CLAIMS

What is claimed is:

1. A respiratory interface assembly, comprising:

an interface configured to communicate with an airway of a user, the interface comprising a frame, the frame comprising a post, the frame defining an opening, wherein the post defines a portion of the opening, the frame opening comprising a narrowed portion defined by opposed upper and lower surfaces, the narrowed portion located adjacent the post;

a headgear configured to secure the interface in an operable position on the head of the user, the headgear comprising a clip having a base and a hook portion extending from the base, the hook portion configured to engage the post of the frame;

wherein the hook portion comprises an upper surface and a lower surface that substantially match a shape of respective upper and lower surfaces of the narrowed portion whereby when the hook portion is engaged with the post, the upper surface and the lower surface of the hook portion engage respective ones of the opposed upper and lower surfaces of the narrowed portion to resist rotation of the clip relative to the frame about an axis perpendicular to a longitudinal axis of the post.

2. The respiratory interface assembly of Claim 1, wherein a section of the hook portion between the upper surface and the lower surface of the hook portion is shaped to span the space when the hook portion is engaged with the post.

3. The respiratory interface assembly of Claim 1, wherein the post and the opposed upper and lower surfaces cooperate to define a space, wherein a section of the hook portion between the upper surface and the lower surface occupies a substantial entirety of the space when the hook portion is engaged with the post.

4. The respiratory interface assembly of any one of Claims 1-3, wherein the opposed upper and lower surfaces are parallel to one another.

5. The respiratory interface assembly of any one of Claims 1-4, wherein the hook portion defines an interior surface facing the post, an exterior surface and a thickness between the interior surface and the exterior surface, wherein the thickness is greatest in a portion that

~~is located between the opposed upper and lower surfaces when the hook portion is engaged with the post.~~

~~6. The respiratory interface assembly of any one of Claims 1-5, wherein the base of the clip has a height that is greater than a height of the hook portion such that the base is configured to contact a portion of the frame adjacent the opposed upper and lower surfaces of the narrowed portion to limit rotation of the clip about a longitudinal axis of the post.~~

~~7. The respiratory interface assembly of any one of Claims 1-6, wherein the headgear comprises at least one semi-rigid side strap configured to extend from the respiratory interface toward the ear of a user along each side of the user's face, and at least one semi-rigid top strap that extends from the at least one semi-rigid side strap on a first side of the user's face to the at least one semi-rigid side strap on a second side of the user's face.~~

~~8. The respiratory interface assembly of Claim 7, wherein the at least one semi-rigid side strap comprises a bifurcated portion on each side, each of the bifurcated portions having an upper strap portion and a lower strap portion.~~

~~9. The respiratory interface assembly of Claim 8, wherein the headgear further comprises a rear portion, wherein the upper strap portion connects to the rear portion above the level of the user's ear and the lower strap portion connects to the rear portion below the level of and in front of the user's ear.~~

~~10. The respiratory interface assembly of Claim 9, wherein the rear portion comprises a spacer fabric panel.~~

~~11. The respiratory interface assembly of Claim 10, wherein the rear portion further comprises an upper strap and a lower strap, wherein the upper strap is less stretchable than the lower strap.~~

~~12. The respiratory interface assembly of Claim 9, wherein the rear portion comprises a knitted panel.~~

~~13. The respiratory interface assembly of Claim 12, wherein the knitted panel is less stretchable in the vertical direction than in the horizontal direction.~~

~~14. The respiratory interface assembly of any one of Claims 7-13, wherein one or both of the at least one semi-rigid side strap and the at least one semi-rigid top strap comprises a fabric inner layer, a fabric outer layer and an interior plastic layer joined by the~~

~~interior plastic layer being introduced between the fabric inner layer and the fabric outer layer in a molten state and allowed to harden.~~

~~15. The respiratory interface assembly of Claim 14, wherein the fabric inner layer and the fabric outer layer are knitted.~~

~~16. The respiratory interface assembly of any one of Claims 7-15, wherein the at least one semi-rigid side strap comprises a first semi-rigid side strap and a second semi-rigid side strap, wherein each of the first and second semi-rigid side straps are connectable to the frame by one of the clips.~~

