

A Connector Device

TECHNICAL FIELD

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The present disclosure relates broadly to a connector device and more particularly to a connector device for providing fluid communication between a mask and a misting chamber.

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BACKGROUND

In hospital or medical settings, a patient or subject may be prescribed to be provided with medication in vapour or gaseous form. The medication may be administered by passing a fluid or gas to interact with a liquid medication. The liquid medication in liquid form is typically provided in a calibrated dose and contained in a misting container or chamber. The fluid or gas is passed into or through the misting chamber for the liquid medication to interact or react with the fluid or gas. The final medication in vapour or gaseous form is then typically provided to the patient or subject using a mask or respirator. Therefore, the misting chamber is connected to the subject.

In such medical settings, a misting chamber is typically desired to be maintained in an upright position for sufficient interaction between the liquid medication contained in the misting chamber and the fluid or gas being passed into or through the misting chamber. For example, for a nebulization solution prescribed for e.g. loosening of a subject's body secretion, it is desired for the subject's body to be positioned upright e.g. at least 60 to 90 degrees to a chair/bed surface, or in the so-called semi-Fowler's position, while being connected to a nebulization chamber (the misting chamber) to ensure that the nebulization solution is able to contact with a baffle of the nebulization chamber. It has been recognized that if the nebulization solution is not in sufficient contact with the baffle of the chamber e.g. in some instances while in the semi-Fowler's position, even though there may be some contact, nebulization may not be sufficiently administered to the

subject. With the nebulization chamber being maintained in an upright position due to the subject's body positioning, nebulization mist can be created.

It has been recognized that a problem may arise in a scenario where a subject's body is unable to be positioned upright on a chair/bed surface. For example, a subject may be a subject with spinal injuries, an unconscious subject or a restless subject. In these circumstances, a misting chamber may not be able to be positioned in an upright position following the orientation of the subject's body. The nebulization received by such a subject is typically not optimal and may not be at full capacity. It has been recognized that if nebulization is not delivered at its maximum capacity, e.g. below the prescribed dosage, a subject's condition may worsen. For example, for a subject having a tracheostomy tube applied, if nebulization is not delivered at its prescribed dosage, the subject may as a result have thickening secretions. The thickening secretions may potentially obstruct the tracheostomy tube and may in turn lead to death of the subject.

Hence, there exists a need for a connector device that seeks to address at least one of the above problems.

SUMMARY

In accordance with an aspect of the present disclosure, there is provided a connector device for providing fluid communication between a mask and a misting chamber, the connector device comprising, an inlet portion configured to couple to a misting chamber; an outlet portion configured to couple to a mask; a body portion disposed between the inlet portion and the outlet portion for providing fluid communication therebetween; wherein at least one of the inlet portion and the outlet portion is disposed at a first angle to an axis parallel to the body portion; and further wherein the inlet portion is configured to orientate the misting chamber, by way of the coupling between the inlet portion and the misting chamber, such that a vertical center axis in parallel to the misting chamber is substantially upright with respect to a horizontal plane.

The inlet portion may be configured to orientate the misting chamber, by way of the coupling between the inlet portion and the misting chamber, such that the vertical center axis

in parallel to the misting chamber is between about 60 degrees to about 90 degrees to about 120 degrees with respect to the horizontal plane.

5 In use, the first angle to the axis parallel to the body portion may be substantially fixed.

The connector device may further comprise a first locking mechanism configured to lock said at least one of the inlet portion and the outlet portion with respect to the body portion to provide the first angle.

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The connector device may further comprise a first movable joint to dispose said at least one of the inlet portion and the outlet portion with respect to the body portion.

15 The connector device may further comprise the body portion being integrally formed with said at least one of the inlet portion and the outlet portion.

In use, the first angle to the axis parallel to the body portion may be configured to be variable from a first default angular displacement from the axis parallel to the body portion, the variance being in a range of about 5 degrees to about 30 degrees.

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The connector device may further comprise the other of the at least one of the inlet portion and the outlet portion being disposed at a second angle to the axis parallel to the body portion.

25 In use, the second angle to the axis parallel to the body portion may be substantially fixed.

The connector device may further comprise a second locking mechanism configured to lock said the other of the at least one of the inlet portion and the outlet portion with respect to the body portion to provide the second angle.

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The connector device may further comprise a second movable joint to dispose said the other of the at least one of the inlet portion and the outlet portion with respect to the body portion.

The connector device may further comprise the body portion being integrally formed with said the other of the at least one of the inlet portion and the outlet portion.

5 In use, the second angle to the axis parallel to the body portion may be configured to be variable from a second default angular displacement from the axis parallel to the body portion, the variance being in a range of about 5 degrees to about 30 degrees.

10 The connector device may further comprise the inlet portion being disposed at an angle of more than about 80 degrees to the axis parallel to the body portion in a clockwise direction.

15 The connector device may further comprise the outlet portion being disposed at an angle of more than about 90 degrees to the axis parallel to the body portion in a clockwise direction.

One or more of the inlet portion, the outlet portion and the body portion may be constructed of medical-grade material.

20 The connector device may further comprise the inlet portion being configured to couple to a misting chamber via a first seal mechanism.

25 The first seal mechanism may comprise a fitted capping provided at the inlet portion capable of fitting over a tubing of a misting chamber such that, in use, the inlet portion is in sealed fluid communication with the tubing of the misting chamber.

The connector device may further comprise the outlet portion being configured to couple to a mask via a second seal mechanism.

30 The second seal mechanism may comprise a breakage formed at the outlet portion such that the outlet portion is compressible on application of a force and insertable into a tubing of a mask and such that, in use, upon removal of the application of the force, the outlet portion expands to form a sealed fluid communication with the tubing of a mask.

The connector device may further comprise the inlet portion being configured to couple to a misting chamber via a third seal mechanism.

The third seal mechanism may comprise a roughened external surface provided at the inlet portion, the roughened external surface capable of fitting by insertion into a tubing of a misting chamber such that, in use, the inlet portion is in sealed fluid communication with the tubing of the misting chamber.

The inlet portion, the outlet portion and the body portion may form a tubular shape.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

FIG.1 is a schematic drawing of a connector device in an exemplary embodiment.

FIG.2A is a schematic drawing showing a misting chamber.

FIG.2B is a photograph showing two nebuliser chambers.

FIG.2C is a schematic drawing of two nebuliser chambers.

FIG.3 is a schematic drawing of a connector device in another exemplary embodiment.

FIG.4 is a photograph showing a plurality of connector devices of different exemplary embodiments.

FIG.5 is a photograph showing a connector device of an exemplary embodiment.

FIG.6A is a photograph showing a connector device of an exemplary embodiment.

5 FIG.6B is a photograph showing a connector device of another exemplary embodiment.

FIG.7A is a schematic drawing of a connector device in an exemplary embodiment.

10 FIG.7B is a schematic drawing of a connector device in another exemplary embodiment.

15 FIG.8 is a schematic drawing of a connector device in an exemplary embodiment.

FIG.9 is a schematic drawing of a connector device in another exemplary embodiment.

20 FIG.10 is a schematic drawing illustrating the connector device of FIG.3 in association with a mask.

FIG.11 is a schematic drawing illustrating the connector device of FIG.3 in association with a misting chamber.

