[0009] In some configurations, the at least one strap incorporates a stretch component, a relatively non-stretch member and two or more buckles that interconnect the at least one strap and the relatively non-stretch member. In some such configurations, the stretch component has a greater length than the relatively non-stretch member. In some such configurations, the two or more buckles are adjustable along a length of the relatively non-stretch member. In some such configurations, the two or more buckles are adjustable such that an intermediate length of the stretch component disposed between the two buckles can be varied. In some such configurations, adjusting the spacing between the two or more buckles adjusts the amount of the stretch component that is secured to the relatively non-stretch member and, therefore, unable to stretch. In some such configurations, the relatively non-stretch component comprises a hollow portion through which the stretch component passes. In some such configurations, the two or more buckles attach to the non-stretch component with the stretch component being secured within the non-stretch component.

[0010] In some configurations, the at least one strap incorporates a stretch component, a relatively non-stretch member and two or more limiters that interconnect the at least one strap and the relatively non-stretch member. In some such configurations, the stretch component has a greater length than the relatively non-stretch member. In some such configurations, the nonstretch member comprises two or more apertures that receive the two or more limiters and the stretch member comprises two or more apertures. In some such configurations, the nonstretch member comprises at least three openings and the stretch component comprises at least three openings. In some such configurations, the two or more apertures of the non-stretch member have a first spacing and the two or more apertures of the stretch member have a second spacing. In some such configurations, the second spacing is the same as the first spacing. In some such configurations, the second spacing is different from the first spacing. In some such configurations, the second spacing is less than the first spacing. In some such configurations, the two or more limiters are connected for movement. In some such configurations, a hinge connects two adjacent limiters such that depressing one causes a lifting of the other.

[0011] In some configurations, a connector is configured to be attached to the at least one strap and the connector comprises a passage through which the at least one strap passes. In some such configurations, the connector comprises a clamping configuration that secures the connector in position along the at least one strap. In some

[0082] Figures 115-116i illustrate hook and loop fastener adjustments for headgear.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

[0083] In some of the following description, materials are formed using one or more of weaving, knitting and braiding. Weaving is interlacing, usually at right angles, of two sets of threads to form cloth, rug or other types of woven textiles. In automated processes, two distinct sets of yarns called the warp and the filling or weft are interlaced with each other to form a fabric. The lengthwise yarns that run front to back in the loom are called the warp while the yarns that extend crosswise are called the weft. Typically, the warp threads are held stationary while the weft threads are woven through them.

[0084] The yarn in knitted fabrics follows a meandering path, forming symmetric loops or stitches. When the interlocking loops run lengthwise, each row is called a wale. A wale can be compared with the warp in weaving. When the loops run across the fabric, each row is called a course. A course corresponds to the weft. There are two major varieties of knitting: weft knitting and warp knitting. In weft knitting, one continuous yarn forms courses across the fabric. In warp knitting, a series of yarns form wales in the lengthwise direction of the fabric. As used herein, knitting will typically refer to warp knitting but may refer to weft knitting in certain configurations.

[0085] In braiding, three or more strands can be interwoven to form a rope-like member. The interweaving is performed in a diagonally overlapping pattern. Braiding is done by intertwining yarns in whatever direction suited to the manufacturer's purpose. Braiding can be classified as two and three-dimensional braiding. Two-dimensional braid structure can be a circular or flat braid. They are formed by crossing a number of yarns diagonally so that each yarn passes alternately over and under one or more of the others. Three dimensional braiding is a two dimensional array of interconnected 2-D circular braids. As used herein, braiding will typically refer to two-dimensional braiding but could refer to three-dimensional braiding in certain configurations.

[0086] Various head strap configurations and headgear configurations will be described. In some configurations, the headgear features upper straps, lower straps and a top strap. In some such configurations, the headgear comprises a three dimensional shape when not being worn such that the headgear does not lie flat when not being worn. In

Multi-Yarn Knit in a Continuous Braid Incorporating Tactile Elements

[0105] With reference Figures 17-19, a strap or headgear component 1900 is illustrated that has incorporated a surface texture 1902. The surface texture can be used to increase grip, for example but without limitation.

[0106] As illustrated, in some configurations, such as that shown in Figure 17, the knit or braid can incorporate a string 1904, such as a rubber string, a silicone string, or the like. Such configurations can use exposed regions of the string 1904 to create the surface texture, which defines a high friction component, such as a pad, that can be integrated into the braid of the strap or headgear component 1900.

[0107] In addition to, or as an alternative to, using the multi yarn knit to create a textured surface 1902, other techniques also can be used. For example, in some configurations, such as those shown in Figures 18 and 19, screen printing can be used to create a textured surface 1902. Screen printing has the additional advantage of complete freedom in shape and size of the print. In the illustrated configurations, rubber dots can be screen printed. In some configurations, other shapes can be defined. In some configurations, other shapes can be defined by screen printing or the like. For example but without limitation, the shapes can change as desired and, in some instances, depending upon fashion desires.