~~17. The respiratory interface assembly of any one of Claims 7-16, wherein the at least one semi-rigid top strap comprises a first semi-rigid top strap and a second semi-rigid top strap, wherein the first and second semi-rigid tops straps are selectively connectable to one another in one of a plurality of available adjustment positions.~~

~~18. The respiratory interface assembly of any one of Claims 1-17, wherein the interface comprises a nasal mask seal configured to seal around one or both nares of the user, the nasal mask seal having a sealing surface defining an opening.~~

~~19. The respiratory interface assembly of Claim 18, wherein the opening defined by the sealing surface of the nasal mask seal defines a width to height ratio of between about 1.3-1.6.~~

~~20. The respiratory interface assembly of either one of Claims 18 or 19, wherein a height range of the nasal mask seal across all available sizes is between about 47.8mm-57.8mm.~~

~~21. The respiratory interface assembly of any one of Claims 18-20, wherein the nasal mask seal comprises a rolling bridge portion.~~

~~22. The respiratory interface assembly of Claim 21, wherein the nasal mask seal comprises a rim at which the nasal mask seal is secured to a rigid clip or housing, wherein the rolling bridge portion connects to a rearward edge of the rim.~~

~~23. The respiratory interface assembly of Claim 21, wherein the nasal mask seal comprises a rim at which the nasal mask seal is secured to a rigid clip or housing, wherein the rolling bridge portion connects to a forward edge of the rim.~~

~~24. The respiratory interface assembly of any one of Claims 21 to 23, wherein the nasal mask seal further comprises a thickened band located between the sealing surface and the rolling bridge, and a pair of thickened pads that extend from the thickened band toward the opening on each side of the nasal mask seal.~~

~~25. The respiratory interface assembly of any one of Claims 21 to 23, wherein the nasal mask seal further comprises a thickened band located between the sealing surface and the rolling bridge, a pair of thickened pads intermediate the thickened band and the opening and spaced from the thickened band, and a pair of joining pads extending between a portion of the thickened band and a portion of a respective one of the pair of thickened pads.~~

~~26. The respiratory interface assembly of Claim 25, wherein the thickened band is thicker than the pair of thickened pads, and the pair of thickened pads are thicker than the pair of joining pads.~~

~~27. The respiratory interface assembly of Claim 25 or Claim 26, wherein the pair of thickened pads and the pair of joining pads each have a length extending in a peripheral direction around the inside of the nasal mask seal, and the length of each of the pair of joining pads is between about 15% and 50%, preferably about 20% and 45%, and more preferably about 25% and 33%, of the length of each of the pair of thickened pads.~~

~~28. The respiratory interface assembly of any one of Claims 25 to 27, wherein each of the pair of joining pads extends between a portion of the thickened band and an upper portion of a respective one of the pair of thickened pads.~~

~~29. The respiratory interface assembly of any one of Claims 25 to 28, wherein the pair of joining pads are provided to a side wall of the nasal mask seal on opposing sides of the nasal mask seal, and at least a portion of the pair of thickened pads are provided to an end wall defining the sealing surface of the nasal mask seal.~~

~~30. The respiratory interface assembly of any one of Claims 18 to 29, wherein the nasal mask seal comprises a pair of elongate thickened portions, the pair of thickened portions each extending from a first end at or adjacent or near to respective lower corners of a side wall of the nasal mask seal at or adjacent or near to a rim, to a second end at or adjacent or near to an end wall defining the sealing surface of the nasal mask seal.~~

~~31. The respiratory interface assembly of Claim 30, wherein the pair of thickened portions diverge from the first ends towards respective intermediate portions of the pair of thickened portions.~~

~~32. The respiratory interface assembly of Claim 30 or Claim 31, wherein the pair of thickened portions converge from respective intermediate portions of the pair of thickened portions towards the second ends.~~

~~33. The cushion of any one of Claims 30 to 32, wherein each of the pair of elongate thickened portions are curved in a direction substantially normal to their respective major surfaces.~~

~~34. A headgear for a respiratory interface, comprising:~~

~~at least one semi-rigid side strap configured to extend from the respiratory interface toward the ear of a user along each side of the user's face;~~