25 FIG.12A is a perspective view of a connector device in an exemplary embodiment.

FIG.12B is a top view of the connector device of FIG.12A.

30 FIG.12C is a front view of the connector device of FIG.12A when viewed from direction A.

DETAILED DESCRIPTION

FIG.1 is a schematic drawing of a connector device in an exemplary embodiment. The drawing is a side cross-sectional view of the connector device 100. The connector device 100 comprises an inlet portion 102 configured to couple to a misting chamber (not shown). The connector device 100 further comprises an outlet portion 104 configured to couple to a mask (not shown). The connector device 100 also comprises a body portion 106. The body portion 106 is displaced between the inlet portion 102 and the outlet portion 104 to provide fluid communication therebetween, i.e. between the inlet portion 102 and the outlet portion 104.

In the exemplary embodiment, when in use, the connector device 100 is substantially tubular in shape.

In the exemplary embodiment, the body portion 106 has an elongated body having a length that is substantially similar or is longer than a length of one of the inlet portion 102 and the outlet portion 104. See for example numeral 114. An axis parallel to the body portion 106 is shown as axis 108.

In the exemplary embodiment, at least one of the inlet portion 102 and the outlet portion 104 is disposed at a first angle with respect to the axis 108. For example, the inlet portion 102 is displaced at an angular displacement 110 with respect to the axis 108.

In some exemplary embodiments, both the inlet portion 102 and the outlet portion 104 are angularly displaced with respect to the axis 108. In such exemplary embodiments, the other of the at least one of the inlet portion 102 and the outlet portion 104 is disposed at a second angle with respect to the axis 108. For example, if the inlet portion 102 is displaced at the angular displacement 110 with respect to the axis 108, the outlet portion 104 is displaced at an angular displacement 112 with respect to the axis 108.

The inlet portion 102 is configured to orientate the misting chamber (not shown) when coupled such that the misting chamber may be maintained in a substantially

upright position. For example, a vertical centre axis in parallel to the misting chamber may be maintained substantially upright, e.g. between about 60 degrees to about 90 degrees to about 120 degrees with respect to a horizontal plane. In the exemplary embodiment, the angular displacement of the at least one of the inlet portion 102 and the outlet portion 104 provides, via or by way of the coupling between the inlet portion 102 and the misting chamber (not shown), the said orientation to maintain the misting chamber in a substantially upright position. The first angle, in co-operation with the body portion 106 and in co-operation with the misting chamber and the mask (not shown) when coupled, allows the said orientation to maintain the misting chamber in a substantially upright position. In the exemplary embodiment, the coupling between the inlet portion 102 and the misting chamber is such that the misting chamber effectively becomes an extension of the inlet portion 102. For example, an axis 116 parallel to the inlet portion 102 is aligned or in-line or parallel to a vertical centre axis in parallel to the misting chamber (not shown in FIG.1).

In the exemplary embodiment, the first angle, e.g. angular displacement 110 or angular displacement 112, is fixed when in use, for example when the misting chamber and/or the mask is coupled to the inlet portion 102 and/or the outlet portion 104 respectively. In some exemplary embodiments, the body portion 106 may be integrally formed with one, or both, of the inlet portion 102 and the outlet portion 104 to obtain the fixed first angle.

In some other exemplary embodiments, it may be provided that the body portion 106 may be attachable to one or both of the inlet portion 102 and the outlet portion 104 and the first angle is then fixed by fixedly attaching the body portion 106 to one or both of the inlet portion 102 and the outlet portion 104. In some other exemplary embodiments, it may also be provided that one or both of the inlet portion 102 and the outlet portion 104 are coupled to the body portion 106 and the first angle is fixed prior to use by e.g. a movable joint and/or a locking mechanism. In such exemplary embodiments, the first angle may be variable prior to using e.g. a click-wheel type movable joint and/or the locking mechanism.

In yet other exemplary embodiments, the first angle, e.g. angular displacement 110 or angular displacement 112, may be configured to be variable from a first default

angular displacement, i.e. slightly adjustable. For example, if the first angle is for an inlet portion, the inlet portion may be provided in a first default position and the inlet portion is variable from the first default position in a range of about 5 degrees to about 30 degrees.

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In some exemplary embodiments, the connector device 100 may be connected to an oxygen source via the inlet portion 102 and via a misting chamber coupled to the inlet portion 102.

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In exemplary embodiments that have both the inlet portion 102 and the outlet portion 104 being angularly displaced with respect to the axis 108, i.e. the other of the at least one of the inlet portion 102 and the outlet portion 104 is disposed at a second angle with respect to the axis 108, the second angle may be fixed or variable in use, similarly to the description above for the first angle. For example, the body portion 106 may be integrally formed with one or both of the inlet portion 102 and the outlet portion 104 to obtain the fixed second angle. For example, the second angle is fixed prior to use by e.g. a movable joint and/or a locking mechanism. In such exemplary embodiments, the second angle may be variable prior to using e.g. a click-wheel type movable joint and/or the locking mechanism. In yet other exemplary embodiments, the second angle, e.g. angular displacement 110 or angular displacement 112, may be configured to be variable from a second default angular displacement, i.e. slightly adjustable. For example, if the second angle is for an inlet portion, the inlet portion may be provided in a second default position and the inlet portion is variable from the second default position in a range of about 5 degrees to about 30 degrees.

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In the exemplary embodiment, if it is a first angle or a second angle as described above, the angular displacement 110 of the inlet portion 102 from the axis 108 in the clockwise direction may be more than 80 degrees. The range of the angular displacement 110 of the inlet portion 102 from the axis 108 in the clockwise direction may be in the range of about 50 degrees (inclusive) to about 120 degrees (inclusive), the range being disclosed here being in steps of 0.1 degrees.

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In the exemplary embodiment, if it is a first angle or a second angle as described above, the angular displacement 112 of the outlet portion 104 from the axis 108 in the

clockwise direction may be more than 90 degrees and/or more than 100 degrees. The range of the angular displacement 112 of the outlet portion 104 from the axis 108 in the clockwise direction may be in the range of about 60 degrees (inclusive) to about 130 degrees (inclusive), the range being disclosed here being in steps of 0.1 degrees.

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FIG.2A is a schematic drawing showing a misting chamber. In some exemplary embodiments, the misting chamber 200 is a nebuliser chamber.

10 The misting chamber 200 is shown in an upright position with respect to a horizontal plane 202. In some exemplary embodiments, the horizontal plane is intended to be the horizon. For example, the horizontal plane is intended to be parallel to a floor of a room or a surface of a flat-bed.

15 A vertical centre axis 204 in parallel to the misting chamber 200 may be maintained substantially upright, e.g. between about 60 degrees to about 90 degrees to about 120 degrees with respect to the horizontal plane 202. Liquid medication may be provided or contained in a medication chamber 206. The misting chamber 200 may be provided with supports or legs e.g. 208. The misting chamber 200 may comprise a plug 210 configured to couple to an inlet portion of a connector device (compare inlet portion 20 102 of FIG. 1). As a nebuliser chamber, the chamber 200 may be provided with an inlet column (not shown) coupled to the medication chamber 206, the inlet column extending into the medication chamber 206 and being configured to receive a gas or fluid source for interacting with liquid medication contained in the medication chamber 206. The medication may be suitably nebulised for delivery, via a connector device i.e. through an 25 outlet portion of the connector device (compare outlet portion 104 of FIG. 1), to a mask.

