid communication, with the patient interface device;

positioning the patient interface device in a use position;

operating the first pressure generating device; and

operating the second pressure generating device.

15. The method of claim 14, wherein operating the first pressure generating device; and operating the second pressure generating device include:

detecting a characteristic of the generated pressure; and

altering the pressure generated by at least one of first pressure generating device and the second pressure generating device.

16. The method of claim 14, wherein operating the first pressure generating device; and operating the second pressure generating device include:

operating first pressure generating device continuously; and

operating second pressure generating device upon detection of a selected characteristic of the generated pressure.

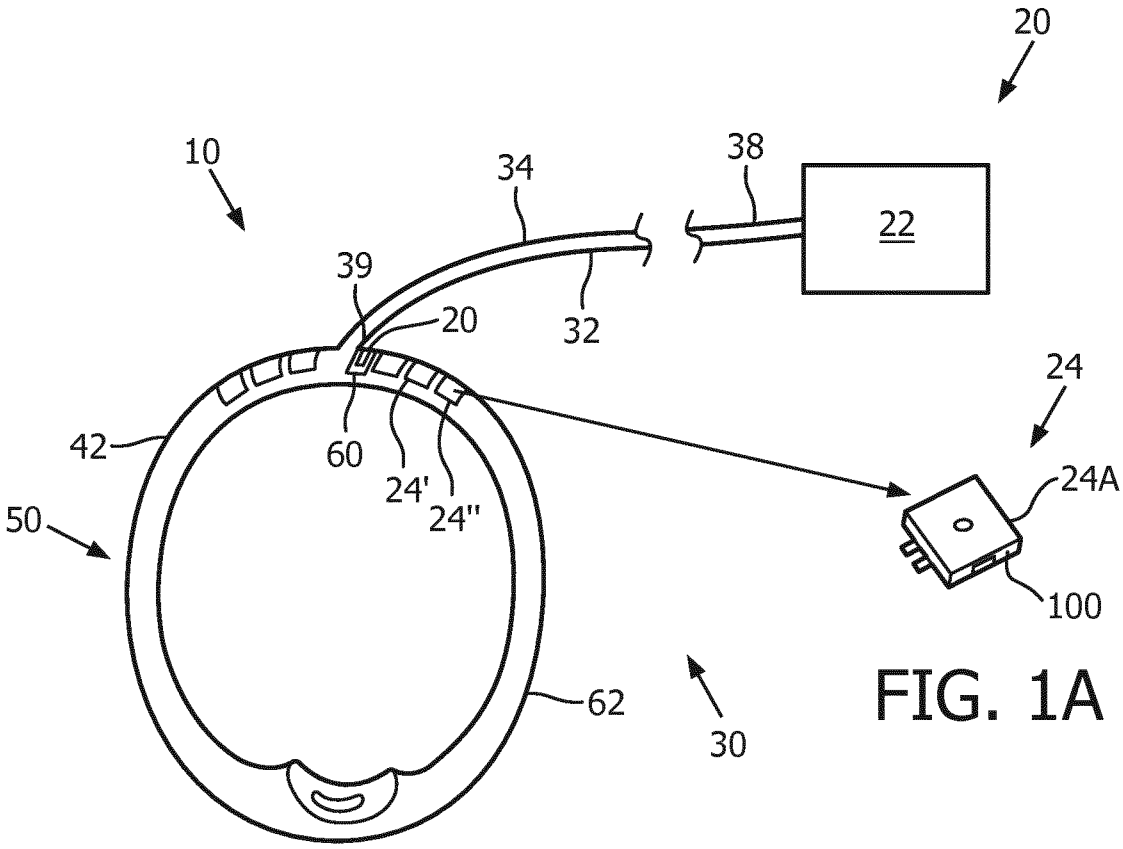

FIG. 1A

FIG. 1

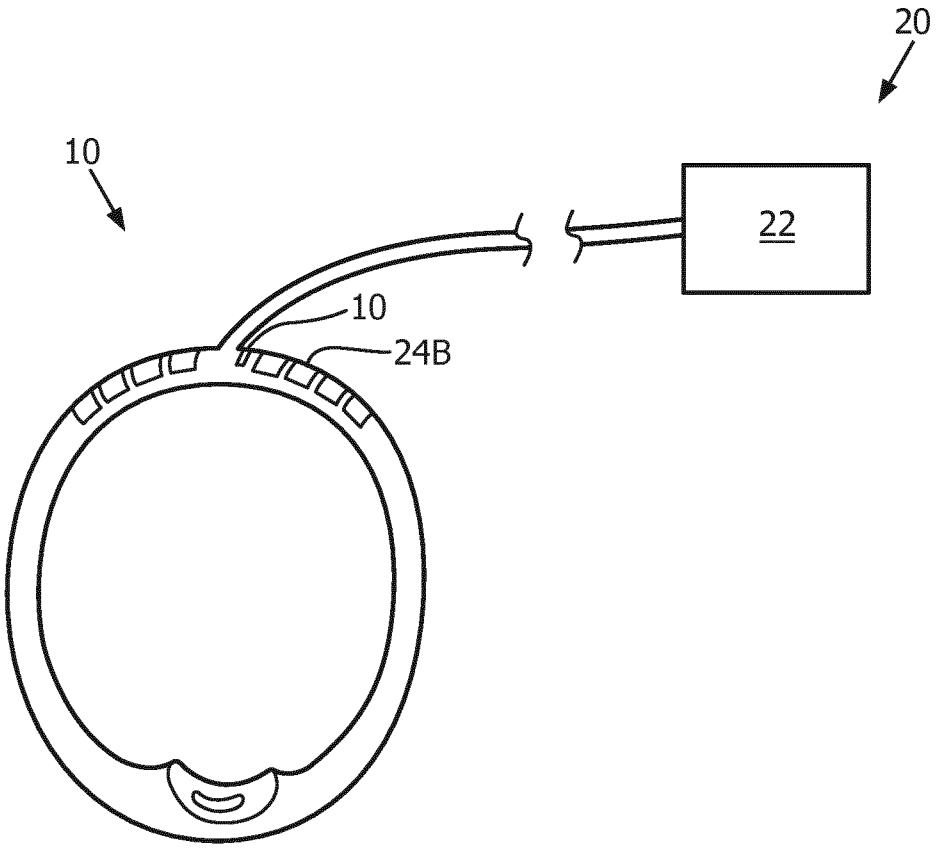

FIG. 2

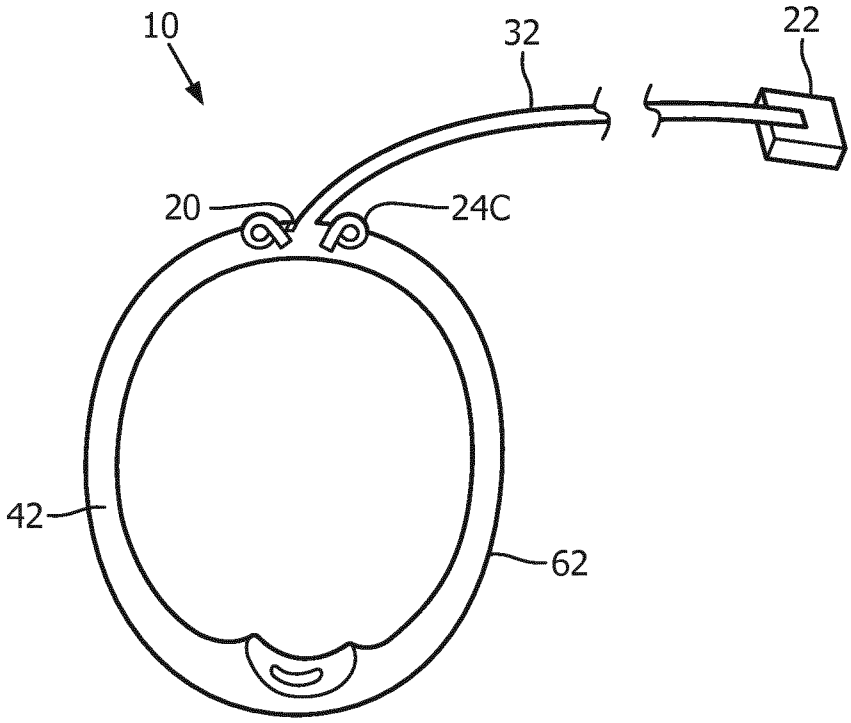