~~at least one semi-rigid top strap that extends from the at least one semi-rigid side strap on a first side of the user's face to the at least one semi-rigid side strap on a second side of the user's face.~~

~~35. The headgear of Claim 34, wherein the at least one semi-rigid side strap comprises a bifurcated portion on each side, each of the bifurcated portions having an upper strap portion and a lower strap portion.~~

~~36. The headgear of Claim 35, wherein the headgear further comprises a rear portion, wherein the upper strap portion connects to the rear portion above the level of the user's ear and the lower strap portion connects to the rear portion below the level of and in front of the user's ear.~~

~~37. The headgear of Claim 36, wherein the rear portion comprises a spacer fabric panel.~~

~~38. The headgear of Claim 37, wherein the rear portion further comprises an upper strap and a lower strap, wherein the upper strap is less stretchable than the lower strap.~~

~~39. The headgear of Claim 36, wherein the rear portion comprises a knitted panel.~~

~~40. The headgear of Claim 39, wherein the knitted panel is less stretchable in the vertical direction than in the horizontal direction.~~

41. The headgear of Claims 34-40, wherein one or both of the at least one semi-rigid side strap and the at least one semi-rigid top strap comprises a fabric inner layer, a fabric outer layer and an interior plastic layer joined by the interior plastic layer being introduced between the fabric inner layer and the fabric outer layer in a molten state and allowed to harden.

42. The headgear of Claim 41, wherein the fabric inner layer and the fabric outer layer are knitted.

43. The headgear of any one of Claims 34-42, wherein the at least one semi-rigid top strap comprises a first semi-rigid top strap and a second semi-rigid top strap, wherein the first and second semi-rigid tops straps are selectively connectable to one another in one of a plurality of available adjustment positions.

44. The headgear of any one of Claims 34-42, wherein the at least one semi-rigid side strap is formed from at least one tubular knitted structure injection molded with a semi-rigid plastic core.

45. The headgear of Claim 44 when directly or indirectly dependent from Claim 35, wherein at least one of the top strap, upper strap portion and lower strap portion of the at least one side strap comprises a separate tubular knitted structure injection molded with a plastic core, and joined to the at least one side strap by an overmolded joining portion.

46. A respiratory interface assembly, comprising:

the headgear of any one of Claims 34-43; and

an interface configured to communicate with an airway of a user.

47. The respiratory interface of Claim 46, wherein the interface comprises a frame having a post, the frame defining an opening, wherein the post defines a portion of the opening, the frame opening comprising a narrowed portion defined by opposed upper and lower surfaces, the narrowed portion located adjacent the post, and wherein the headgear comprises a clip having a base and a hook portion extending from the base, the hook portion configured to engage the post of the frame, wherein the hook portion comprises an upper surface and a lower surface that substantially match a shape of respective upper and lower surfaces of the narrowed portion whereby when the hook portion is engaged with the post, the upper surface and the lower surface of the hook portion engage respective ones of the

~~opposed upper and lower surfaces of the narrowed portion to resist rotation of the clip relative to the frame about an axis perpendicular to a longitudinal axis of the post.~~

~~48. The respiratory interface assembly of Claim 47, wherein a section of the hook portion between the upper surface and the lower surface of the hook portion is shaped to span the space when the hook portion is engaged with the post.~~

~~49. The respiratory interface assembly of Claim 47, wherein the post and the opposed upper and lower surfaces cooperate to define a space, wherein a section of the hook portion between the upper surface and the lower surface occupies a substantial entirety of the space when the hook portion is engaged with the post.~~

~~50. The respiratory interface assembly of any one of Claims 47-49, wherein the opposed upper and lower surfaces are parallel to one another.~~

~~51. The respiratory interface assembly of any one of Claims 47-50, wherein the hook portion defines an interior surface facing the post, an exterior surface and a thickness between the interior surface and the exterior surface, wherein the thickness is greatest in a portion that is located between the opposed upper and lower surfaces when the hook portion is engaged with the post.~~

