[0074] According to a further aspect, the intermittent surfaces are spaced apart by recesses.

[0075] According to a further aspect, the front bearing surface further includes a substantially spherical annular surface contacting the ball joint and providing a substantially airtight seal with the ball joint.

[0076] According to a further aspect, the recesses have substantially rectangular profiles defined by an outer recess wall, a front recess wall and two side walls.

[0077] According to a further aspect, the exhaust holes are configured to extend radially through the outer recess wall and the outer perimeter.

[0078] According to a further aspect, the insert socket has a substantially C-shaped profile, the socket having an outer perimeter and an inner perimeter separated by a front wall to define an annular channel between the outer perimeter and the inner perimeter, the inner perimeter having a front bearing surface that contacts the ball joint and provides a substantially airtight seal with the ball joint, and the outer perimeter connected to the respiratory mask.

[0079] According to a further aspect, the outer perimeter has a snap fit bump that interlocks with a snap fit connector of the respiratory mask.

[0080] According to a further aspect, an elbow connector positioned between the annular component and the respiratory mask. The annular component further includes a flange extending radially outward from an outer wall of the annular component, wherein the shroud and the flange define the plenum chamber.

[0081] In accordance with at least one of the embodiments disclosed herein, a respiratory mask assembly is provided and includes a mask frame, a seal housing configured to form a substantially airtight seal with a user's face, an elbow connector having a first end connected to an air supply and a second end having a ball joint disposed, and a socket insert portion positioned between the mask frame and the seal housing and configured to retain the ball joint within the socket insert. The socket insert portion has an array of exhaust holes extending through the socket insert, the exhaust holes providing an outlet for exhausted air from the seal housing to exit the socket insert.

[0082] According to a further aspect, the socket insert portion further includes an outer perimeter, an inner perimeter, front and rear insert surfaces, and exhaust holes. The inner perimeter is defined by a front bearing surface and a rear bearing surface, and the rear bearing surface is defined by a series of intermittent surfaces.

[0083] According to a further aspect, the intermittent surfaces are spaced apart by recesses.

[0084] According to a further aspect, the front bearing surface further includes a substantially spherical annular surface contacting the ball joint and providing a substantially airtight seal with the ball joint.

[0085] According to a further aspect, the recesses have substantially rectangular profiles defined by an outer recess wall, a front recess wall and two side walls.

[0086] According to a further aspect, the exhaust holes are configured to extend radially through the outer recess wall and the outer perimeter.

[0087] According to a further aspect, the insert socket has a substantially C-shaped profile, the insert socket having an outer perimeter and an inner perimeter separated by a front wall to define an annular channel between the outer perimeter and the inner perimeter, the inner perimeter having a front bearing surface that contacts the ball joint and provides a substantially airtight seal with the ball joint, and the outer perimeter connected to the seal housing.

[0088] According to a further aspect, the outer perimeter of the insert socket has a snap fit bump that interlocks with a snap fit connector of the seal housing.

[0089] According to a further aspect, the mask frame further includes a shroud positioned around the socket insert portion and defining a plenum chamber around the exhaust holes.

[0090] In accordance with at least one of the embodiments disclosed herein, a respiratory mask assembly is provided and includes a seal housing configured to form a substantially airtight seal with a user's face, the seal housing having an outer wall with an array of exhaust holes extending therethrough, the exhaust holes providing an outlet for exhausted air to exit the seal housing, an elbow connector having a first end connected to an air supply and a second end having a ball joint disposed, a socket insert portion positioned between the mask frame and the seal housing and configured to retain the ball joint within the socket insert, and a shroud extending from the outer wall and angled towards the elbow connector, the shroud and the outer wall defining a plenum chamber around the exhaust holes.

[0091] In accordance with at least one of the embodiments disclosed herein, a respiratory mask is provided and includes a mask body defining a breathing chamber, an opening to the breathing chamber and a bias flow vent comprising a plurality of vent holes configured to permit gases to exit the breathing chamber through the plurality of vent holes, the mask body configured for connection to a gases supply conduit such that a supply of breathing gas can be

[0138] Figures 43A and 43B show an embodiment of the bias-flow venting system as applied to an elbow.

