CLAIMS

~~1. A patient interface for delivery of a supply of pressurised air or breathable gas to an entrance of a patient's airways comprising:~~

~~a cushion member that includes a retaining structure and a seal-forming structure permanently connected to the retaining structure, the seal-forming structure comprising a pair of nasal pillows constructed and arranged to provide a substantially sealed path for the breathable gas to the nares of the patient, and to form a seal at least in part on a columella region of the patient's nose; and~~

~~a frame member,~~

~~wherein the retaining structure and the frame member are repeatedly engageable with and disengageable from one another,~~

~~wherein a gas chamber is formed at least in part by engagement of the cushion member and the frame member, and~~

~~wherein an increase in air pressure within the cushion member causes a sealing force between the seal-forming structure and the frame member to increase.~~

~~2. The patient interface of claim 1, wherein the seal-forming structure is co-molded with the retaining structure.~~

~~3. The patient interface of claim 1 or 2, wherein the cushion member is repeatedly removably engageable with and disengageable from the frame member by pinching two opposing locations on the cushion member proximal to the retaining structure.~~

~~4. The patient interface of any one of claims 1 to 3, wherein the cushion member comprises a sealing lip that seals against the frame member when the retaining structure and frame member are attached to one another, and when air pressure increases within the cushion member, the sealing force is increased.~~

~~5. The patient interface of claim 4, wherein the sealing lip is a continuous inner peripheral edge integral to the seal-forming structure.~~

~~6. The patient interface of any one of claims 1 to 5, wherein the retaining structure and the frame member are more rigid than the seal-forming structure.~~

~~7. The patient interface of any one of claims 1 to 6, wherein the retaining structure comprises a pair of barbs.~~

~~8. The patient interface of any one of claims 1 to 7, wherein said frame member comprises a channel configured to receive a respective mating feature of said cushion member.~~

~~9. The patient interface of any one of claims 1 to 8, wherein said cushion member comprises a channel configured to receive a respective mating feature of said frame member.~~

~~10. The patient interface of any one of claims 1 to 9, wherein said seal-forming structure comprises a sealing flange extending around a perimeter of said seal-forming structure to form a seal at the entrance of the patient's airways.~~

~~11. The patient interface of claim 10, wherein said frame member comprises a tongue portion constructed and arranged to effect a seal with said sealing flange.~~

~~12. The patient interface of any one of claims 1 to 11, wherein the cushion member comprises a plenum chamber having a posterior wall that is constructed and arranged to be located adjacent an upper lip of the patient in use, and the plenum chamber is located between the retaining structure and the seal-forming structure.~~

~~13. The patient interface of any one of claims 1 to 12, wherein the retaining structure is substantially rectangular or substantially ellipsoidal with a major axis and a minor axis, the length of the major axis being about double the length of the minor axis.~~

~~14. The patient interface of claim 1, wherein the frame comprises a pair of vents, each disposed on an anterior surface of the frame at opposite sides.~~

~~15. The patient interface of claim 14, wherein the pair of vents comprise at least 50% of a superficial portion of the anterior surface of the frame.~~

~~16. A cushion member for a patient interface for delivery of a supply of pressurised air or breathable gas to an entrance of a patient's airways, the cushion member comprising:~~

~~a retaining structure for repeatable engagement with and disengagement from a frame member; and~~

~~a seal-forming structure permanently connected to the retaining structure, the seal-forming structure being a pair of nasal pillows pneumatically connected to the plenum chamber by stalks;~~

~~wherein the seal-forming structure is made from a first material and the retaining structure is made from a second material with different mechanical characteristics from the first material and the second material is more rigid than the first material; and~~

~~wherein an increase in air pressure within the cushion member causes a sealing force between the seal-forming structure and the frame member to increase.~~

~~17. The cushion member according to claim 16, wherein the first material is silicone and the second material is silicone with a higher durometer than the first material.~~

~~18. The cushion member according to claim 16, further comprising a plenum chamber located between the retaining structure and the seal-forming structure.~~

~~19. The cushion member according to claim 16, wherein the first material permits the seal-forming structure to readily conform to finger pressure and the second material prevents the retaining structure from readily conforming to finger pressure.~~

~~20. A cushion member for a nasal pillows mask, comprising:~~

~~a retaining structure for repeatable engagement with and disengagement from a frame member; and~~

~~a seal-forming structure permanently connected to the retaining structure;~~

~~wherein an increase in air pressure within the cushion member causes a sealing force between the seal-forming structure and the frame member to increase; and~~

~~wherein a retention force between the retaining structure and the frame member is higher than a disengagement force to disengage the retaining structure from the frame member.~~

~~21. A patient interface to provide breathable gas to a patient, the patient interface comprising:~~

~~a plenum chamber having a plenum connection region;~~

~~a seal-forming structure disposed on the plenum chamber; and~~

~~a frame comprising a frame connection region and a headgear connection region, the headgear connection region being shaped and dimensioned to be inserted within a hollow headgear strap;~~

~~wherein the frame connection region is configured for attachment to the plenum chamber at the plenum connection region, and~~

~~wherein a sealing lip is configured to engage the frame connection region to deflect from a neutral position to a sealed position, such that an increase in air pressure within the plenum chamber urges the sealing lip against the frame connection region.~~

~~22. The patient interface of claim 21, wherein the seal-forming structure comprises a pair of nasal pillows constructed and arranged to provide a substantially sealed path for the breathable gas to the nares of the patient, and to form a seal at least in part on a columella region of the patient's nose.~~

~~23. The patient interface of claim 21, wherein each of the pair of nasal pillows comprises a frustocone portion pneumatically connected to the plenum chamber by a stalk.~~

~~24. The patient interface of claim 23, wherein the frustocone portion comprises a sealing flange and a support flange, said sealing flange and said support flange being connected to the stalk by a flexible region.~~

~~25. The patient interface of claim 24, wherein the support flange is adapted to press the sealing flange against a peripheral region of the nares of the patient.~~

~~26. The patient interface of any one of claims 21 to 25, wherein the plenum chamber comprises the sealing lip, said sealing lip being located at the plenum connection region.~~

~~27. The patient interface of claim 26, wherein the sealing lip is disposed annularly about the plenum chamber at the plenum connection region.~~