~~52. The respiratory interface assembly of any one of Claims 47-51, wherein the base of the clip has a height that is greater than a height of the hook portion such that the base is configured to contact a portion of the frame adjacent the opposed upper and lower surfaces of the narrowed portion to limit rotation of the clip about a longitudinal axis of the post.~~

~~53. The respiratory interface assembly of any one of Claims 47-52, wherein the at least one semi-rigid side strap comprises a first semi-rigid side strap and a second semi-rigid side strap, wherein each of the first and second semi-rigid side straps are configured to connectable to the frame by one of the clips.~~

~~54. The respiratory interface assembly of any one of Claims 46-53, wherein the interface comprises a nasal mask seal configured to seal around one or both nares of the user, the nasal mask seal having a sealing surface defining an opening.~~

~~55. The respiratory interface assembly of Claim 54, wherein the opening defined by the sealing surface of the nasal mask seal defines a width to height ratio of between about 1.3-1.6.~~

56. The respiratory interface assembly of either one of Claims 54 or 55, wherein a height range of the nasal mask seal across all available sizes is between about 47.8mm-57.8mm.

57. The respiratory interface assembly of any one of Claims 54-56, wherein the nasal mask seal comprises a rolling bridge portion.

58. The respiratory interface assembly of Claim 57, wherein the nasal mask seal comprises a rim at which the nasal mask seal is secured to a rigid clip or housing, wherein the rolling bridge portion connects to a rearward edge of the rim.

59. The respiratory interface assembly of either one of Claims 57 or 58, wherein the nasal mask seal further comprises a thickened band located between the sealing surface and the rolling bridge, further comprising a pair of thickened pads the extend from the thickened band toward the opening on each side of the nasal mask seal.

60. A cushion for a respiratory interface assembly, the cushion comprising:

a rim attached or configured for attachment to a housing of the respiratory interface assembly;

a resilient side wall extending from the rim;

a resilient end wall extending inwardly from the resilient side wall, the end wall defining a sealing surface to seal with a user's face and an opening to receive the nose and/or mouth of the user, in use;

a thickened band in the side wall;

a pair of thickened pads intermediate the thickened band and the opening and spaced from the thickened band; and

a pair of joining pads intermediate respective portions of the thickened band and a portion of a respective one of the pair of thickened pads.

61. The cushion of Claim 60, wherein the thickened band is thicker than the pair of thickened pads, and/or the pair of thickened pads are thicker than the pair of joining pads.

62. The cushion of Claim 60 or Claim 61, wherein the pair of thickened pads and the pair of joining pads each have a length extending in a peripheral direction around the inside of the cushion, and the length of each of the pair of joining pads is between about 15% and

~~50%, preferably about 20% and 45%, and more preferably about 25% and 33%, of the length of each of the pair of thickened pads.~~

~~63. The respiratory interface assembly of any one of Claims 60 to 62, wherein each of the pair of joining pads extends between a portion of the thickened band and an upper portion of a respective one of the pair of thickened pads.~~

~~64. The respiratory interface assembly of any one of Claims 60 to 63, wherein the pair of joining pads are provided to a side wall of the nasal mask seal on opposing sides of the nasal mask seal, and at least a portion of the pair of thickened pads are provided to a face contacting surface of the nasal mask seal.~~

~~65.~~1. A cushion for a respiratory interface assembly, the cushion comprising:

a rim configured for attachment to a housing of the respiratory interface assembly;

a resilient side wall extending from the rim;

a resilient end wall extending inwardly from the resilient side wall, the resilient end wall defining a sealing surface to seal with a user's face and an opening to receive the nose and/or mouth of the user, in use; and

a pair of elongate thickened portions, the pair of elongate thickened portions each extending from a first end at or adjacent or near to respective lower corners of the resilient side wall at or adjacent or near to the rim, to a second end at or adjacent or near to the resilient end wall on respective opposing sides of the opening.

~~66.~~2. The cushion of Claim ~~65~~1, wherein the pair of elongate thickened portions diverge from the first ends towards respective intermediate portions of the pair of elongate thickened portions.

~~67.~~3. The cushion of Claim ~~65~~ 1 or ~~66~~ 2, wherein the pair of elongate thickened portions converge from respective intermediate portions of the pair of elongate thickened portions towards the second ends.