[0139] Figures 44A to 44E show various views of a bias-flow venting system that incorporates a ball and socket joint.

[0140] Figure 45 shows a cross-sectional view of a further bias-flow venting system configuration.

[0141] Figure 46 shows a cross-sectional view of a further bias-flow venting system configuration.

[0142] Figure 47 shows a cross-sectional view of a further bias-flow venting system configuration.

[0143] Figure 48 shows a cross-sectional view of a further bias-flow venting system configuration.

[0144] Figure 49 shows a cross-sectional view of an embodiment where the bias-flow venting system is attached to an elbow.

DETAILED DESCRIPTION

[0145] Embodiments of systems, components and methods of assembly and manufacture will now be described with reference to the accompanying figures, wherein like numerals refer to like or similar elements throughout. Although several embodiments, examples and illustrations are disclosed below, it will be understood by those of ordinary skill in the art that the inventions described herein extends beyond the specifically disclosed embodiments, examples and illustrations, and can include other uses of the inventions and obvious modifications and equivalents thereof. The terminology used in the description presented herein is not intended to be interpreted in any limited or restrictive manner simply because it is being used in conjunction with a detailed description of certain specific embodiments of the inventions. In addition, embodiments of the inventions can comprise several novel features and no single feature is solely responsible for its desirable attributes or is essential to practicing the inventions herein described.

[0146] Certain terminology may be used in the following description for the purpose of reference only, and thus are not intended to be limiting. For example, terms such as "above" and "below" refer to directions in the drawings to which reference is made. As used herein the terms 'front', 'rear', 'upper' and 'lower' shall refer to the location of a part or portion of a respiratory mask in relation to a user. Wherein, 'front' refers to a location that is distal to the user

(when the mask is in use) and 'rear' refers to a location that is proximal to the user by comparison. The terms 'upper' and 'lower' refer to the location of a part or component of a mask relative to the rest of the mask when the mask is in use and the user is sitting in an upright position. Moreover, terms such as "first," "second," "third," and so on may be used to describe separate components. Such terminology may include the words specifically mentioned above, derivatives thereof, and words of similar import.

[0147] The term 'seal housing' refers to a respiratory mask component that is configured to provide a breathing chamber that substantially surrounds a user's nose and/or mouth (when in use). A seal housing may comprise a seal that is integrally formed or removably attached, wherein the seal is configured to have a surface that contacts a user's face, thereby providing a substantially air-tight connection.

Respiratory mask:

[0148] Figure 1A shows a respiratory mask 100 that incorporates a removable ball jointed elbow and other mask components. The respiratory mask 100 comprises a cushion module 110, a mask frame 120, an elbow 130, a socket insert 140, headgear 150, a swivel 160 and a forehead piece 170.

[0149] The cushion module 110 is configured to substantially surround a user's nose and/or mouth (when in use). The cushion module 110 comprises a seal 180 and a seal housing 190, wherein the seal 180 is configured to contact the user's face and to form a substantially airtight seal. In the illustrated arrangement, the seal 180 is over-moulded to the seal housing 190. The seal housing 190 comprises a substantially enclosed breathing chamber 192 and an annular opening 194 as shown in Figure 1B. The annular opening 194 is configured to receive and connect to the socket insert 140 and to allow a flow of air to pass into the breathing chamber 192. In other embodiments, the annular opening 194 may be replaced with an opening of any other appropriate geometry.