FIG. 3

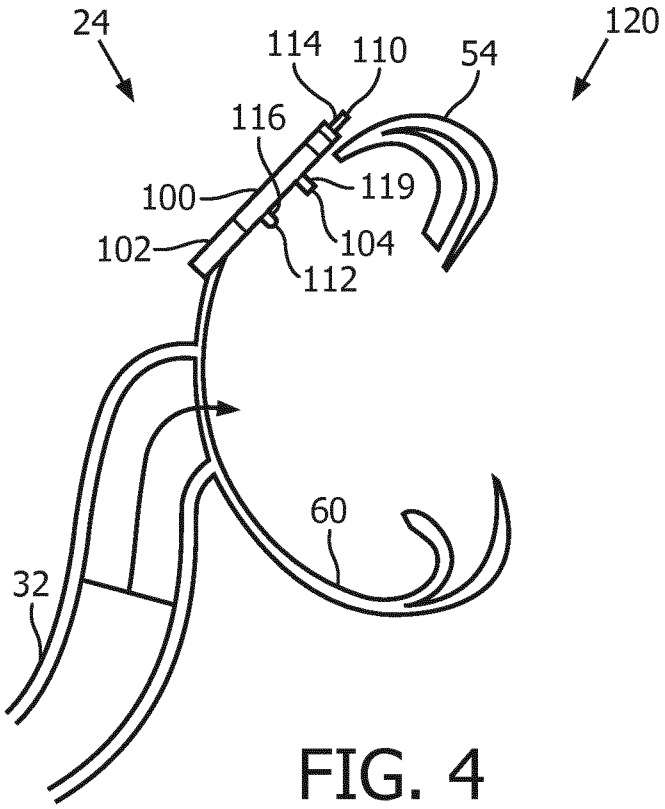

FIG. 4

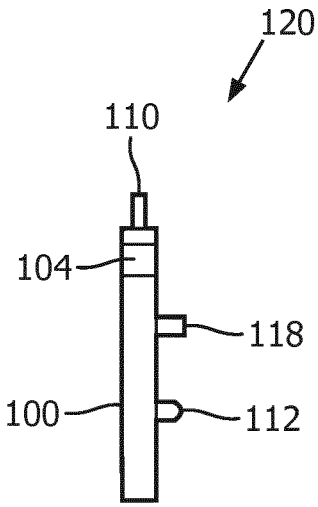

FIG. 5

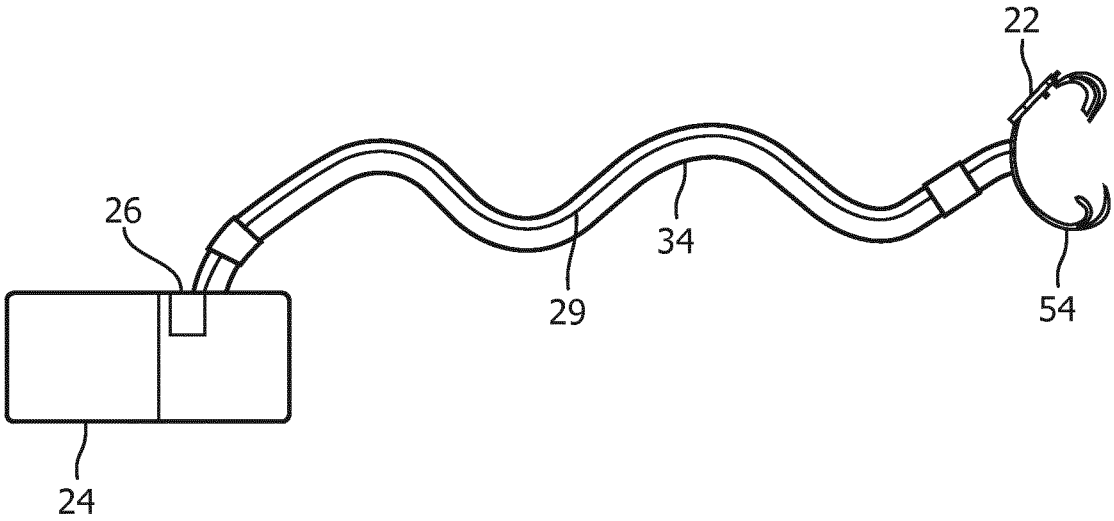

FIG. 6

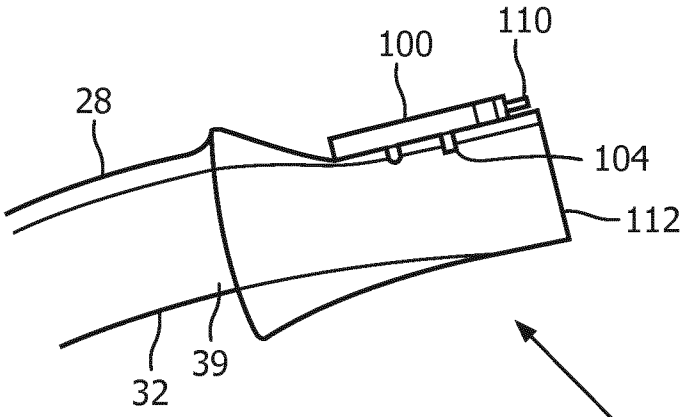

FIG. 7A

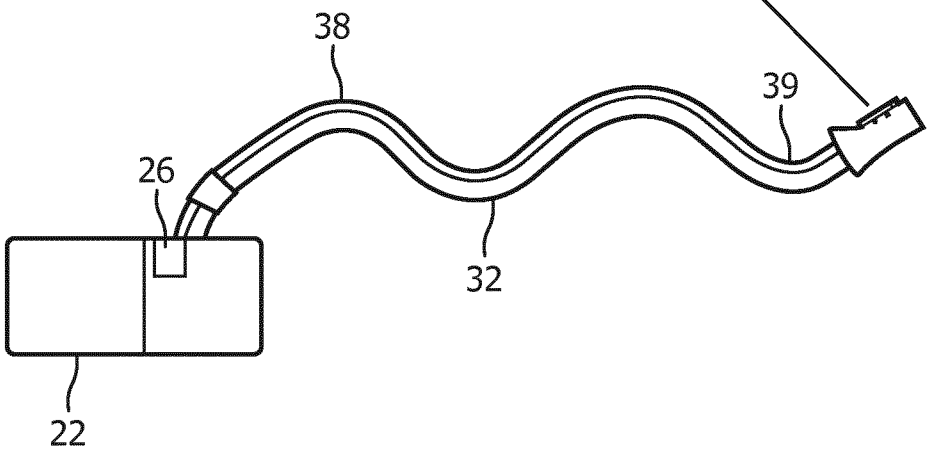

FIG. 7

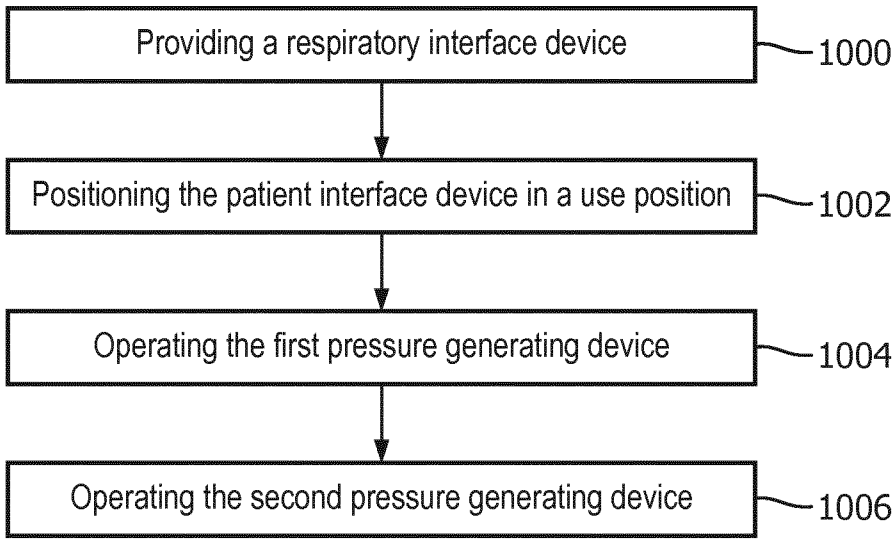
Providing a respiratory interface device
1000
Positioning the patient interface device in a use position
1002
Operating the first pressure generating device
1004
Operating the second pressure generating device
1006

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/081940

A. CLASSIFICATION OF SUBJECT MATTER
INV. A62B18/00 A61M16/00 A61M16/06 F04B19/00 F04B43/04
ADD.

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)
A62B A61M F04B

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 655 052 A2 (AIR PROD & CHEM INC) 10 May 2006 (2006-05-10) abstract; figures 1,2 paragraphs [0052] - [0056], [0072] - [0076]	1-13
X	US 2015/320958 A1 (METYSEK MARK [DE] ET AL) 12 November 2015 (2015-11-12) abstract; figures 1-15 paragraphs [0066] - [0132]	1-13