~~28. The patient interface of claim 27, wherein the sealing lip is disposed about a partial or entire interior periphery or a partial or entire exterior periphery of the plenum chamber.~~

~~29. The patient interface of claim 28, further comprising an additional sealing lip disposed about a partial or entire interior periphery or a partial or entire exterior periphery of the plenum chamber.~~

~~30. The patient interface of any one of claims 26 to 29, wherein the sealing lip depends from the plenum chamber at an angle and in a direction substantially opposite of the seal-forming structure.~~

~~31. The patient interface of any one of claims 26 to 30, wherein the sealing lip is constructed and arranged such that it is deformable in a direction substantially toward the seal-forming structure such that a pneumatic seal is formed between the plenum chamber and the frame when the frame is attached to the plenum chamber via the plenum connection region.~~

~~32. The patient interface of any one of claims 21 to 31, wherein the sealing lip and the plenum chamber comprise one piece.~~

~~33. The patient interface of any one of claims 21 to 32, wherein the plenum connection region and the plenum chamber are fixedly attached by co-molding or injection molding.~~

~~34. The patient interface of claim 33, wherein the plenum connection region and the plenum chamber comprise different materials.~~

~~35. The patient interface of claim 34, wherein the plenum chamber comprises a softer material than the plenum connection region.~~

~~36. The patient interface of claim 35, wherein the plenum chamber comprises an elastomeric material and the plenum connection region comprises thermoplastic polymer, high durometer silicone, thermoset or thermoplastic elastomer having a higher durometer than the elastomeric material of the plenum chamber.~~

~~37. The patient interface of any one of claims 21 to 36, wherein the plenum connection region and frame are made from an equivalent material.~~

~~38. The patient interface of any one claims 21 to 37, wherein the plenum connection region comprises at least one retention feature to facilitate connection with the frame, and~~

~~wherein the frame comprises at least one complementary frame connection region to receive the at least one retention feature corresponding thereto.~~

~~39. The patient interface of claim 38, wherein the at least one retention feature comprises a barb, said barb having a leading surface and a trailing surface and each of the at least one complementary frame connection region comprises a lead-in surface and a retaining surface.~~

~~40. The patient interface of claim 39, wherein the leading surface is configured to contact a corresponding lead-in surface of the at least one frame connection region during attachment of the plenum connection region to the frame such that the at least one retention feature deforms in a direction generally opposite the lead-in surface.~~

~~41. The patient interface of claim 40, wherein complete engagement of the at least one retention feature to the at least one frame connection region generates an audible~~

~~click when the plenum connection region is attached to the frame and the leading surface passes the lead-in surface.~~

~~42. The patient interface of any one of claims 39 to 41, wherein said barb depends from said at least one retention feature opposite an additional surface of the at least one retention feature.~~

~~43. The patient interface of claim 42, wherein the leading surface and the trailing surface of said barb are angled toward one another away from and with respect to the additional surface.~~

~~44. The patient interface of claim 43, wherein the leading surface of said barb is angled at about 60 degrees with respect to the additional surface.~~

~~45. The patient interface of claim 44, wherein the trailing surface of said barb is angled at about 75 degrees with respect to the additional surface.~~

~~46. The patient interface of any one of claims 43 to 45, wherein the trailing surface is angled closer to perpendicular with respect to the additional surface than the leading surface such that a force required to attach the plenum connection region to the frame is greater than a force required to detach the plenum connection region from the frame.~~

~~47. The patient interface of any one of claims 43 to 46, wherein the lead-in surface of the at least one frame connection region is angled to be flush with the leading surface of the at least one retention feature during attachment.~~

~~48. The patient interface of any one of claims 43 to 47, wherein the retaining surface of the at least one frame connection region is angled to be flush with the trailing surface of the at least one retention feature when the at least one frame connection region and the at least one retention feature are completely engaged.~~

~~49. The patient interface of any one of claims 38 to 48, wherein the at least one retention feature comprises a first retention feature and a second retention feature and the at least one frame connection region comprises a first frame connection region and a second frame connection region.~~

~~50. The patient interface of claim 49, wherein the first retention feature is complementarily dimensioned with respect to the first frame connection region such that the second retention feature cannot be engaged to the first frame connection region.~~

~~51. The patient interface of any one of claims 21 to 50, wherein the frame, plenum chamber or plenum connection region comprises a port adapted to connect to an air delivery tube.~~

~~52. The patient interface of claim 51, wherein the port is substantially cylindrical or substantially conical.~~

~~53. The patient interface of claim 51 or 52, wherein when the frame comprises the port, the port and the frame comprise one piece.~~

~~54. The patient interface of any one of claims 51 to 53, wherein when the frame comprises the port, the port extends from the frame in a direction substantially opposite the plenum chamber.~~

~~55. The patient interface of claim 54, wherein the port extends inferiorly from the frame.~~

~~56. A method for manufacturing a patient interface for the treatment of respiratory disorders, the method comprising:~~

~~cutting a vent portion from a textile formed by interlacing fibers, the textile having a predetermined amount of porosity;~~

~~holding the vent portion in a mold; and~~

~~permanently connecting the held vent portion to a mask frame to form a vent of the patient interface to washout exhaled air.~~

~~57. The method according to claim 56, wherein the fibers are plastic fibers and the mask frame is made from plastic.~~

~~58. The method according to claim 57, wherein the plastic fibers are made from a thermoplastic polymer from any one from the group consisting of: polypropylene, a woven polypropylene material, polycarbonate, nylon and polyethylene.~~

~~59. The method according to claim 57, wherein the permanent connection is obtained by molecular adhesion using any one from the group consisting of: overmolding, co-injection molding and two shot (2K) injection molding.~~

~~60. The method according to claim 56, wherein the patient interface is any one from the group consisting of: nasal mask, full-face mask, nasal pillows and nasal cradle.~~

~~61. The method according to claim 56, wherein the cutting is any one from the group consisting of: laser cutting, ultrasonic cutting and mechanical cutting.~~

~~62. The method according to claim 56, wherein the vent has a shape substantially corresponding to a semi-circle or D-shaped.~~

~~63. The method according to claim 56, wherein the textile is provided in the form of a roll or ribbon before cutting the vent portion.~~

~~64. The method according to claim 56, wherein the vent has a maximum width of about 16mm to about 21mm and a maximum height of about 19mm to about 24mm, and a thickness of about 0.36mm to about 0.495mm.~~

~~65. The method according to claim 56, wherein the vent has a maximum width of about 18.2mm to about 18.6mm, and a maximum height of about 21.6mm to about 22mm, and a thickness of about 0.40 to about 0.45mm.~~

~~66. The method according to claim 56, wherein the mask frame has two vents substantially equivalent in size.~~

~~67. The method according to claim 66, wherein a first vent is positioned on a left side of the mask frame and a second vent is positioned on a right side of the mask frame, the first and second vents being separated by an aperture for receiving an air delivery tube.~~

68. The method according to claim 56, further comprising selectively reducing the amount of porosity of the vent portion if the airflow rate through the vent portion exceeds a predetermined range.