~~68.~~4. The cushion of any one of Claims ~~65~~ 1 to ~~67~~3, wherein each of the pair of elongate thickened portions are curved in a direction substantially normal to their respective major surfaces.

5. The cushion of any one of claims 1 to 4, wherein the pair of elongate thickened portions extend into an interior of the cushion.

6. The cushion of any one of claims 1 to 5, wherein a thickness of the pair of elongate thickened portions, relative to adjacent portions of the resilient side wall or the resilient end wall, is uniform along a length of the pair of elongate thickened portions.

7. The cushion of any one of claims 1 to 6, wherein portions of the cushion comprising the pair of elongate thickened portions are thicker than adjacent portions of the resilient side wall and/or the resilient end wall by between about 0.1 and 0.6 mm, preferably by between about 0.1 and 0.3 mm, and more preferably by about 0.2 mm.

8. The cushion of any one of claims 1 to 5, wherein portions of the cushion comprising the pair of elongate thickened portions have an absolute thickness which is substantially uniform along the length of the pair of elongate thickened portions, and preferably about 1.2 mm thick.

9. The cushion of any one of claims 1 to 8, wherein the pair of elongate thickened portions curve in an upward direction at intermediate portions of the pair of elongate thickened portions at a transition of the cushion from the resilient side wall to the resilient end wall.

10. The cushion of any one of claims 1 to 9, wherein the elongate thickened portions each form a substantial plane curve.

11. The cushion of any one of claims 1 to 10, wherein the pair of elongate thickened portions extend substantially rearwardly before curving upwardly and terminating at the second end in the resilient end wall adjacent respective cheek surfaces of the sealing surface.

12. The cushion of any one of claims 1 to 11, comprising a reinforcement in the form of at least one thickened band extending inwardly from an interior surface of the cushion, the thickened band positioned along the resilient side wall and comprising a lower region on each lateral side of the cushion and a connecting portion that extends between the lower regions by extending around an upper portion of the interior surface of the cushion.

13. The cushion of claim 12, wherein the pair of elongate thickened portions terminate at the second ends vertically above, and horizontally spaced from, the respective lower regions of the thickened band.

14. The cushion of any one of claims 1 to 13, comprising lower thickened corners at or adjacent the respective lower corners of the resilient side wall, wherein the resilient side wall tapers over a relatively short distance upwardly from the lower thickened corners and tapers over a relatively longer distance downwardly from the lower thickened corners, and the pair of elongate thickened portions extend under, and terminate at the first ends vertically below and spaced from, the respective lower thickened corners.

15. The cushion of any one of claims 1 to 14, wherein a minimum spacing between the pair of elongate thickened portions and the opening is at least 4 mm, preferably between about 5 and 6 mm, and more preferably between about 5.2 and 5.5 mm.

16. The cushion of any one of claims 1 to 15, wherein the first ends are narrower than the second ends of the pair of elongate thickened portions, preferably by at least 50%, more preferably by between 50% and 60%, and yet more preferably by about 54%.

17. The cushion of any one of claims 1 to 16, wherein an upper portion of the cushion is configured to pivot or hinge relative to a lower portion of the cushion about a hinge axis or hinge region to allow pivotal movement of the upper portion of the cushion in a forward direction.

18. A respiratory interface assembly for a respiratory therapy system supplying breathing gases to a user for positive airway pressure or non-invasive ventilation therapy, the respiratory interface assembly comprising:

the cushion of any one of claims 1 to 17;

a relatively rigid housing, wherein the cushion is permanently connected or removably connectable to the housing;

a frame, wherein the housing is configured to interface with the frame; and

a headgear arrangement configured to be coupled to the frame to secure the respiratory interface assembly in place on the user.