X	US 2015/059749 A1 (NITTA KAZUFUKU [JP]) 5 March 2015 (2015-03-05) abstract; figures 1,24,25 paragraphs [0047] - [0049], [0123]	1-13

☐ 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 another 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	Date of mailing of the international search report
23 February 2018	05/03/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Moraru, Liviu

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2017/081940

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.: 14-16
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:

see FURTHER INFORMATION sheet PCT/ISA/210

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:

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 fees, this Authority did not invite payment of additional fees.

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.

Continuation of Box II.2

Claims Nos.: 14-16

Methods of providing ventilation to a subject as defined in claims 14-16 of the present application are methods for treatment of human or animal body by therapy.
Indeed these methods are meant to provide respiratory gas to a patient (see paragraph 34).
Thus, claims 14-16 relate to subject-matter considered by this Authority to be covered by the provisions of Rules 39.1(iv) and 67.1(iv) PCT, and no international search report has been established with respect to the subject-matter of these claims (Article 17(2)(a)(i)PCT). Consequently, no opinion will be formulated with respect to novelty, inventive step and industrial applicability of the subject-matter of these claims (Article 34(4)(a)(i)PCT).

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2017/081940

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1655052 A2	10-05-2006	CA 2524829 A1	05-05-2006
		EP 1655052 A2	10-05-2006
		JP 2006130320 A	25-05-2006
		US 2006096596 A1	11-05-2006
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		JP 2013213421 A	17-10-2013
		US 2015059749 A1	05-03-2015
		WO 2013151014 A1	10-10-2013