69. The method according to claim 68, wherein the predetermined range is about 47 to about 53 litres per minute at 20cm H_2O pressure.

70. The method according to claim 58, wherein the airflow rate through the woven polypropylene material is about 42 to about 58 litres at 20cm H_2O pressure.

71. The method according to claim 68, wherein the porosity of the vent portion is reduced by any one from the group consisting of: heat staking, plastic deformation by compression, ultrasonic welding, applying a sealant and applying a thin film.

72. The method according to claim 71, wherein the porosity of the vent portion is reduced by partially occluding or by fully occluding holes in the vent portion.

73. The method according to claim 71, wherein the sealant is a hot melt adhesive.

74. The method according to claim 68, wherein the porosity of a continuous peripheral edge region of the vent portion is reduced.

75. The method according to claim 56, further comprising providing a mechanical interlock between the vent portion and mask frame to permanently connect the vent portion to the mask frame.

76. The method according to claim 56, further comprising:

permanently connecting a first vent portion having a first airflow rate to the mask frame; and

permanently connecting a second vent portion having a second airflow rate that is different to the first airflow rate to the mask frame;

wherein the first and second vent portions are selected if the average combined first and second airflow rates is within a predetermined range.

77. The method according to claim 56, wherein the predetermined amount of porosity is such that an airflow rate of about 42 to about 59 litres per minute at 20cm

~~H_2O pressure of respiratory gas from the patient interface is obtained and an A-weighted sound power level is less than or equal to 25 dbA, with uncertainty 3 dbA and an A-weighted sound pressure at a distance of 1 meter is less than or equal to 17 dbA with uncertainty 3 dbA are generated.~~

~~78. The method according to claim 77, wherein the airflow rate is about 47 to about 53 litres per minute at 20cm H_2O pressure.~~

~~79. A patient interface for the treatment of respiratory disorders, comprising:~~

~~a vent to washout exhaled air, the vent being permanently connected directly to a mask frame made from a plastic material;~~

~~wherein the vent is made from a textile formed by interlacing plastic fibers, the textile having a predetermined amount of porosity.~~

~~80. The patient interface according to claim 79, wherein the vent has a portion occluded by heat staking to obtain the predetermined amount of porosity.~~

~~81. The patient interface according to claim 79 or 80, wherein the vent has a superficial area of about 201.6mm^2 to about 278.6mm^2.~~

~~82. The patient interface according to claim 81, wherein the superficial area of the vent has a total porous region of approximately 1% to 10%.~~

~~83. The patient interface according to any one of claims 79 to 82, wherein the patient interface is nasal pillows or nasal cradle.~~

~~84. A venting system for a patient interface for delivery of a supply of pressurised air or breathable gas to an entrance of a patient's nasal airways only, the venting system comprising:~~

~~at least two vents, each vent comprising an interlaced structure of fibers having tortuous air paths for exhaled air that are defined by spaces between the interlaced fibers,~~

~~wherein the interlaced structure of fibers has a superficial area that is substantially planar, and~~

wherein the interlaced structure of fibers of each vent is directly attached to a frame of the patient interface.

85. The venting system according to claim 84, wherein a first vent of the at least two vents is positioned on a left side of the frame and a second vent of the at least two vents is positioned on a right side of the frame, the first and second vents being separated by a connection port for receiving an air delivery tube.

86. The venting system according to claim 85, wherein the air delivery tube is permanently connected and non-rotatably connected to the frame.

87. A gas delivery tube to supply breathable gas from a respiratory apparatus, comprising:

a helical coil comprised of a plurality of adjacent coils, each coil separated by a width and having an outer surface defining a coil diameter; and

a web of material coaxial to the helical coil attached to the helical coil between adjacent ones of the plurality of adjacent coils and having at least one fold extending radially outward between adjacent ones of the plurality of adjacent coils, said at least one fold defined by a predetermined fold line,

wherein a vertex of said at least one fold defines a fold diameter,

wherein when the gas delivery tube is in a neutral state the coil diameter being substantially equal to the fold diameter and the adjacent coils are separated from each other in the neutral state; and the helical coil and the web of material are made from a thermoplastic material;

wherein the gas delivery tube comprises one of three different states: a neutral state wherein the gas delivery tube comprises a neutral length, an extended state wherein the gas delivery tube is extended along its longitudinal axis to an extended length that is greater than the neutral length, and a compressed state wherein the gas delivery tube is compressed along its longitudinal axis to a compressed length that is less than the neutral length; and

~~wherein the web of material has a slope angle that increases from the helical coil to the vertex of the at least one fold when the gas delivery tube is in the neutral state.~~

~~88. The gas delivery tube according to claim 87, wherein the web of material comprises the at least one fold extending radially outward along at least one lengthwise portion of the gas delivery tube.~~

~~89. The gas delivery tube according to any one of claims 87 or 88, wherein the web of material has an asymmetrical cross-sectional profile about the predetermined fold line.~~

~~90. The gas delivery tube according to any one of claims 87 to 89, wherein the predetermined fold line is spaced evenly between adjacent ones of the plurality of adjacent coils.~~

~~91. The gas delivery tube according to any one of claims 87 to 90, wherein the width separating adjacent ones of the plurality of adjacent coils is substantially equal to a width of the helical coil when the gas delivery tube is in the neutral state.~~