Mask frame:

[0150] As shown in Figure 2A, the mask frame 120 comprises a socket connection opening 200, headgear connectors 210, a bridge portion 220 and a male forehead piece connector 230. The socket insert 140 is configured to be insertable into the socket connection opening 200. In some configurations, the socket insert 140 is configured to be permanently connected to the socket connection opening 150. The socket insert 140 provides a socket for the elbow 130 (see e.g., Figure

rotational position. As shown in Figure 5, in the present embodiment, the elbow 130 can be removed when it is rotated to an upside down position, where the elbow body 320 is directed upwards towards the bridge portion 220 of the mask frame 120 (not shown). This reduces or eliminates the likelihood of unintentional detachment of the elbow during use. In other embodiments, the elbow 130 may be rotated to a different position for removal. Once removed, the elbow 130 can be reassembled to the socket insert 140 by reversing the removal actions and forces.

[0164] The single removal position and blended geometry of the elbow removal notch 430 dictate that the action of removing the elbow may not be obvious to all users, meaning that a user may need to be taught how to remove the elbow. This may be beneficial in some situations, as it may be desirable for only certain user groups to know how to remove the elbow. For instance, removal of the elbow for cleaning and sterilization is particularly important in environments where a single mask may be used for multiple users, such as in sleep labs; whereas it is not as important in home use environments where the mask has only a single user. Therefore, it may be desirable for doctors or sleep lab technicians to know how to remove the elbow, but not the direct user of the mask. In alternative embodiments, the geometry may be such that it is obvious how to remove the elbow.

Forehead piece:

[0165] As shown in Figure 1A, the forehead piece 170 is a removable end cap configured to provide a connection between the mask frame 120 and the headgear 150. Figures 6A to 6E show that the forehead piece 170 comprises a front portion 600 and a rear portion 610, wherein the front and rear portions 600, 610 are connected to form a horizontal loop 620. The horizontal loop 620 provides a hole that extends horizontally (when the mask is in use) from one side of the forehead piece 170 to the other. The rear portion 610 comprises a rear opening 622. The rear opening 622 is configured to extend through the rear portion 610 in a direction that is substantially perpendicular to the front portion 600. The rear opening 622 in combination with the horizontal loop 620 are configured to provide a path through which the forehead straps 152 of the headgear 150 can pass. Both of the forehead straps 152 enter the forehead piece through the rear opening 622 and one forehead strap 152 exits from each side of the horizontal loop 620, as shown in Figure 6B. In this configuration, the forehead piece forms a buckle through which the length of the forehead straps 152 can be adjusted.

[0166] The front portion 600 comprises a female frame connector 630. The female frame connector 630 is configured to connect to the male forehead piece connector 230 of the mask frame 120 and comprises an internal cavity 640. The internal cavity 640 is shown in more detail in Figure 6C. The internal cavity comprises a frame opening 642, a bump 644 and a moulding opening 646. The frame opening 642 is configured to pass over the male forehead piece connector 230. As shown in Figure 6D, the geometry of the internal cavity 640 is configured to substantially match the geometry of the male forehead piece connector 230. The bump 644 comprises a raised lump that is configured to fit into the notch 234 of the male forehead piece connector 230. When the bump 644 and notch 234 are fitted together they, form a snap fit connection that enables the forehead piece 170 to be removably connected to the mask frame 120. The moulding opening 646 provides the internal cavity 640 with a second opening at the opposing end to the frame opening 642. The opening is substantially perpendicular to the front portion 600 and is located on the rear surface of the front portion 600. The moulding opening 646 is configured to provide a means for the mould tool to form the bump 644 on an internal surface of the internal cavity 640. The moulding opening 646 is configured to fit within the bounds of the rear opening 622, such that a single tooling component may form both the moulding opening 646 and the bump 644 as well as the rear opening 622.

[0167] In some configurations, the forehead piece 170 is provided in two or more sizes, as shown in Figure 6E. The different sizes can be provided by varying the height h of the forehead piece 170. The different sizes cater to a range of facial geometries in users. In the present embodiment, a medium/large and a small size are provided, wherein the small size has a height h_2 that is less than the height h_1 of the medium/large. The height of the forehead piece 170 determines the height at which the forehead straps of the headgear are connected to the mask 100 and, thus, how far up a user's forehead the straps will sit. The size of the forehead piece 170 can be selected to provide the most comfortable fit for a user. The horizontal loop 620 varies in size dependent on the height h of the forehead piece 170. The rear opening 622 has a fixed size that corresponds to the width of the forehead straps 152. The fixed size of the rear opening 622 restricts vertical movement of the forehead straps within the horizontal loop.