FIG.2B is a photograph showing two nebuliser chambers 212, 214. The respective baffles 216 and 218 of the nebuliser chambers 212, 214 are shown in FIG.2B.

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FIG.2C is a schematic drawing of two nebuliser chambers 220, 222. The nebuliser chamber 220 is substantially identical to the nebuliser chambers 212, 214. The nebuliser chamber 220 comprises a baffle 224. The nebuliser chamber 222 is of another type that is different from the nebuliser chamber 220. The nebuliser chamber

222 comprises a removable baffle 226. One difference between the nebuliser chamber 220 and the nebuliser chamber 222 is with regard to the respective outlets 228, 230 for connecting to a mask (not shown).

5 The outlet 228 of the nebuliser chamber 220 is in the form of a tubing and is suitable for an inlet portion of a connector device (compare inlet portion 102 of FIG.1) to be fitably/sealably capped over the outlet 228, for sealed fluid communication with the nebuliser chamber 220.

10 The outlet 230 of the nebuliser chamber 222 is in the form of a dome cap that comprises a tunnelled aperture 232. The tunnelled aperture 232 is suitable for an inlet portion of a connector device (compare inlet portion 102 of FIG.1) to be fitably/sealably inserted into the outlet 230, for sealed fluid communication with the nebuliser chamber 222.

15 FIG.3 is a schematic drawing of a connector device in another exemplary embodiment. The connector device 300 is substantially similar to the connector device 100 described with reference to FIG.1. The drawing is a side cross-sectional view of the connector device 300.

20 The connector device 300 has a length 302 of about 74.1 millimetres (mm). The connector device 300 has a height 304 of about 48.5 mm. The connector device 300 has a body portion length 306 of about 43.1 mm. The connector device 300 has an outlet portion having an aperture opening diameter 308 of about 18.5 mm. The
25 connector device 300 has an inlet portion having an aperture opening diameter 310 of about 20.6 mm.

30 In the exemplary embodiment, the inlet portion is displaced at an angle 312 of about 83.2 degrees (83.2°) clockwise with respect to an axis parallel to the body portion (compare axis 108 of FIG.1). The outlet portion is displaced at another angle 314 of about 124.4° clockwise with respect to the axis parallel to the body portion (compare axis 108 of FIG.1). Arbitrarily, the angle 312 may be denoted as the first angle and the angle 314 may be denoted as the second angle.

In some exemplary embodiments, the inlet portion may be displaced at an angle of more than 80°, or more preferably of more than 90°, clockwise with respect to an axis parallel to the body portion (compare axis 108 of FIG.1). In some exemplary embodiments, the outlet portion may be displaced at another angle of more than 90°, or more preferably of more than 100°, clockwise with respect to the axis parallel to the body portion (compare axis 108 of FIG.1). In some exemplary embodiments, the inlet portion may be displaced at an angle in a range of about 50 degrees (inclusive) to about 120 degrees (inclusive) clockwise with respect to the axis parallel to the body portion (compare axis 108 of FIG.1), the range being disclosed here being in steps of 0.1 degrees. In some exemplary embodiments, the outlet portion may be displaced at another angle in a range of about 60 degrees (inclusive) to about 130 degrees (inclusive) clockwise with respect to the axis parallel to the body portion (compare axis 108 of FIG.1), the range being disclosed here being in steps of 0.1 degrees.

In the exemplary embodiment, the connector device 300 comprises a seal mechanism at the outlet portion. For example, the seal mechanism may be provided as, but is not limited to, a breakage such as a slit 316 formed at the outlet portion. The seal mechanism is further illustrated with FIG.10.

FIG.10 is a schematic drawing illustrating the connector device 300 of FIG.3 in association with a mask. The slit 316 e.g. one of a plurality disposed around a periphery of the outlet portion allows the connector device 300 to be detachably connected/mated to an inlet of a mask 1002. For example, the mask 1002 may comprise a tubing 1004. The slit 316 e.g. one of a plurality may provide a relatively weakened rigidity at the outlet portion such that the outlet portion becomes compressible with a force. With the slit 316 e.g. one of a plurality, the outlet portion is compressible on application of a force and insertable into a tubing of a mask. In use, upon removal of the application of the force, the outlet portion expands to form a sealed fluid communication with the tubing of the mask.

In other exemplary embodiments, other forms of attachment components may be provided to detachably connect/mate the outlet portion of the connector device 300 to a mask.

Similarly, various forms of attachment components may be provided to detachably connect/mate the inlet portion of the connector device 300 to a misting chamber.

FIG.11 is a schematic drawing illustrating the connector device 300 of FIG.3 in association with a misting chamber. A misting chamber 1102 is shown and the misting chamber 1102 comprises an outlet such as a tubing 1104 of the misting chamber 1102. The connector device 300 may comprise another seal mechanism at the inlet portion, apart from the slit 316 of the outlet portion. The seal mechanism may be, but is not limited to, a fitted capping provided at the inlet portion. The fitted capping may be provided capable of fitting over (see numeral 1106) the tubing 1104 of the misting chamber 1102. For example, the internal diameter of the opening at the inlet portion may be provided to be substantially similar or the same as the maximum diameter of the opening of the tubing 1104. Further, for example, an internal surface of the opening at the inlet portion may additionally be roughened such that a roughened internal surface is provided. The roughened internal surface may be in the form of one or more protrusions or bumps (not shown) disposed around an internal periphery of the inlet portion. The roughened internal surface may provide frictional forces to maintain the inlet portion in position in sealed fluid communication with the tubing 1104 of the misting chamber 1102. In use, with the fitted capping, the inlet portion is in sealed fluid communication with the tubing 1104 of the misting chamber 1102. In some exemplary embodiments, the inlet portion of the connector device 300 additionally or alternatively comprise yet another seal mechanism in the form of a roughened external surface of the inlet portion. The roughened external surface may be in the form of one or more protrusions or bumps e.g. 1108 disposed around a periphery of the inlet portion. The roughened external surface may assist the inlet portion to be inserted into another misting chamber such as via the tunnelled aperture 232 of the misting chamber 222 of FIG. 2C. The roughened external surface may provide frictional forces to maintain the inlet portion in position in sealed fluid communication with such a misting chamber.

Returning to FIG.3, the exemplary embodiment shown illustratively in FIG.3 comprises a fixed first angle and a fixed second angle. In other exemplary embodiments, the first angle and/or the second angle may be variable from respective first and second default angular displacements/positions. For example, the angle 312 of

about 83.2° clockwise with respect to an axis parallel to the body portion (compare axis 108 of FIG.1) may be a default angular displacement for a first angle. The angle 312 may be variable from the first default angular displacement, i.e. slightly adjustable. For example, the inlet portion is variable in a range of about 5 degrees to about 30 degrees both clockwise and anti-clockwise with respect to the first default angular displacement of 83.2° clockwise with respect to an axis parallel to the body portion (compare axis 108 of FIG.1). As another example, the angle 314 of about 124.4° clockwise with respect to the axis parallel to the body portion (compare axis 108 of FIG.1) may be a default angular displacement for a second angle. The angle 314 may be variable from the second default angular displacement, i.e. slightly adjustable. For example, the outlet portion is variable in a range of about 5 degrees to about 30 degrees both clockwise and anti-clockwise with respect to the second default angular displacement of 124.4° clockwise with respect to an axis parallel to the body portion (compare axis 108 of FIG.1).