~~92. The gas delivery tube according to any one of claims 87 to 91, wherein the helical coil comprises a greater proportion of a superficial surface area of the gas delivery tube than the at least one fold of the web of material.~~

~~93. The gas delivery tube according to any one of claims 87 to 92, wherein an outer portion of the helical coil has a rounded profile.~~

~~94. The gas delivery tube according to any one of claims 87 to 93, wherein an outer surface of the helical coil has a radius of curvature of 44mm under its own weight when draped over a cylinder having a 13mm diameter.~~

~~95. The gas delivery tube according to any one of claims 87 to 94, wherein an outer portion of the helical coil has an oval-shaped profile.~~

~~96. The gas delivery tube according to any one of claims 87 to 95, wherein the helical coil has a greater thickness than the web of material.~~

~~97. The gas delivery tube according to any of claims 87 to 96, wherein the web of material has a substantially uniform thickness.~~

~~98. The gas delivery tube according to any one of claims 87 to 97, wherein the helical coil comprises a thermoplastic elastomer (TPE) or thermoplastic polyurethane (TPU).~~

~~99. The gas delivery tube according to any one of claims 87 to 98, wherein the web of material comprises a thermoplastic elastomer (TPE) or thermoplastic polyurethane (TPU).~~

~~100. The gas delivery tube according to any one of claims 87 to 99, wherein the web of material and the helical coil are bonded to form a uniform and continuous inner surface of the gas delivery tube.~~

~~101. The gas delivery tube according to any one of claims 87 to 100, wherein the at least one fold extends radially outward between alternating ones of the plurality of adjacent coils.~~

~~102. The gas delivery tube according to any one of claims 87 to 101, wherein the helical coil has a neutral pitch of about 3.2mm to about 4.7mm when the gas delivery tube is in the neutral state.~~

~~103. The gas delivery tube according to any one of claims 87 to 101, wherein the helical coil has a neutral pitch of about 4.5mm to about 4.7mm when the gas delivery tube is in the neutral state.~~

~~104. The gas delivery tube according to any one of claims 87 to 103, wherein the helical coil has a spring stiffness of about 0.03 N/mm.~~

~~105. The gas delivery tube according to any one of claims 87 to 104, wherein an internal diameter of the tube is about 18mm when the gas delivery tube is in the neutral state.~~

~~106. The gas delivery tube according to claim 99, wherein the helical coil and the web of material are made from an equivalent thermoplastic material.~~

~~107. The gas delivery tube according to claim 87, wherein said web of material comprises a humped portion adjacent to a first side of the coils and a slanted portion adjacent to a second side of the coils, said second side opposite said first side.~~

~~108. The gas delivery tube according to claim 107, wherein when the gas delivery tube is in the neutral state, a slope of the web of material is steeper from the slanted portion to an adjacent peak than a slope of the web of material from the humped portion to the adjacent peak.~~

~~109. The gas delivery tube according to claim 87, further comprising cuffs overmolded or heat-formed to end portions of the tube.~~

~~110. The gas delivery tube according to claim 109, wherein a port of a mask frame is overmolded onto a first cuff and a second cuff is configured to permanently engage with a cuff connector for releasably connecting to another gas delivery tube.~~

~~111. The gas delivery tube according to claim 87, wherein a port of a mask frame is overmolded onto an end portion of the tube.~~

~~112. The gas delivery tube according to claim 87, further comprising an second helical coil comprised of a second plurality of adjacent coils, each coil separated by a second width and having a second outer surface defining a second coil diameter.~~

~~113. A gas delivery tube for delivery of a supply of pressurised air or breathable gas to an entrance of a patient's airways via a patient interface, comprising:~~

~~a helical coil comprised of a plurality of adjacent coils, each coil separated by a width;~~

~~a web of material coaxial to the helical coil attached to the helical coil between adjacent ones of the plurality of adjacent coils and having at least one fold extending radially outward between adjacent ones of the plurality of adjacent coils, said at least one fold defined by a predetermined fold line;~~

~~a first end cuff for permanently and non-rotatably connecting the tube to a frame of the patient interface;~~

~~a second end cuff for releasably and rotatably connecting with a tube adapter;~~

~~wherein the gas delivery tube comprises one of three different states: a neutral state wherein the gas delivery tube comprises a neutral length, an extended state wherein the gas delivery tube is extended along its longitudinal axis to an extended length that is greater than the neutral length, and a compressed state wherein the gas delivery tube is compressed along its longitudinal axis to a compressed length that is less than the neutral length.~~

~~114. The tube according to claim 113, wherein the first cuff is overmolded to the frame.~~

~~115. A gas delivery tube for delivery of a supply of pressurised air or breathable gas to an entrance of a patient's airways via a patient interface, comprising:~~

~~a plurality of coils each separated by a width; and~~

~~a web of material coaxial to the coils attached to the coils between adjacent ones of the plurality of coils and having at least one fold extending radially outward between adjacent ones of the plurality of coils, said at least one fold defined by a peak;~~

~~wherein said web of material comprises a humped portion adjacent to a first side of the coils and a slanted portion adjacent to a second side of the coils, said second side opposite said first side; and~~

~~wherein when the gas delivery tube is in a neutral state a slope of the web of material is steeper from the slanted portion to the adjacent peak than a slope of the web of material from the humped portion to the adjacent peak.~~

~~116. A gas delivery tube to supply a pressurised flow of breathable gas from a respiratory apparatus comprising:~~

~~a helical coil comprised of a plurality of adjacent coils, each coil separated by a width and having an outer surface defining a coil diameter; and~~

~~a web of material coaxial to the helical coil attached to the helical coil between adjacent ones of the plurality of adjacent coils and having at least one fold extending~~

radially outward between adjacent ones of the plurality of adjacent coils, said at least one fold defined by a predetermined fold line,

wherein the helical coil and the web of material are structured so that the gas delivery tube is prevented from occluding during supply of the pressurised flow of breathable gas from the respiratory apparatus, and

wherein the gas delivery tube has a flexural stiffness that is sufficiently low such that when a distal end of the gas delivery tube is extended by thirty millimeters in a direction perpendicular to the orientation of a proximal end of the gas delivery tube, there is substantially no torsional tube drag at the proximal end.