[0168] In other configurations, the forehead piece 170 and the mask frame 120 may be configured for a one time, permanent connection (e.g., a barbed or ramped protrusion and notch). Such a configuration allows for a common mask frame that is connectable to forehead pieces 170 of various shapes and sizes.

Headgear:

[0169] The headgear 150 is configured to apply retaining forces to the mask frame 120 such that the respiratory mask 100 is held in place on a user's face and a substantially airtight seal is achieved. The headgear 150 comprises a pair of forehead straps 152, a top or crown strap 154, a pair of lower or chin straps 156 and a rear headgear portion 158, as shown in Figure 7A. In use, the forehead straps 152 are configured to extend forward from the rear headgear portion 158 and across the user's forehead to connect to the forehead piece 170, as previously described. The crown strap 154 is configured to form a link between the forehead straps 152, wherein the crown strap 154 extends across the top of the user's head. The chin straps 156 are configured to extend forward from the lower edge of the rear headgear portion 158, across the user's cheeks and chin, to the headgear connectors 210 of the mask frame 120. The chin straps 156 are connected to the headgear connectors 210 via separate headgear clips 700. The headgear clips 700 hook onto post components in the headgear connectors and provide a quick means for users to attach and detach the headgear 150 from the mask frame 120.

[0170] The length of the forehead straps 152 and chin straps 156 are secured by hook and loop fastener tabs 710 located at the ends of the straps. The tabs 710 comprise the hook component of hook and loop fastener material. The outer surface 720 is configured to have a surface finish that is suitable for the hook material to attach to. The forehead straps 152, the crown strap 154 and the chin straps 156 are made from a material, such as Breath-o-prene ™, which comprises layers of differing fabrics including textiles and foams. Breath-o-prene ™ is made from polyurethane foam with an outer layer of nylon and spandex. The materials are heat laminated together. Each of the straps can be made from a material with differing physical properties. For example, the crown strap 154 can be stretchable while the chin straps 156 are substantially non-stretch by comparison.

[0171] The rear headgear portion 158 comprises a spacer fabric pad 730 and a lower back strap 740. The spacer fabric pad 730 comprises a substantially rectangular portion with scalloped edges and the corners cut off. The cut off corners are configured to attach to the forehead straps 152 and the lower back strap 740. Figure 7B shows that the spacer fabric pad 730 comprises two spacer fabric layers 732 layered one on top of the other. The spacer fabric layers have a right side 733 and a wrong side 734. The two layers are sewn together, inside out (i.e., with the wrong sides of the fabric facing out) to form a seam 736 near the raw edges 738 of the spacer fabric layers. Once sewn together the layers 732 are then turned right-side out, such that the right sides 733 are on the outside and the raw edges 738 are on the inside. The seam 736

defines opening 1000; however, it can be desirable for further inward portions of the seal 180 to have greater thicknesses. In some configurations, the thin edge section 1030 has a thickness that is equal to or less than about 0.6 mm or equal or less than about 0.4 mm. The continuous thin internal edge section 1030 can vary in thickness in a direction extending inwardly from the edge that defines opening 1000 or along its length within these desired thickness ranges.

[0193] In some configurations, the seal 180 also or alternatively includes thickened nose pads 1032. The thickened nose pads 1032 preferably are positioned on each lateral side of the upper portion 1002 of the opening 1000. Preferably, the thickened nose pads 1032 extend along at least a portion of the face contacting surface 106 of the seal 180 but do not extend in a lateral direction all the way to the edge that defines the opening 1000. That is, innermost edges of the nose pads 1032 terminate prior to the edge that defines the opening 1000. In some configurations, the thickened nose pads 1032 are created by thickened regions of the seal 180 wherein the additional material extends inwardly into the interior of the cushion module 110. The thickened nose pads 1032 can have laterally inward edges 1034 that are curved (e.g., U-shaped) with centers of the curved portions being positioned closer to the opening 1000 than upper and lower portions of the curved edge 1034.