FIG.8 is a schematic drawing of a connector device in an exemplary embodiment. The connector device 802 is substantially similar to the connector device 100 described with reference to FIG.1 and the connector device 300 described with reference to FIG.3.

The connector device 802 is coupled to a misting chamber 804 at an inlet portion 806 (compare e.g. inlet portion 102 of FIG.1). The connector device 802 is coupled to a mask 808 at an outlet portion 810 (compare e.g. outlet portion 104 of FIG.1). The connector device 802 comprises a body portion 812 disposed between the inlet portion 806 and the outlet portion 810 for providing fluid communication therebetween the inlet portion 806 and the outlet portion 810. An axis parallel to the body portion 812 is shown as axis 814 (compare e.g. axis 108 of FIG.1). In the exemplary embodiment, the inlet portion 806 is disposed at an angular displacement from the axis 814 and the outlet portion 810 is disposed at another angular displacement from the axis 814.

In the exemplary embodiment, the inlet portion 806 is configured to orientate the misting chamber 804, by way of the coupling between the inlet portion 806 and the misting chamber 804, such that a vertical center axis 816 is parallel to the misting chamber 804 is substantially upright with respect to a horizontal plane (compare plane 202 and axis 204 of

FIG.2A). In the exemplary embodiment, the coupling between the inlet portion 806 and the misting chamber 804 is such that the misting chamber 804 effectively becomes an extension of the inlet portion 806. For example, an axis 818 parallel to the inlet portion 806 is aligned or in-line or parallel to the vertical center axis 816 in parallel to the misting chamber 804.

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In the exemplary embodiment, the connector device 802 comprises a seal mechanism at the inlet portion 806. The seal mechanism is in the form of a fitted capping provided at the inlet portion 806. The fitted capping is fitted over an outlet of the misting chamber 804 such that, with the fitted capping, the inlet portion 806 is in sealed
10 fluid communication with the tubing of the misting chamber 804. An example of the misting chamber 804 is the nebuliser chamber 220 with its outlet 228 described with reference to FIG.2C. The fitted capping may additionally comprise a roughened internal surface at the opening at the inlet portion 806 and the roughened internal surface may provide frictional forces to maintain the inlet portion 806 in position in sealed fluid
15 communication with the misting chamber 804.

In the exemplary embodiment, the connector device 802 comprises another seal mechanism at the outlet portion 810. For example, the another seal mechanism may be provided as, but is not limited to, a breakage formed at the outlet portion 810 that allows
20 the connector device 802 to be detachably connected/mated to an inlet 820 of the mask 808. For example, the inlet 820 is in the form of a tubing. With the breakage, the outlet portion 810 is compressible on application of a force and insertable into the tubing of the mask 808. In use, upon removal of the application of the force, the outlet portion 810 expands to form a sealed fluid communication with the tubing of the mask 808.

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In the exemplary embodiment, the connector device 802 comprises yet another seal mechanism at the inlet portion 806. The yet another seal mechanism is in the form of a roughened external surface of the inlet portion 806. For example, the roughened external surface of the inlet portion 806 may comprise one or more protrusions or
30 bumps e.g. 822. The roughened external surface may assist the inlet portion 806 to be inserted into a misting chamber such as via the tunnelled aperture 232 of the misting chamber 222 of FIG. 2C. The roughened external surface may provide frictional forces to maintain the inlet portion 806 in position in sealed fluid communication with such a misting chamber.

FIG.9 is a schematic drawing of a connector device in another exemplary embodiment. The connector device 902 is substantially similar to the connector device 100 described with reference to FIG.1, the connector device 300 described with reference to FIG.3 and the connector device 802 described with reference to FIG.8.

The connector device 902 is coupled to a misting chamber 904 at an inlet portion 906 (compare e.g. inlet portion 102 of FIG.1). The connector device 902 is coupled to a mask 908 at an outlet portion 910 (compare e.g. outlet portion 104 of FIG.1). The connector device 902 comprises a body portion 912 disposed between the inlet portion 906 and the outlet portion 910 for providing fluid communication therebetween the inlet portion 906 and the outlet portion 910. An axis parallel to the body portion 912 is shown as axis 914 (compare e.g. axis 108 of FIG.1). In the exemplary embodiment, the inlet portion 906 is disposed at an angular displacement from the axis 914 and the outlet portion 910 is disposed at another angular displacement from the axis 914.

In the exemplary embodiment, the inlet portion 906 is configured to orientate the misting chamber 904, by way of the coupling between the inlet portion 906 and the misting chamber 904, such that a vertical center axis 916 is parallel to the misting chamber 904 is substantially upright with respect to a horizontal plane (compare plane 202 and axis 204 of FIG.2A). In the exemplary embodiment, the coupling between the inlet portion 906 and the misting chamber 904 is such that the misting chamber 904 effectively becomes an extension of the inlet portion 906. For example, an axis 918 parallel to the inlet portion 906 is aligned or in-line or parallel to the vertical center axis 916 in parallel to the misting chamber 904.

In the exemplary embodiment, the connector device 902 comprises a seal mechanism at the inlet portion 906. The seal mechanism is in the form of a roughened external surface provided at the inlet portion 906. Compare bumps e.g. 822 of FIG. 8. The roughened external surface is fitably inserted into an outlet 922 of the misting chamber 904 such that, with the roughened external surface, the inlet portion 906 is in sealed fluid communication with the outlet 922 of the misting chamber 904. An example of the misting chamber 904 is the nebuliser chamber 222 with its outlet 230 described with reference to FIG.2C. The outlet 922 is in the form of a dome cap that comprises a tunnelled aperture within. The tunnelled aperture is suitable for the inlet portion 906 to

be fitably/sealably inserted into the outlet 922, for sealed fluid communication with the misting chamber 904.

In the exemplary embodiment, the connector device 902 comprises another seal
5 mechanism at the outlet portion 910. For example, the yet another seal mechanism may be provided as, but is not limited to, a breakage formed at the outlet portion 910 that allows the connector device 902 to be detachably connected/mated to an inlet 920 of the mask 908. For example, the inlet 920 is in the form of a tubing. With the breakage, the outlet portion 910 is compressible on application of a force and insertable into the tubing of
10 the mask 908. In use, upon removal of the application of the force, the outlet portion 910 expands to form a sealed fluid communication with the tubing of the mask 908.

In the exemplary embodiments described with reference to FIGs.8, 9, 10 and 11, different seal mechanisms have been exemplarily illustrated. It will be appreciated that
15 other exemplary embodiments may incorporate none or one or more of the seal mechanisms described. Other forms of seal mechanisms may also be used in such exemplary embodiments.

FIG.4 is a photograph showing a plurality of connector devices of different
20 exemplary embodiments. These connector devices function substantially similarly to the connector device 100 described with reference to FIG.1.