117. A gas delivery tube according to claim 116, wherein a vertex of said at least one fold defines a fold diameter.

118. A gas delivery tube according to claim 116, wherein when the gas delivery tube is in a neutral state the coil diameter is substantially equal to the fold diameter,

wherein the adjacent coils are separated from each other in the neutral state, and

wherein the helical coil and the web of material are made from a thermoplastic material.

119. A gas delivery tube according to claim 116, wherein the gas delivery tube comprises one of three different states: a neutral state wherein the gas delivery tube comprises a neutral length, an extended state wherein the gas delivery tube is extended along its longitudinal axis to an extended length that is greater than the neutral length, and a compressed state wherein the gas delivery tube is compressed along its longitudinal axis to a compressed length that is less than the neutral length.

120. Positioning and stabilising structure for a patient interface device, comprising:

at least one strap; and

at least one rigidiser arm, each at least one rigidiser arm having a distal end and a proximal end that are spaced apart, and the proximal end being structured to attach to a mask frame,

~~wherein each at least one strap is coupled to a corresponding one of the at least one rigidiser arm between the distal end and the proximal end such that the at least one rigidiser arm imparts a predetermined shape to the at least one strap at a rigidised portion of the at least one strap and allowing at least the rigidised portion of the at least one strap to move relative to the at least one rigidiser arm.~~

~~121. Positioning and stabilising structure according to claim 120, wherein the at least one rigidiser arm is affixed to the at least one strap at one localized point or area only.~~

~~122. Positioning and stabilising structure according to claim 120, wherein the at least one rigidiser arm is affixed to the at least one strap in a limited area of the at least one strap.~~

~~123. Positioning and stabilising structure according to claim 122, wherein the limited area is adjacent a pocket or a sleeve opening of the at least one strap.~~

~~124. Positioning and stabilising structure according to any one of claims 120 to 123, wherein the positioning and stabilising structure comprises headgear for the patient interface device for delivery of a supply of pressurised air or breathable gas to an entrance of a patient's airways.~~

~~125. Positioning and stabilising structure according to any one of claims 120to 124, wherein the at least one rigidiser arm is multi-axially deformable to conform to a patient's facial profile.~~

~~126. Positioning and stabilising structure according to claim 125, wherein the at least one rigidiser arm is shaped to extend from the mask frame to a position proximally on or below the patient's cheekbone.~~

~~127. Positioning and stabilising structure according to claim 126, wherein the at least one rigidiser arm has a side profile that is crescent shaped.~~

~~128. Positioning and stabilising structure according to any one of claims 120to 125, wherein the at least one strap is made of an elastic textile material and the positioning and stabilising structure is arranged such that the at least one strap is substantially free to move by elastically expanding and/or contracting, relative to the at least one~~

~~rigidiser arm, and along a longitudinal axis of the at least one strap and/or rigidiser arm.~~

~~129. Positioning and stabilising structure according to claim 128, wherein the at least one strap has a stretchable length that remains substantially unaltered relative to the at least one strap without the at least one rigidiser arm.~~

~~130. Positioning and stabilising structure according to claim 128, wherein the elastic textile material is any one from the group consisting of: elastane, TPE, nylon and silicone.~~

~~131. Positioning and stabilising structure according to any one of claims 128 to 130, wherein the positioning and stabilising structure is able to stretch along its substantially entire length.~~

~~132. Positioning and stabilising structure according to any one of claims 128 to 131, wherein the at least one strap is stretchable and is in the form of a sleeve arranged to slip over the at least one rigidiser arm, the arrangement being such that the at least one strap maintains its substantially entire stretchable length and is able to substantially freely stretch over the at least one rigidiser arm.~~

~~133. Positioning and stabilising structure according to any one of claims 120to 132, wherein the at least one strap comprises a hollow sleeve for receiving the at least one rigidiser arm in place and at least one opening, for receiving the at least one rigidiser arm into the sleeve.~~

~~134. Positioning and stabilising structure according to claim 133, wherein the sleeve and the at least one rigidiser arm are arranged to allow the at least one rigidiser arm to move substantially axially inside the sleeve.~~

~~135. Positioning and stabilising structure according to any of claims 120to 134, wherein an end portion of the at least one rigidiser arm is affixed to the at least one strap.~~

~~136. Positioning and stabilising structure according to claim 135, wherein the at least one rigidiser arm is affixed to the at least one strap by sewing, welding, gluing,~~

~~heat staking, clamping, buttoning, snapping a cover over an end, and/or snapping on an external part.~~

~~137. Positioning and stabilising structure according to claim 136, wherein if the at least one rigidiser arm is affixed to the at least one strap by snapping on an external part, snapping on the external part is achieved by aligning the at least one strap and the at least one rigidiser arm, pushing the at least one rigidiser arm inside a hollow sleeve for receiving the at least one rigidiser arm, and fixing both sleeve and rigidiser arm to the external part.~~

~~138. Positioning and stabilising structure according to claim 137, wherein the external part is an external clip that holds both the sleeve and a respective end of the at least one rigidiser arm,~~

~~wherein the clip is adapted to attach an end of the positioning and stabilising structure to a respective end of a mask frame, and~~

~~wherein the clip is a part of the mask frame itself.~~

~~139. Positioning and stabilising structure according to any one of claims 120to 138, wherein the imparted predetermined shape directs pressure of the positioning and stabilising structure to predetermined portions of a wearers' face.~~

~~140. Positioning and stabilising structure according to any one of claims 120to 139, wherein a plurality of attachment points for attachment may be provided such that at least one fixation location is chosen and varied to allow adjustment of an elastic length of the at least one strap.~~

~~141. Positioning and stabilising structure according to any one of claims 120to 140, wherein the at least one rigidiser arm is incapable of stretching and is relatively more rigid than the at least one strap.~~

~~142. Positioning and stabilising structure according to any one of claims 120to 141, wherein the at least one strap comprises elastic walls, said elastic walls being any one from the group consisting of: woven, knitted, braided, molded, and extruded.~~

~~143. Positioning and stabilising structure according to any one of claims 120to 142, further comprising two or more rigidiser arms symmetrically disposed on opposite sides of a patient's face.~~