[0194] Figure 17 illustrates differences in thicknesses of the seal 180 in various regions or portions. The regions and portions are indicated in Figure 17. Typically, the outer surface of the seal 180 is of a substantially smoothly curved shape with variations in thickness being accomplished by inwardly-extending portions of the inner surface of the seal 180, as apparent, for example, in Figures 18 and 22. The seal 180 can include one or more of the regions or portions described herein.

[0195] The illustrated seal 180 comprises a bottom or chin region 1040. The chin region 1040 in the illustrated seal 180 extends along at least a portion of the opening 1000. Preferably, the chin region 1040 extends along at least a lower, central portion of the opening 1000 that is positioned below the lower lip of the user on or near the user's chin. The chin region 1040 can extend along an entirety or a substantial entirety of a height of the lower section of the face contacting surface 106 of the seal 180. In other words, the chin region 1040 can extend from a lower end of the outer edge 1010 to a lower end of the edge that defines the opening 1000. The chin region 1040 can extend along a substantial portion of a width of the seal 180, such as at least about one-half or more of a maximum width of the opening 1000. The illustrated chin region 1040 is centered in a lateral direction of the seal 180.

inwardly into the interior of the cushion module 110. The nose pads 1032 can extend into a stiffening portion of the seal 180, such as a thickened band 1060, which extends from one side to the other over the top of the seal 180 and is described in additional detail below. It has been discovered by the present inventors that the presence of the nose pads 1032 can result in a dramatic reduction in leaks occurring at the side of the user's nose. In addition, by terminating the nose pads 1032 prior to the opening 1000, comfort can be maintained.

[0207] It has been discovered that the nose pads 1032 should be relatively thick to improve sealing performance of the seal 180, but not so thick as to cause discomfort. In some configurations, the nose pads 1032 are among the thickest or are the thickest portions of the face contacting surface 106 of the seal 180. In some configurations, the nose pads 1032 are at least as thick as the outer peripheral portions 1046. In some configurations, the nose pads 1032 are thicker than the outer peripheral portions 1046. In some configurations, the nose pads 1032 are between about 1.5 mm and 2.0 mm in thickness. In some configurations, the nose pads 1032 are about 1.8 mm in thickness.

[0208] With reference to Figure 19, as described above, the illustrated seal 180 includes a continuous thin internal edge section 1030 of at least a portion of the edge that defines the opening 1000 in the upper portion 1002 of the seal 180. The continuous thin internal edge section 1030 is not necessarily a discrete section, but can be partially or completely defined by other portions of the seal (e.g., the lateral portions 1044 or nasal bridge portion 1042) so long as the entire section 1030 is below the desired thickness. In some configurations, the continuous thin internal edge section 1030 extends along about or at least about the entire upper half of the seal 180. In some configurations, the continuous thin internal edge section 1030 extends along approximately the upper two-thirds or at least about the upper two-thirds of the seal 180. In some configurations, the continuous thin internal edge section 1030 extends inwardly from the edge that defines opening 1000 at least about 0.5 mm to about 1 mm. In some configurations, the thin edge section 1030 can extend further inwardly from the edge that defines opening 1000; however, it can be desirable for further inward portions of the seal 180 to have greater thicknesses, as described above.