Connector devices 402, 404, 406 and 408 are examples of a connector device including a first angle of displacement (e.g. either of an inlet portion or of an outlet
25 portion) from an axis parallel to the body portion of the connector device. The respective axes of the connector devices 402, 404, 406 and 408 are shown at axes 410, 412, 414 and 416. For example, the other of the inlet portion and outlet portion is substantially in line with the axis parallel to the body portion of the connector device.

30 Connector devices 418, 420, 422 and 424 are examples of a connector device comprising a first angle of displacement (e.g. either of an inlet portion or of an outlet portion) from an axis parallel to the body portion of the connector device, and also comprising a second angle of displacement (i.e. of the other of the inlet portion or the

outlet portion). The respective axes of the connector devices 418, 420, 422 and 424 are shown at axes 426, 428, 430 and 432.

FIG.5 is a photograph showing a connector device of an exemplary embodiment.

5 The exemplary embodiment shows either one of an inlet portion or an outlet portion being disposed at a first angle to an axis parallel to a body portion of the connector device 502. The connector device 502 functions substantially similarly to the connector device 100 described with reference to FIG.1.

10 In the exemplary embodiment, the connector device 502 comprises an inlet portion 504 that is disposed at a first angle to an axis parallel to a body portion 506 of the connector device 502. The inlet portion 504 is connected or coupled to a misting chamber 508 in the form of a nebuliser chamber. An outlet portion of the connector device 502 is substantially in line or parallel with the body portion 506 and is connected
15 or coupled to a mask 510 in the form of a tracheostomy mask.

In the exemplary embodiment, the first angle is fixed and at least the inlet portion 504 is integrally formed with the body portion 506 of the connector device 502 to provide the fixed first angle.

20 FIG.6A is a photograph showing a connector device of an exemplary embodiment. The exemplary embodiment shows either one of an inlet portion or an outlet portion being disposed at a first angle to an axis parallel to a body portion of the connector device 602; and the other of the either one of an inlet portion or an outlet
25 portion being disposed at a second angle to an axis parallel to the body portion of the connector device 602. The connector device 602 functions substantially similarly to the connector device 100 described with reference to FIG.1.

30 In the exemplary embodiment, the connector device 602 comprises an inlet portion 604 that is disposed at a first angle to an axis parallel to a body portion 606 of the connector device 602. The connector device 602 also comprises an outlet portion 608 that is disposed at a second angle to the axis parallel to the body portion 606 of the connector device 602. The inlet portion 604 is connected or coupled to a misting

chamber 610 in the form of a nebuliser chamber. The outlet portion 608 of the connector device 602 is connected or coupled to a mask 612 in the form of a tracheostomy mask.

In the exemplary embodiment, both the first angle and the second angle are fixed. In the exemplary embodiment, the inlet portion 604 and the outlet portion 608 are integrally formed with the body portion 606 of the connector device 602 to provide the fixed first and second angles.

FIG.6B is a photograph showing a connector device of another exemplary embodiment. The exemplary embodiment shows either one of an inlet portion or an outlet portion being disposed at a first angle to an axis parallel to a body portion of the connector device 614; and the other of the either one of an inlet portion or an outlet portion being disposed at a second angle to an axis parallel to the body portion of the connector device 614. The connector device 614 functions substantially similarly to the connector device 100 described with reference to FIG.1.

In the exemplary embodiment, the connector device 614 comprises an inlet portion 616 that is disposed at a second angle to an axis parallel to a body portion 618 of the connector device 614. The connector device 614 also comprises an outlet portion 620 that is disposed at a first angle to the axis parallel to the body portion 618 of the connector device 614. The inlet portion 616 is connected or coupled to a misting chamber 622 in the form of a nebuliser chamber. The outlet portion 620 of the connector device 614 is connected or coupled to a mask 624 in the form of a tracheostomy mask.

In the exemplary embodiment, both the first angle and the second angle are fixed. In the exemplary embodiment, the inlet portion 616 and the outlet portion 620 are integrally formed with the body portion 618 of the connector device 614 to provide the fixed first and second angles.

FIG.7A is a schematic drawing of a connector device in an exemplary embodiment. The connector device 700 functions substantially similarly to the connector device 100 described with reference to FIG.1. The drawing is a side view of the connector device 700.

The exemplary embodiment described here comprises a movable joint in co-operation with a locking mechanism. The description, by way of example only, provides a mobility to an inlet portion to vary its angular displacement with respect to a body portion of the connector device. In use, the inlet portion is locked in position with a locking mechanism. It will be appreciated that the description below can also apply to an outlet portion of the connector device. In some exemplary embodiments, both the inlet portion and the outlet portion may be provided with respective movable joints in co-operation with respective locking mechanisms.

The connector device 700 comprises an inlet portion 702 configured to couple to a misting chamber (not shown; compare chamber 200 of FIG.2A). The connector device 700 also comprises an outlet portion 704 configured to couple to a mask (not shown). The connector device 700 comprises a body portion 706 disposed between the inlet portion 702 and the outlet portion 704 for providing fluid communication therebetween. An axis parallel to the body portion 706 is shown as axis 708.

In the exemplary embodiment, the inlet portion 702 is capable of being disposed at a first angle to the axis 708 and/or the outlet portion 704 is capable of being disposed at a second angle to the axis 708. In the exemplary embodiment, the inlet portion 702 and/or the outlet portion 704 may be configured to be variable in its angular positioning with respect to the axis 708.

In the exemplary embodiment, the inlet portion 702 is configured to be variable in its angular positioning with respect to the axis 708. The inlet portion 702 comprises a movable joint (not shown) that allows the inlet portion 702 to be movable with respect to the axis 708. A locking mechanism in the form of an adjustment wheel 710 is provided coupled to the body portion 706. The adjustment wheel 710 comprises a plurality of retractable pins e.g. 712, 713. The retractable pins e.g. 712, 713 are provided on or flushed with the surface of the adjustment wheel 710. A catch 714 is provided on the inlet portion 702. The catch 714 may be in the form of a groove/valley or a tunnel component. The catch 714 is configured to house or mate with a retractable pin e.g. 712, 713 of the adjustment wheel 710.

In use, the inlet portion 702 may be rotated with the movable joint with respect to the axis 708. At a desired position, a retractable pin e.g. 712 may be pushed out of its retracted

position on the adjustment wheel 710 and the pin 712 protrudes and mates with the catch 714. With the mating or housing of the pin 712 in the catch 714, the inlet portion 702 becomes fixed in angular displacement with respect to the axis 708, to provide e.g. a first angle to the axis 708.

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As described above, the movable joint and locking mechanism may be provided, instead or additionally to, the outlet portion 704. FIG.7A shows the implementation with the inlet portion 702.

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In some exemplary embodiments, with both the inlet portion and the outlet portion being movable prior to use and being capable of being locked in positions with respective locking mechanisms when in use, a first angle and a second angle with respect to the axis 708 may be provided to a connector device in association with the inlet portion and the outlet portion.

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In the above description, a locking mechanism has been described as being in the form of an adjustment wheel and the catch. However, it will be appreciated that various other or alternative forms of locking mechanisms may also be implemented. In some exemplary embodiments, a separate locking mechanism may also be omitted.