~~144. Positioning and stabilising structure according to any one of claims 120to 143, wherein the at least one rigidiser arm is completely removable from the at least one strap.~~

~~145. Positioning and stabilising structure according to any one of claims 120to 144, wherein the positioning and stabilising structure maintains its entire operational length and is able to freely stretch along the at least one rigidiser arm.~~

~~146. Positioning and stabilising structure according to any one of claims 120to 145, wherein the at least one strap includes two side strap portions arranged to extend from a patient interface along the sides of a patient's head, and two back strap portions arranged to extend along the back of the patient's head.~~

~~147. Positioning and stabilising structure according to claim 146, wherein the two back strap portions are not adjustable except through the elasticity of the back strap portions or through increasing the back strap portions in tightness equally by shortening the total length of the positioning and stabilising structure.~~

~~148. Positioning and stabilising structure according to any one of claims 120to 147, further comprising three, four or more separate straps connected by two or more joints.~~

~~149. Positioning and stabilising structure according to any one of claims 120to 148, wherein the at least one strap comprises two pockets, each receiving a rigidiser arm to releasably secure the at least one strap to the rigidiser arms.~~

~~150. Positioning and stabilising structure according to any one of claims 120to 149, wherein the at least one strap comprises at least one retaining means, said retaining means comprising a loop, a sleeve and/or a pocket, for receiving the at least one rigidiser arm and holding the at least one rigidiser arm in place.~~

~~151. Positioning and stabilising structure according to any one of claims 120to 149, wherein the at least one rigidiser arm comprises at least one retaining means, said~~

~~retaining means comprising a loop, a sleeve and/or a pocket, for receiving the at least one strap and holding the at least one strap in place.~~

~~152. Positioning and stabilising structure according to any one of claims 120to 151, wherein the at least one rigidiser arm is affixed to a guiding element provided to the at least one strap.~~

~~153. Positioning and stabilising structure according to claim 152, wherein the guiding element is a loop- or sheath-like portion or passage or a pocket into which or through which the at least one rigidiser arm extends.~~

~~154. Positioning and stabilising structure according to claim 152, wherein the guiding element allows longitudinal expansion or retraction of the at least one strap relative to the at least one rigidiser arm and/or allows substantially free movement or floating of the at least one rigidiser arm relative to the at least one strap.~~

~~155. Positioning and stabilising structure according to any one of claims 120to 154, wherein the at least one strap comprises a back portion that is split into at least two back straps.~~

~~156. Positioning and stabilising structure according to claim 155, wherein the at least two back straps comprise a first back strap adapted to engage a patient proximal to the crown of the head of the patient and a second back strap adapted to engage the patient proximal to the rear of the head.~~

~~157. Positioning and stabilising structure according to claim 155, wherein each of the at least two back straps are adapted to retain the patient interface against the nose of a patient with substantially equal tension forces on each of the at least two back straps.~~

~~158. Positioning and stabilising structure according to claim 155, wherein when donned by a patient, each of the at least two back straps are in tension with a substantially equal force.~~

~~159. Positioning and stabilising structure according to claim 155, wherein each of the at least two back straps are non-independently adjustable such that the at least two back straps naturally center on respective sides of the crown of the head of a patient.~~

~~160. Positioning and stabilising structure according to claim 159, wherein the at least two back straps are symmetrical.~~

~~161. Positioning and stabilising structure according to claim 155, wherein a split region is defined between the at least two back straps and the split region is about 200mm in length.~~

~~162. A patient interface system, comprising:~~

~~a positioning and stabilising structure according to any one of claims 120 to 161; and~~

~~a patient interface comprising any one from the group consisting of: a nasal cannula, nasal prongs and a respiratory mask covering nose and/or mouth of a wearer, to a patient's face.~~

~~163. A patient interface system to provide breathable gas to a patient, comprising:~~

~~a patient interface including a mask frame attached to a seal-forming structure to provide a pneumatic connection to a patient's airways; and~~

~~a positioning and stabilising structure including at least one strap and at least one rigidiser arm and configured to releasably retain the patient interface on the patient,~~

~~wherein a shaped portion of the at least one strap is adapted to take on a shape of the at least one rigidiser arm, said shaped portion being arranged to move along a longitudinal axis of the at least one rigidiser arm; and~~

~~wherein the at least one rigidiser arm extends from the mask frame of the patient interface device.~~

~~164. A patient interface system, comprising:~~

~~a positioning and stabilising structure according to claim 163; and~~

~~a patient interface comprising any one from the group consisting of: a nasal cannula, nasal prongs and a respiratory mask covering nose and/or mouth of a wearer, to a patient's face.~~

~~165. A method for repeatedly engaging a positioning and stabilising structure to a patient interface device, the method comprising:~~

~~inserting a rigidiser arm via an opening of a hollow stretchable fabric strap into a portion of the strap; and~~

~~releasably securing an end portion of the strap to the rigidiser arm;~~

~~wherein the positioning and stabilising structure is arranged to position the strap and the rigidiser arm with regard to one another such that the rigidiser arm imparts a predetermined shape to a length of the strap at a rigidised portion while allowing the rigidised portion of the strap to freely elongate relative to the rigidiser arm in a direction parallel to a longitudinal axis of the rigidiser arm.~~

~~166. The method according to claim 165, wherein the rigidiser arm is inextensible.~~

~~167. The method according to claim 165, wherein the rigidiser arm is permanently connected to a mask frame of the patient interface device.~~

~~168. The method according to claim 165, wherein the end portion of the strap is a pocketed end that is secured to a corresponding catching member of the rigidiser arm.~~

~~169. The method according to claim 168, wherein the pocketed end is wrapped over the corresponding catching member of the rigidiser arm.~~

~~170. The method according to claim 168, wherein the catching member is an edge of the rigidiser arm~~

~~171. A patient interface for the treatment of respiratory disorders, comprising:~~

~~a rigidiser arm including a protruding end proximal to the mask frame and spaced from a distal end of the rigidiser arm, the protruding end configured to retain a pocketed end of a strap of a positioning and stabilising structure to attach the strap to the rigidiser arm; and~~

~~a mask frame releasably engageable with the rigidiser arm, the rigidiser arm being more resiliently flexible than the mask frame.~~