[0209] In some configurations, the thin edge section 1030 has a thickness that is equal to or less than about 0.6 mm or equal to or less than about 0.4 mm. In some configurations, at least the first 0.5 mm extending from the edge that defines the opening 1000 is less than about 0.4 mm in thickness. The continuous thin internal edge section 1030 can vary in thickness in a direction extending inwardly from the edge that defines opening 1000 or along its length within these

[0235] In an alternative embodiment, the cushion module 2010 may include multiple rolling portions to accommodate differing facial geometries. For comparison, Figure 30 illustrates a cushion module 2010 having a single rolling bridge 2012. The single rolling bridge 2012 allows a nasal contact point 2014 to rotate closer to the housing 2020 about a hinge point H_1 in order to allow the cushion module 2010 accommodate differing sublabiale-sellion lengths between users of different size and facial geometry. The length of the seal 2016 between the nasal contact point 2022 and the chin contact point 2024 can generally corresponds to the sublabiale-sellion length of a user's face. Accordingly, a seal length L_1 when the single rolling bridge 2012 is not rolled is greater than a seal length L_2 when the rolling bridge 2012 is rolled to a displaced nasal contact point 2026. The difference between L_1 and L_2 allows the single rolling bridge 2012 to fit a range of sublabiale-sellion lengths. The cushion module 2010 may be provided in 3 mask sizes (i.e., small, medium and large) to fit a range of sublabiale-sellion lengths. However, the number of mask sizes may be reduced while accommodating a similar range of sublabiale-sellion lengths by further rotating the single rolling bridge 2012 about the hinge point H_1 to provide a greater displacement of the nasal contact point 2022 (i.e., reducing the length L_2 when the rolling bridge is rolled).

[0236] In contrast, Figures 31-33 illustrates a cushion module 2110 having a first rolling portion 2112 and a second rolling portion 2114. The first rolling portion 2112 rotates about a hinge point H_{11} and the second rolling portion rotates about a hinge point H_{12}. The second rolling portion 2114 is positioned below the first rolling portion. The first rolling portion 2112 is substantially the same as the single rolling portion 2012 in Figure 30. However, the housing 2120 is reduced in height relative to the housing 2020 in Figure 30 to allow for the additional rolling portion.

[0237] Figures 32A and 32B illustrate the cushion module 2110 in unrolled and rolled form, respectively. The first rolling portion 2112 is configured to roll over the top of the second rolling portion 2114. In use, the first and second rolling portions 2112, 2114 roll simultaneously as a result or having similar geometries that provide a similar resistance to rolling. As a result, the first rolling portion 2112 is unlikely to be fully rolled without the second portion 2114 being fully rolled.

[0238] As illustrated in Figure 33, L_{11} is a length of the seal 2116 between the nasal contact point 2122 and the chin contact point 2124 when the first and second rolling portions 2112, 2114 are not rolled. L_{12} is the seal length when only the first rolling portion 2112 is fully rolled in isolation to the second rolling portion 2114. L_{12} is shorter than L_{11}. L_{13} is the seal length

ways. Similarly, Figures 45-48 show only an upper portion of the socket insert, but preferably the socket insert surrounds the ball joint of the elbow. This embodiment comprises an elbow 5100 with a ball joint 5102, a socket member 5110 and a shroud member 5120. The socket member 5110 comprises a spherical wall section configured to rotatably connect to the ball joint 5102.

[0277] The socket member 5110 may be configured to form a part of a mask frame or a seal housing or, alternatively, may be a separate insert component. The shroud member 5120 comprises a seal housing wall 5121 and a shroud wall 5125. The seal housing wall 5121 is configured to form part of or connect to a seal housing (not shown). It comprises an elbow end 5122 and a distal end 5223, wherein the elbow end connects to the socket member 5110 and the distal end adjoins the shroud wall 5125. The seal housing wall 5121 also comprises an annular array of exhaust holes 5130, which are located proximal to the distal end 5123. The shroud wall 5125 comprises an annular wall section that is angled inwardly towards the elbow 5100. The shroud wall is configured to create a plenum chamber 5140 in combination with the seal housing wall 5121 and the socket member 5110. An exhaust vent 5150 is formed by a gap between the front ends of the socket member 5110 and the shroud wall 5125.