~~69. A connection arrangement for connecting a headgear strap to an interface of a patient interface assembly, the connection arrangement comprising:~~

~~a post provided to or configured to be provided to one of the headgear strap or the patient interface assembly;~~

~~a clip provided to the other of the headgear strap or the patient interface, the clip comprising a base portion and a hook portion defining therebetween a space configured to selectively receive the post;~~

~~a gap provided to one of the post or the clip; and~~

~~a rib provided to the other of the post or the clip,~~

~~wherein the rib and the gap are each disposed asymmetrically so that the rib is received by the gap when the clip is connected to the post, and the rib is configured to inhibit or prevent an alternative connection.~~

~~70. The connection arrangement of claim 69, wherein:~~

~~the gap is provided to the post and defined between first and second coaxially-aligned post portions;~~

~~the rib is provided to the clip and projects into the space;~~

~~the rib is configured to be received by the gap when the post is received by the space; and~~

~~the rib is configured to inhibit or prevent connection of the clip to an alternative post.~~

~~71. The connection arrangement of claim 69, wherein:~~

~~the rib is provided to the post;~~

~~the gap is provided to the clip;~~

~~the rib is configured to be received by the gap when the post is received by the space; and~~

~~the rib is configured to inhibit or prevent connection of an alternative clip to the post.~~

~~72. A headgear assembly for securing a patient interface to the head of a patient, the headgear assembly comprising:~~

~~two or more straps; and~~

~~two or more headgear clips provided to or configured to be provided to the two or more straps, at least a first clip of the two or more headgear clips comprising a base portion and a hook portion defining therebetween a space configured to selectively receive a post of the patient interface, and further comprising a rib~~

~~projecting into the space, the rib being disposed asymmetrically along a length of the space so as to be received by a gap defined in at least a first post of the patient interface when the first clip is coupled with the first post, and to impede or prevent coupling of the first clip with a second post of the patient interface.~~

~~73. The headgear assembly of Claim 72, a second clip of the two or more headgear clips comprising a base portion and a hook portion defining therebetween a space configured to selectively receive a post of the patient interface, and further comprising a rib projecting into the space, the rib being disposed asymmetrically along a length of the space so as to be received by a gap defined in at least a second post of the patient interface when the second clip is coupled with the second post, and to impede or prevent coupling of the second clip with the first post.~~

~~74. The headgear assembly of Claim 73, wherein the first clip and the second clip are mirror images of each other.~~

~~75. A headgear clip for attaching a headgear to a patient interface assembly, the headgear clip comprising:~~

~~a base portion attached to, or configured to be attached to, a strap of the headgear at a first end;~~

~~a hook portion projecting from a second end of the base portion and defining a space configured to selectively receive a post of the patient interface assembly; and~~

~~a projection extending outwardly from an outer side of the base portion.~~

~~76. The headgear clip of Claim 75, wherein the projection is disposed at or adjacent or near the first end of the base portion.~~

~~77. The headgear clip of Claim 75 or Claim 76, further comprising a depression in the outer side of the base portion, intermediate the second end and the projection.~~

~~78. The headgear clip of any one of Claims 75 to 77, at least the hook portion and a first part of the base portion comprising a resilient and relatively rigid first material, and at least a second part of the base portion comprising an elastomeric second material overmolded to the first material.~~

~~79. The headgear clip of Claim 78, wherein the second material is also overmolded to the strap.~~

~~80. The headgear clip of Claim 78 or Claim 79, the first part of the base portion comprising an inner portion of the projection, and the second part of the base portion comprising an outer portion of the projection.~~

~~81. The headgear clip of any one of Claims 75 to 80, wherein the projection spans a width of the base portion.~~

~~82. The headgear clip of any one of Claims 75 to 81, wherein the projection provides at least one surface which is substantially orthogonal to a direction of force required to engage or disengage the hook portion and the post.~~

~~83. A frame for a patient interface assembly, the frame comprising or being configured to be coupled with a cushion for sealing engagement with a patient's face, the frame comprising first and second posts configured to be coupled with first and second headgear clips of a headgear assembly of the patient interface assembly, the first post comprising a first portion and a second portion arranged coaxially and defining a gap therebetween, wherein the gap is disposed asymmetrically in an axial direction.~~

~~84. The frame of Claim 83, wherein the second post is a mirror image of the first post.~~

~~85. The frame of Claim 83 or Claim 84, wherein the first post is configured to couple with the first headgear clip, and impeded or prevent coupling with the second headgear clip.~~