~~172. The patient interface according to claim 171, further comprising a flexible joint releasably engageable with the rigidiser arm and releasably engageable with the mask frame, the flexible joint relatively more resiliently flexible than the rigidiser arm.~~

~~173. The patient interface according to claim 172, wherein the releasable engagement between the rigidiser arm and the mask frame is provided by a mechanical clip assembly.~~

~~174. The patient interface according to claim 173, wherein the releasable engagement between the flexible joint and the rigidiser arm is provided by a mechanical clip assembly, and the releasable engagement between the flexible joint and the mask frame is provided by a mechanical clip assembly.~~

~~175.~~1. Positioning and stabilising structure, comprising:

at least one strap including at least two back straps; and

a split region defined between the at least two back straps;

wherein each of the at least two back straps are symmetrical and non-independently adjustable such that the at least two back straps naturally center on respective sides of the crown of the head of a ~~patient~~user, and

wherein the at least two back straps converge to form a side strap portion at respective ends, each side strap portion configured to receive a rigidiser arm.

~~176.~~2. Positioning and stabilising structure according to claim ~~175~~1, further comprising at least one rigidiser arm inserted within a portion of at least one strap.

~~177.~~3. A ~~patient~~user interface system, comprising:

a positioning and stabilising structure according to claim ~~175~~1 or ~~177~~2; and

a ~~patient~~user interface comprising any one from the group consisting of: a nasal cannula, nasal prongs and a respiratory mask covering nose and/or mouth of a wearer, to a ~~patient~~user's face.

~~178.~~4. Positioning and stabilising structure, comprising:

at least one strap including:

a pair of side straps,

a pair of back straps positioned between each of the pair of side straps, the pair of back straps configured to pass behind a user's head,

a hollow sleeve for receiving a rigid, elongate component~~at least one rigidiser arm~~, and

at least one opening, for receiving the rigid, elongate component~~at least one rigidiser arm~~ into the sleeve,

wherein the pair of side straps and the pair of back straps are unitary.

~~179.~~5. Positioning and stabilising structure according to claim ~~178~~4, wherein the at least one strap comprises a warp-knitted material.

~~180.~~6. Positioning and stabilising structure according to claim ~~178~~4, wherein the at least one strap comprises a woven material.

~~181.~~7. Positioning and stabilising structure according to any one of claims ~~178~~4 to ~~180~~6, comprising a split region defined between the pair of back straps.

~~182.~~8. Positioning and stabilising structure according to claim ~~181~~7, wherein the split region initiates at a distal end of each of the pair of back straps.

~~183.~~9. Positioning and stabilising structure according to claim ~~182~~8, wherein each distal end comprises a reinforced portion adjacent to the split region.

~~184.~~10. Positioning and stabilising structure according to any one of claims ~~178~~4to ~~183~~9, wherein the at least one strap is more stretchable along its longitudinal axis than its lateral axis.

~~185.~~11. Positioning and stabilising structure according to any one of claims ~~178~~4 to ~~184~~10, wherein the at least one opening is located at a proximal end of each of the pair of side straps, the at least one opening being shaped and dimensioned to receive an insertion of the rigid, elongate component ~~rigidiser arm~~ into the sleeve.

12. (new) Positioning and stabilising structure, comprising:

a strap including at least two back straps, said at least two back straps being adjustably separable to adjust a tension force of the at least one strap,

wherein the tension force of the strap is adjustable only by varying the distance between said at least two back straps.

~~186. A method for donning a patient interface by a patient, the patient interface including a positioning and stabilising structure, the method comprising:~~

~~stretching the positioning and stabilising structure away from the patient interface;~~

~~placing a seal-forming structure of the patient interface against airways of the patient;~~

~~releasing a portion of tension of the positioning and stabilising structure by locating a rear portion of the positioning and stabilising structure against a rear portion of the patient's head; and~~

~~adjusting tension of the positioning and stabilising structure by varying a distance between back straps of the rear portion of the positioning and stabilising structure,~~

~~wherein tension of the positioning and stabilising structure is adjustable only by varying the distance between the back straps.~~

~~187. A patient interface system, comprising:~~

~~at least one strap including at least two back straps having a split region therebetween, the at least one strap comprising a single continuous piece of material;~~

~~a patient interface including a seal-forming structure and connectable to the at least one strap;~~

~~wherein the at least two back straps are adjustably separable such that when the seal-forming structure is placed against a patient's airways, a tension sealing force~~

~~generated against the patient interface by the at least one strap is greatest when an angle between the at least two back straps is zero.~~

~~188. A patient interface system according to claim 187, wherein the tension sealing force decreases as the angle increases between the at least two back straps.~~

~~189. A patient interface system according to claim 187, wherein a starting angle between the at least two back straps is zero to allow a patient to adjust the tension sealing force by increasing the angle between the at least two back straps.~~

~~190. A patient interface system according to claim 187, wherein the angle between the at least two back straps is less than 180°.~~

~~191. A patient interface system according to claim 187, wherein when the angle between the at least two back straps is about 180° the tension sealing force is about 40% less than the tension sealing force when the angle between the at least two back straps is about zero.~~

~~192. A patient interface system to provide breathable gas to a patient, comprising:~~

~~a patient interface including a seal-forming structure to provide a pneumatic connection to a patient's airways; and~~

~~a positioning and stabilising structure including at least one strap and at least one rigidiser arm and configured to releasably retain the patient interface on the patient,~~

~~wherein the at least one rigidiser arm has a bend with an angle of substantially 90° such that a first portion of the at least one rigidiser arm proximal to the seal forming structure lies in a first plane substantially parallel to the sagittal plane and a second portion of the at least one rigidiser arm distal from the seal forming structure lies in a second plane substantially parallel to the coronal plane.~~

~~193. The patient interface system according to claim 192, wherein the bend has an upper surface facing away from the patient and a lower surface face towards the patient, and wherein the lower surface has a larger radius than the upper surface to minimise facial marking on the patient if the bend contacts the patient's face.~~

194. A rigidiser arm to connect a strap of a positioning and stabilising structure to a mask frame, comprising:

a main body having a curvature in more than one axis to substantially follow a cheek shape of a patient; and

a protruding end configured to retain a pocketed end of the strap, the protruding end located at a distal end of the rigidiser arm;

wherein the rigidiser arm extends from a mask frame to a position proximal to the cheekbone of the patient.