[0278] Figure 49 shows a non-limiting exemplary embodiment, wherein the bias-flow venting system 5200 is provided to one end of an elbow 5210, wherein the elbow is configured to be connected to and supply air to a respiratory mask. The bias-flow venting system comprises a conduit connector 5220, a shroud 5230 and a cylindrical exhaust member 5240. The elbow comprises an air supply end 5212 and a mask attachment end 5214. In this figure, it is shown that the mask attachment end 5214 comprises a ball joint 5216; however, in other embodiments, it may comprise an annular swivel connection or any other appropriate connection that allows for rotation between the elbow 5210 and a mask. The conduit connector 5220 comprises a cylindrical conduit 5222 and a flange 5224. The cylindrical conduit 5222 is configured to provide a removable connection with an air supply conduit. The flange 5224 extends perpendicularly from the end of the cylindrical conduit 5222 that is proximal to the air supply end 5316 of the elbow 5210. It is configured to form a wall of a plenum chamber 5250. In alternative embodiments, the flange 5224 may be formed at a greater or lesser angle to the cylindrical conduit 5222.

[0279] The shroud 5230 and the cylindrical exhaust member 5240 form the remaining walls of the plenum chamber 5250. The cylindrical exhaust member 5240 is configured to provide a connection between the conduit connector 5220 and the air supply end 5212 of the elbow 5210. The connections may be permanent or temporary. The cylindrical

WHAT IS CLAIMED IS:

1. A respiratory mask comprising:

a frame portion configured to support a seal, wherein the seal is configured to form a substantially airtight seal with a user's face; and

a conduit connector comprising a ball joint end;

wherein the frame portion defines an opening configured to receive the ball joint end of the conduit connector, the frame portion comprising a conduit connector removal notch configured to provide a leverage point for removal of the conduit connector;

wherein the conduit connector comprises a portion configured to be received in the conduit connector removal notch to facilitate removal of the conduit connector from the frame portion.

2. The respiratory mask of Claim 1, wherein the ball joint includes an end surface, the end surface comprising a tapered chamfer that defines an angle relative to a remainder of the end surface.

3. The respiratory mask of Claim 1 or 2, wherein the opening is defined by an insert of the frame portion.

4. The respiratory mask of any one of Claims 1-3, wherein the conduit connector is an elbow.

5. The respiratory mask of Claim 3, wherein the conduit connector is an elbow and wherein the ball joint is configured to provide a substantially freely rotating connection between the elbow and the insert.

6. The respiratory mask of Claim 4 or 5, wherein the ball joint is connected to an elbow body via a cylindrical cuff and a lip.

7. The respiratory mask of Claim 6, wherein the lip comprises an edge that is formed by a surface extending perpendicularly from the cylindrical cuff.

8. The respiratory mask of Claim 7, wherein the lip is at an upper portion of the elbow body.

9. The respiratory mask of any one of Claims 6-8, wherein the lip is configured to be received in the conduit connector removal notch to facilitate removal of the conduit connector from the frame portion.

10. The respiratory mask of any one of Claims 4-9, wherein the ball joint comprises a rear edge, the rear edge being angled along a truncation axis, the rear edge being angled toward the lower portion of the elbow.

11. The respiratory mask of Claim 10, wherein the ball joint comprises a ball truncated along the truncation axis.

12. The respiratory mask of Claim 10 or 11, wherein the rear edge of the ball joint is angled such that a length of an upper edge of the ball or ball joint is greater than a length of a lower edge of the ball or ball joint.

13. The respiratory mask of any one of Claims 1-12, wherein the conduit connector is removable from the opening when oriented to a predetermined position.

14. The respiratory mask of any one of Claims 4-13, wherein the conduit connector further comprises a swivel connection positioned at the opposite end of the elbow relative to the ball joint.

15. The respiratory mask of any one of Claims 1-14, wherein the frame portion comprises a cushion module that supports the seal and a headgear connector portion configured to be connected to a headgear.

16. The respiratory mask of any one of Claims 1-15, wherein the frame portion further comprises a male forehead piece connector configured to connect to a separate forehead piece, which provides for a connection to a headgear.