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FIG.7B is a schematic drawing of a connector device in another exemplary embodiment. The connector device 716 is similar to the connector device 700 described with reference to FIG.7A. Like numerals for identical parts are used in this drawing.

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In Fig.7B, instead of a locking mechanism in the form of an adjustment wheel and catch co-operating with a movable joint, this exemplary embodiment provides a substantially rigid movable joint 720. In some exemplary embodiments, the rigid movable joint 720 may be in the form of a so-called clickwheel.

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In the exemplary embodiment, the inlet portion 702 is configured to be variable in its angular positioning with respect to the axis 708. The inlet portion 702 is coupled to the movable joint 720 that allows the inlet portion 702 to be movable with respect to the axis 708. The movable joint 720 is substantially rigid in that force is needed to move the inlet

portion 702 with respect to the axis 708 and when the force is removed, the inlet portion 702 remains fixed in position with respect to the axis 708.

In use, the inlet portion 702 may be rotated with application of a mechanical force on the movable joint 720 with respect to the axis 708. At a desired position, the mechanical force is removed and the inlet portion 702 becomes fixed in angular displacement with respect to the axis 708, to provide e.g. a first angle to the axis 708. Therefore, a separate locking mechanism may be omitted from such an exemplary embodiment.

The rigid movable joint may be provided, instead of or additionally to, the outlet portion 704. FIG.7B shows the implementation with the inlet portion 702.

In some exemplary embodiments, with both the inlet portion and the outlet portion being movable prior to use with application of mechanical forces on respective rigid movable joints and being capable of being fixed in positions with removal of the respective mechanical forces when in use, a first angle and a second angle with respect to the axis 708 may be provided to a connector device in association with the inlet portion and the outlet portion.

The described exemplary embodiments may provide a connector device that is tubular in shape, i.e. the inlet portion, the outlet portion and the body portion may form a tubular shape. In some exemplary embodiments, the tubular shape may be continuous from the inlet portion to the outlet portion and provide a sealed fluid communication therebetween the inlet portion to the outlet portion.

In some exemplary embodiments, an angular displacement of the inlet portion and/or an angular displacement of the outlet portion with respect to the axis parallel to the body portion may be each/both a function of a length of the body portion.

In some exemplary embodiments, the body portion of the connector device may be integrally formed with at least one of the inlet portion and the outlet portion by utilising three-dimensional (3D) printing technology. In some exemplary embodiments, the body portion of the connector device may be integrally formed with at least one of the inlet portion and the outlet portion by utilising molding technology. It will be appreciated that various other

technologies may be used to manufacture or form the connector device of the exemplary embodiments.

In the described exemplary embodiments, one or more of the inlet portion, the outlet portion and the body portion may be constructed of medical-grade material. For example, the one or more of the inlet portion, the outlet portion and the body portion may be constructed using, but is not limited to, polycarbonate. In one example, the material used is Makrolon 2458™ by Bayer Material Science.

FIG.12A is a perspective view of a connector device 1202 in an exemplary embodiment. FIG.12B is a top view of the connector device 1202. FIG.12C is a front view of the connector device 1202 when viewed from direction A.

In the exemplary embodiment, the connector device 1202 is shown in an unassembled state. The connector device 1202 comprises a left connector member 1204 and a right connector member 1206. At least one of the left connector member 1204 and the right connector member 1206, or both, comprises at least one slit 1208 functioning as a breakage of an outlet portion of the connector device 1202 and at least one protrusion or bump 1210 functioning as a roughened external surface of an inlet portion of the connector device 1202. The at least one slit 1208 is disposed around a periphery of the outlet portion of the connector device 1202. The at least one protrusion or bump 1210 is disposed around a periphery of the inlet portion of the connector device 1202. In addition, at least one of the left connector member 1204 and the right connector member 1206, or both, comprises at least one internal protrusion or bump 1211 functioning as a roughened internal surface of an inlet portion of the connector device 1202. The at least one internal protrusion or bump 1211 is disposed around an internal periphery of the inlet portion of the connector device 1202.

In the exemplary embodiment, the left connector member 1204 and the right connector member 1206 are configured to be joined together using one or more mating components. In the exemplary embodiment, the left connector member 1204 comprises at least one mating apertures e.g. 1212, 1214. The right connector member 1206 comprises at least one mating protrusions e.g. 1216, 1218. The mating protrusions e.g. 1216, 1218 are positioned to be corresponding to the mating apertures e.g. 1212, 1214. The mating protrusions e.g. 1216, 1218 and the corresponding mating apertures e.g. 1212, 1214 are

disposed along respective internal perimeters of the left connector member 1204 and the right connector member 1206. For better holding strength, the mating protrusions e.g. 1216, 1218 and the corresponding mating apertures e.g. 1212, 1214 may be provided in multiples of two sets each for the inlet portion, the body portion and the outlet portion.

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The left connector member 1204 and the right connector member 1206 may each be manufactured using polycarbonate material and via molding or injection molding. During assembly, the left connector member 1204 and the right connector member 1206 are pressed against each other such that the mating protrusions e.g. 1216, 1218 are inserted and mated into the corresponding mating apertures e.g. 1212, 1214. The assembled connector device 1202 may additionally undergo heat treatment to allow the mating components to be fixed in place.

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SOME EMBODIMENTS (SEs)

15 The following recites some embodiments of the present disclosure.

SE 1. A connector device suitable for providing fluid communication between a mask and a misting chamber, the connector device comprising,

an inlet configured to couple to a misting chamber;

20 an outlet configured to couple to a mask;

a body portion between the inlet and the outlet for providing fluid communication therebetween;

wherein at least one of the inlet and the outlet is disposed at a first angle to an axis parallel to the body portion; and

25 further wherein the inlet is configured to orientate the misting chamber, by way of the coupling between the inlet and the misting chamber, such that a center axis running through the misting chamber is substantially upright with respect to a horizontal plane.

SE 2. The connector device according to SE 1, wherein the inlet is configured to orientate the misting chamber, by way of the coupling between the inlet and the misting chamber, such that the center axis running through the misting chamber is preferably between about 60 degrees to about 90 degrees with respect to the horizontal plane.

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SE 3. The connector device according to any preceding SEs, wherein, in use, the first angle to the axis parallel to the body portion is substantially fixed.

SE 4. The connector device according to SE 3, wherein the first angle is fixed by use of a locking mechanism to lock said at least one of the inlet and the outlet with respect to the body portion.

SE 5. The connector device according to SEs 3 or 4, further comprising a movable joint to dispose said at least one of the inlet and the outlet with respect to the body portion.

SE 6. The connector device according to SE 3, further comprising the body portion being integrally formed with said at least one of the inlet and the outlet.

SE 7. The connector device according to SE 6, wherein the body portion is integrally formed with said at least one of the inlet and the outlet by 3-dimensional (3D) printing.

SE 8. The connector device according to SEs 6 or 7, wherein the body portion is integrally formed with said at least one of the inlet and the outlet by molding.

SE 9. The connector device according to SEs 1 or 2, wherein, in use, the first angle to the axis parallel to the body portion is configured to be variable.