195. The rigidiser arm of claim 194, further comprising a connection portion configured to connect to a flexible joint or a mask frame, the connection portion located at the distal end of the rigidiser arm.

196. The rigidiser arm of claim 195, wherein the connection portion comprises at least one protrusion and at least one void configured to be overmolded to connect to the flexible joint or the mask frame.

197. The rigidiser arm of any one of claims 194 to 196, wherein the rigidiser arm is made from a thermoplastic polyester elastomer that does not stretch, and wherein the rigidiser arm is more resiliently flexible in the coronal plane compared to other planes.

198. A rigidiser arm to operatively connect an elastic strap of a positioning and stabilising structure to a mask frame of a patient interface, comprising:

a bend to redirect the longitudinal axis of the at least one rigidiser arm from a first plane substantially parallel to the sagittal plane to a second plane substantially parallel to the coronal plane;

wherein the bend has an upper surface facing away from the patient and a lower surface face towards the patient, and wherein the lower surface has a larger radius than the upper surface to minimise facial marking on the patient if the bend contacts the patient's face.

199. A patient interface for the treatment of respiratory disorders, comprising:

a rigidiser arm made from a first material;

a mask frame permanently connected to the rigidiser arm by way of a mechanical interlock, the mask frame being made from a second material that is unable to be integrally bonded with the first material;

wherein the first material is relatively more resiliently flexible than the second material.

200. The patient interface according to claim 199, wherein the mask frame is overmolded to the rigidiser arm.

201. The patient interface according to claim 199or 200, wherein the mechanical interlock comprises an enclosable section extending from the rigidiser arm that is overmolded by the material of the mask frame.

202. The patient interface according to claim 201, wherein the enclosable section has a hook and a portion of a bend.

203. The patient interface according to any one of claims 199to 202, wherein the first material is a thermoplastic polyester elastomer.

204. The patient interface according to any one of claims 199to 203, wherein the second material is a thermoplastic polymer.

205. The patient interface according to claim 204, wherein the thermoplastic polymer is polypropylene (PP).

206. The patient interface according to claim 199, wherein the first material is relatively more resiliently flexible than the second material, and the first material is a fiber reinforced composite polypropylene material and the second material is polypropylene.

207. The patient interface according to any one of claims 199to 206, wherein the rigidiser arm includes a protruding end configured to retain a pocketed end of a strap of a positioning and stabilising structure, and wherein the protruding end is proximal to the mask frame.

~~208. The patient interface according to any one of claims 199to 207, wherein the first material is not stretchable, and the rigidiser arm is structured such that it is more flexible in a plane substantially parallel to a patient's Frankfort horizontal compared to other planes.~~

~~209. The patient interface according to any one of claims 199to 208, wherein the rigidiser arm comprises: a main body having a curvature to substantially follow a cheek shape of a patient; a protruding end configured to retain a pocketed end of a strap of a positioning and stabilising structure, the protruding end located at a distal end of the rigidiser arm; and a connection portion configured to connect to the mask frame, the connection portion located at the distal end of the rigidiser arm.~~

~~210. The patient interface according claim 209, wherein the connection portion comprises at least one protrusion and at least one void configured to be overmolded to connect to the mask frame.~~

~~211. A patient interface for the treatment of respiratory disorders, comprising:~~

~~a rigidiser arm made from a first material;~~

~~a flexible joint permanently connected to the rigidiser arm by way of a mechanical interlock, the flexible joint being made from a second material that is unable to be integrally bonded with the first material; and~~

~~a mask frame permanently connected to the flexible joint, the mask frame being made from a third material;~~

~~wherein the first material, the second material, and the third material are distinct materials.~~

~~212. The patient interface according to claim 211, wherein the third material is integrally bonded with the second material and the integral bond is a covalent bond or hydrogen bond.~~

~~213. The patient interface according to claim 211or 212, wherein the flexible joint and mask frame are permanently connected by way of a mechanical interlock.~~

~~214. The patient interface according to any one of claims 211to 213, wherein the first material is a thermoplastic polyester elastomer.~~

~~215. The patient interface according to any one of claims 211to 214, wherein the second material is a thermoplastic elastomer (TPE).~~

~~216. The patient interface according to any one of claims 211to 215, wherein the third material is a thermoplastic polymer.~~

~~217. The patient interface according to claim 216, wherein the thermoplastic polymer is polypropylene (PP).~~

~~218. The patient interface according to any one of claims 211to 217, wherein the flexible joint is overmolded to the mask frame.~~

~~219. The patient interface according to any one of claims 211to 218, wherein the mechanical interlock comprises a protrusion extending from the rigidiser arm that is overmolded by the material of the flexible joint.~~

~~220. The patient interface according to claim 219, wherein the protrusion is T-shaped having a void in a central region of the protrusion which extends through a top side to a bottom side of the protrusion for material of the flexible joint to pass therethrough.~~

~~221. The patient interface according to any one of claims 211to 218, wherein the mechanical interlock comprises two protrusions extending laterally from a distal end of the rigidiser arm.~~

~~222. The patient interface according to claim 221, wherein next to each protrusion is a void which extends through the rigidiser arm for material of the flexible joint to pass therethrough.~~

~~223. A patient interface for the treatment of respiratory disorders, comprising:~~

~~a rigidiser arm made from a first material; and~~

~~a mask frame made from a second material and the mask frame is integrally bonded to the rigidiser arm;~~

~~wherein the first material is relatively more resiliently flexible than the second material, and the first material is a fibre reinforced composite polypropylene material and the second material is polypropylene.~~

~~224. A patient interface for the treatment of respiratory disorders, comprising:~~

~~a rigidiser arm made from a first material that is not stretchable;~~

~~a mask frame permanently connected to the rigidiser arm, the mask frame being made from a second material that is unable to be integrally bonded with the first material;~~

~~wherein the first material is relatively more resiliently flexible than the second material, and the rigidiser arm and the mask frame are permanently connected by way of a mechanical interlock, and~~

~~wherein the rigidiser arm is structured such that it is more flexible in a plane substantially parallel to a patient's Frankfort horizontal compared to other planes.~~