SE 10. The connector device according to SE 9, wherein the first angle to the axis parallel to the body portion is variable in a range of about 5 degrees to about 30 degrees. In some embodiments, the first angle to the axis parallel to the body portion is variable by about 30 degrees, preferably by about 25 degrees, preferably by about 20 degrees, preferably by about 15 degrees, preferably by about 10 degrees, or preferably by about 5 degrees.

SE 11. The connector device according to any preceding SEs, further comprising the other of the at least one of the inlet and the outlet being disposed at a second angle to the axis parallel to the body portion.

SE 12. The connector device according to SE 11, wherein, in use, the second angle to the axis parallel to the body portion is substantially fixed.

SE 13. The connector device according to SE 12, wherein the second angle is fixed by use of another locking mechanism to lock said the other of the at least one of the inlet and the outlet with respect to the body portion.

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SE 14. The connector device according to SEs 12 or 13, further comprising a movable joint to dispose said the other of the at least one of the inlet and the outlet with respect to the body portion.

10 SE 15. The connector device according to SE 12, further comprising the body portion being integrally formed with said the other of the at least one of the inlet and the outlet.

SE 16. The connector device according to SE 15, wherein the body portion is integrally formed with said the other of the at least one of the inlet and the outlet by 3-dimensional (3D) printing.

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SE 17. The connector device according to SEs 15 or 16, wherein the body portion is integrally formed with said the other of the at least one of the inlet and the outlet by molding.

20 SE 18. The connector device according to SE 11, wherein, in use, the second angle to the axis parallel to the body portion is configured to be variable.

SE 19. The connector device according to SE 18, wherein the second angle to the axis parallel to the body portion is variable in a range of about 5 degrees to about 30 degrees. In some embodiments, the first angle to the axis parallel to the body portion is variable by about 30 degrees, preferably by about 25 degrees, preferably by about 20 degrees, preferably by about 15 degrees, preferably by about 10 degrees, or preferably by about 5 degrees.

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30 SE 20. The connector device according to any preceding SEs, further comprising the inlet being disposed at an angle of more than about 90 degrees to an axis parallel to the body portion in a clockwise direction.

SE 21. The connector device according to any preceding SEs, further comprising the outlet being disposed at an angle of more than about 90 degrees, preferably more than 100 degrees, to an axis parallel to the body portion in a clockwise direction.

- 5 SE 22. The connector device according to any preceding SEs, wherein one or more of the inlet, the outlet and the body portion is constructed of medical-grade material.

SE 23. The connector device according to any preceding SEs, further comprising the inlet being configured to couple to a misting chamber via a first seal mechanism.

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SE 24. The connector device according to SE 23, wherein the first seal mechanism comprises a fitted capping at the inlet over a tubing of a misting chamber such that the inlet has a right/ tight fit with a cap over the tubing of the misting chamber to form a seal.

- 15 SE 25. The connector device according to any preceding SEs, further comprising the outlet being configured to couple to a mask via a second seal mechanism.

SE 26. The connector device according to SE 23, wherein the second seal mechanism comprises a breakage formed at the outlet such that the outlet is compressible on application of a force and insertable into a tubing of a mask and such that upon removal of the application of the force, the outlet expands to form a seal.

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SE 27. The connector device according to any preceding SEs, wherein the inlet, the outlet and the body portion form a tubular shape.

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In the above described exemplary embodiments, the inlet portion may be constructed or provided to be preferably rigid or substantially rigid so as to be able to orientate or position a coupled misting chamber. In some embodiments, the coupling between the inlet portion and the misting chamber is preferably rigid such that the misting chamber effectively becomes an extension of the inlet portion. The inlet portion is thus able to orientate or position the misting chamber via an angular displacement of the inlet portion and/or the outlet portion with respect to the axis parallel to the body portion. For example, the coupling of the inlet portion and the misting chamber in association with an angular displacement of the inlet portion with respect to the axis parallel to the body portion (e.g. between about 50

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degrees to about 120 degrees in a clockwise direction) may position the misting chamber in a substantially upright position (e.g. a vertical center axis through the misting chamber is between about 60 degrees to about 90 degrees with respect to a horizontal plane), while the axis parallel to the body portion is parallel or almost parallel to the horizontal plane (e.g. the axis may deviate by about e.g. 15 degrees from the horizontal plane).

Thus, using the described exemplary embodiments, a patient or a subject who is placed in a reclining position of about 30 degrees to the horizontal plane, e.g. being unable to receive conventional nebulization procedures in an unassisted upright position, may be able to undergo effective nebulisation. The described exemplary embodiments may also be useful, over conventional products and methods, to maintain/ensure a nebuliser chamber to be in an upright position that can provide optimal and sufficient nebulisation to a subject who is in the semi-Fowler position (i.e. inclined at an angle of 30 to 45 degrees to the horizontal plane). The described exemplary embodiments may thus be useful in maintaining a nebuliser chamber to be in an upright position for a subject that is inclined at any degree within the range of about 30 degrees to 90 degrees to the horizontal plane. In the described exemplary embodiments, with an angular displacement from an axis parallel to a body portion of a connector device, an inlet portion and/or an outlet portion may assist in maintaining a nebulization chamber in an optimum position to better promote effective nebulization. Therefore, the described exemplary embodiments are useful over conventional nebulisation set-ups whereby a mask is connected directly to a nebuliser chamber and, the nebuliser chamber has freedom of movement and is typically not effected into position by the mask.

The terms "coupled" or "connected" as used in this description are intended to cover both directly connected or connected through one or more intermediate means, unless otherwise stated.

Further, in the description herein, the word "substantially" whenever used is understood to include, but not restricted to, "entirely" or "completely" and the like. In addition, terms such as "comprising", "comprise", and the like whenever used, are intended to be non-restricting descriptive language in that they broadly include elements/components recited after such terms, in addition to other components not explicitly recited. Further, terms such as "about", "approximately" and the like whenever used, typically means a reasonable

variation, for example a variation of +/- 5% of the disclosed value, or a variance of 4% of the disclosed value, or a variance of 3% of the disclosed value, a variance of 2% of the disclosed value or a variance of 1% of the disclosed value.

5 Furthermore, in the description herein, certain values may be disclosed in a range. The values showing the end points of a range are intended to illustrate a preferred range. Whenever a range has been described, it is intended that the range covers and teaches all possible sub-ranges as well as individual numerical values within that range. That is, the end points of a range should not be interpreted as inflexible limitations. For example, a
10 description of a range of 1% to 5% is intended to have specifically disclosed sub-ranges 1% to 2%, 1% to 3%, 1% to 4%, 2% to 3% etc., as well as individually, values within that range such as 1%, 2%, 3%, 4% and 5%. The above reasoning also applies to a range of, for example, 5 degrees to 30 degrees, i.e. sub-ranges and individual values are intended to be specifically disclosed. The intention of the above specific disclosures is applicable to any
15 depth/breadth of a range.

In the described exemplary embodiments, the misting chamber is intended to cover any chamber whereby a gaseous flow is allowed to interact with a fluid medication contained in the chamber. For example, the misting chamber may be a nebulizer chamber. In the
20 described exemplary embodiments, the mask is intended to cover any mask that allows a gaseous flow of medication from a misting chamber. For example, the mask may be a tracheostomy mask.

In the described exemplary embodiments, the discussions of the angular
25 displacements are taken with respect to the connector device being positioned on its longitudinal side with the inlet portion of the connector device being positioned to the left side of a user or person viewing/holding the connector device and the outlet portion of the connector device being positioned to the right side of the user or person viewing/holding the connector device. The discussions of the angular displacements are taken with respect to
30 the axis parallel to the body portion e.g. with an angular displacement of the inlet portion, if available, being clockwise from zero degrees from said axis and with an angular displacement of the outlet portion, if available, being clockwise from 180 degrees from said axis when the inlet portion is also taken into account.

In some exemplary embodiments, the inlet portion may be displaced at an angle in a range of about 50 degrees (inclusive) to about 120 degrees (inclusive) clockwise with respect to the axis parallel to the body portion. In some exemplary embodiments, the outlet portion may be displaced at another angle in a range of about 60 degrees (inclusive) to about 130 degrees (inclusive) clockwise with respect to the axis parallel to the body portion, the range being disclosed here being in steps of 0.1 degrees. However, it will be appreciated that the angular displacements are not limited as such and may comprise other angular displacement values that allow a combination of the inlet portion, the body portion and the outlet portion of the connector device to orientate a misting chamber and a mask when coupled to the connector device.

In the described exemplary embodiments, the inlet portion is described as being configured to orientate a misting chamber in connection to the body portion and the outlet portion. For example, an axis parallel to the inlet portion is aligned or in-line or parallel to a vertical centre axis in parallel to the misting chamber. In some exemplary embodiments, it may be provided that an axis parallel to the outlet portion is also aligned or in-line or parallel to a vertical centre axis in parallel to a tubing of a mask.

It will be appreciated by a person skilled in the art that other variations and/or modifications may be made to the specific embodiments without departing from the scope of the invention as broadly described. For example, in the description herein, features of different exemplary embodiments may be adopted, modified, included etc. or the like across different exemplary embodiments. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

CLAIMS

1. A connector device for providing fluid communication between a mask and a misting chamber, the connector device comprising,

an inlet portion configured to couple to a misting chamber;

an outlet portion configured to couple to a mask;

a body portion disposed between the inlet portion and the outlet portion for providing fluid communication therebetween, the body portion comprising an elongated body;

wherein at least one of the inlet portion and the outlet portion is disposed at a first angle to an axis parallel to the body portion, the first angle to the axis parallel to the body portion being substantially fixed prior to use of the connector device;

wherein the inlet portion, the outlet portion and the body portion form a tubular shape, the tubular shape being continuous from the inlet portion to the outlet portion and providing sealed fluid communication therebetween the inlet portion to the outlet portion; and

further wherein the inlet portion is configured to orientate the misting chamber, by way of the coupling between the inlet portion and the misting chamber, such that a vertical center axis in parallel to the misting chamber is substantially upright with respect to a horizontal plane and the vertical center axis in parallel to the misting chamber is aligned with an axis parallel to the inlet portion.

2. The connector device according to claim 1, wherein the elongated body of the body portion has a length that is at least similar to a length of one of the inlet portion or the outlet portion.

3. The connector device according to claim 2, wherein said at least one of the inlet portion and the outlet portion disposed at the first angle to the axis parallel to the body portion is disposed based on a function of the length of the body portion.

4. The connector device according to claim 1, wherein the inlet portion is configured to orientate the misting chamber, by way of the coupling between the inlet portion and the misting chamber, such that the vertical center axis in parallel to the misting chamber is between 60 degrees to 90 degrees to 120 degrees with respect to the horizontal plane.

5. The connector device according to any preceding claims, wherein, in use, the first angle to the axis parallel to the body portion is substantially fixed.

6. The connector device according to claim 5, further comprising a first locking mechanism configured to lock said at least one of the inlet portion and the outlet portion with respect to the body portion to provide the first angle.

7. The connector device according to claims 5 or 6, further comprising a first movable joint to dispose said at least one of the inlet portion and the outlet portion with respect to the body portion.

8. The connector device according to claim 5, further comprising the body portion being integrally formed with said at least one of the inlet portion and the outlet portion.

9. The connector device according to any one of claims 1 to 4, wherein, in use, the first angle to the axis parallel to the body portion is configured to be variable from a first default angular displacement from the axis parallel to the body portion, the variance being in a range of 5 degrees to 30 degrees.

10. The connector device according to any preceding claims, further comprising the other of the at least one of the inlet portion and the outlet portion being disposed at a second angle to the axis parallel to the body portion.

11. The connector device according to claim 10, wherein, in use, the second angle to the axis parallel to the body portion is substantially fixed.

12. The connector device according to claim 11, further comprising a second locking mechanism configured to lock said the other of the at least one of the inlet portion and the outlet portion with respect to the body portion to provide the second angle.

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13. The connector device according to claims 11 or 12, further comprising a second movable joint to dispose said the other of the at least one of the inlet portion and the outlet portion with respect to the body portion.

14. The connector device according to claim 11, further comprising the body portion being integrally formed with said the other of the at least one of the inlet portion and the outlet portion.

5 15. The connector device according to claim 10, wherein, in use, the second angle to the axis parallel to the body portion is configured to be variable from a second default angular displacement from the axis parallel to the body portion, the variance being in a range of 5 degrees to 30 degrees.

10 16. The connector device according to any preceding claims, further comprising the inlet portion being disposed at an angle of more than about 80 degrees to the axis parallel to the body portion in a clockwise direction.

15 17. The connector device according to any preceding claims, further comprising the outlet portion being disposed at an angle of more than about 90 degrees to the axis parallel to the body portion in a clockwise direction.

18. The connector device according to any preceding claims, wherein one or more of the inlet portion, the outlet portion and the body portion is constructed of medical-grade material.

20 19. The connector device according to any preceding claims, further comprising the inlet portion being configured to couple to the misting chamber via a first seal mechanism.

25 20. The connector device according to claim 19, wherein the first seal mechanism comprises a fitted capping provided at the inlet portion capable of fitting over a tubing of the misting chamber such that, in use, the inlet portion is in sealed fluid communication with the tubing of the misting chamber.

30 21. The connector device according to any preceding claims, further comprising the outlet portion being configured to couple to the mask via a second seal mechanism.

22. The connector device according to claim 21, wherein the second seal mechanism comprises a breakage formed at the outlet portion such that the outlet portion is compressible on application of a force and insertable into a tubing of the mask and such

that, in use, upon removal of the application of the force, the outlet portion expands to form a sealed fluid communication with the tubing of the mask.

23. The connector device according to any preceding claims, further comprising the inlet
5 portion being configured to couple to the misting chamber via a third seal mechanism.

24. The connector device according to claim 23, wherein the third seal mechanism
comprises a roughened external surface provided at the inlet portion, the roughened external
surface capable of fitting by insertion into a tubing of the misting chamber such that, in use,
10 the inlet portion is in sealed fluid communication with the tubing of the misting chamber.

25. The connector device according to any preceding claims, wherein the connector
device is coupled to a subject in a semi-Fowler's position.

15 26. The connector device according to any preceding claims, wherein the connector
device is to connect the misting chamber to a tracheostomy mask.