[0108] In some configurations, being able to provide surface texture can facilitate better control over how certain portions of the headgear behaves or feels when disposed against the skin, for example.

Continuous Braids with Varied Shapes

[0109] With reference now to Figures 20-32, various configurations are shown in which headgear and head straps can be created having varied shapes, which can be desired for multiple reasons.

[0110] With reference first to Figures 20 and 21, the illustrated configurations generally involve straps 2000 having varied cross sections. In the illustrated configurations, the headgear can be created as a continuous knitting process as described above. As illustrated, the knit can have wider regions 2002 and narrower regions 2004 and can be cut for finishing with appropriate or desired hooks, buckles, clips or the like. Such configurations can improve the fit, form and function of the headgear strap.

[0111] With reference to Figures 22-29, these configurations generally involve straps 2010 that are a more complex knit with splits and joins. In some configurations,

the knit, much like that of Figure 20 and 21, can be formed as an endless strip that can be cut later into individual straps or headgear assemblies. In the illustrated configurations, the straps 2010 can define windows, openings or other large voids 2012 (see Figures 22-23, for example) that are included within the materials of the braid and/or knit. In some configurations, the straps can be configured such that two different varieties of headgear can be formed from the same braid and/or weave (see Figures 27-29, for example). For example, in some configurations, a window can be formed within the braid and/or weave that can be positioned on a back of a user's head (see Figure 29) while, if split, the portions of the strap 2010 that form the window 2012 can be used as a forked headgear with two strap ends that connect to an interface or the like (see Figure 28). The two strap ends can receive any suitable connector, buckle, hook, clip or the like.

[0112] With reference now to Figures 30-32, a further configuration is illustrated that is similar in some respects to the configuration of Figures 27-29. In the configurations of Figures 30-32, the windows 2012 discussed above can include a filling component 2014. In some configurations, the windows 2012 can include a mesh material 2014. In some configurations, the mesh material 2014 can be integrally formed with the straps 2010 that generally define the windows 2012. In some configurations, the mesh material 2014 can be formed separately and secured into the windows 2012 or onto the straps 2010 in any suitable manner. In some configurations, the headgear can be formed as a continuous strip that can be severed into multiple headgear during manufacturing.

Single Knit Headgear

[0113] With reference now to Figures 33-36, an entire, complex, headgear 2020 can be knit in one seamless knit. In some configurations, two or more of the straps 2022 used in the headgear 2020 can be integrated into a single knit. In some configurations, a majority of the straps 2022 used in the headgear 2020 can be integrated into a single knit. In some configurations, all of the straps 2022 used in the headgear 2020 can be integrated into a single knit.

[0114] In some configurations, each headgear 2020 can be knit individually. By forming the entire or the majority of the headgear 2020 in a single knit component, very complex shapes can be obtained without undertaking labor intensive stitching or welding steps. Generally, such a seamless knit configuration is less likely to be continuous (i.e., not an endless string of headgear assemblies). In some configurations, however, the seamless knitting process can be used to form headgear 2020 having a rather

also can be used. For example, in some configurations, such as that illustrated in Figures 113 and 114, an external thread 3214 can generally enclose two of the links 3202 or the links 3202 can have a threaded surface 3214. In such configurations, turning the knob 3208 causes the knob 3208 to advance along the links 3202 and to compress the links 3202 toward each other (because the internally threaded portion of the knob 3208 does not change sizes).

[0177] The illustrated configurations provide greater control over the level of adjustment to the headgear via the scissor link system 3200. In some configurations, a visual indicator can be provided showing a specific setting (e.g., 1-10). The visual indicator would allow users to quickly and easily set up the head gear after cleaning and/or would allow users to match existing settings when they replace the head gear in the future.

Adjustment for Headgear and/or Mask Seal

[0178] With reference now to Figures 115-116i, an arrangement featuring a hook and loop fastener based limiting/locking system 3300 is illustrated. As used herein, a hook tab 3302 is a tab specifically designed to increase the difficulty of removing the strap 3304 in question. This system 3300 provides adjustment to users who are trained in its use and makes it more difficult for users who are not. As used herein, a loop head strap 3304 means a loop material for the hook 3302 to grab onto and lock in place.

[0179] In some headgear configurations, the headgear can require a one-time set up by a sleep tech or other experienced person. Following the one-time set up, it is intended that such headgear not be readjusted by the user. The one-time set up poses a problem in how to create a method of adjustment that can be adjusted by one person but not another. By utilizing a more complex adjustment method such as the hook tab 3302 proposed, trained/experienced users will easily be able to make the adjustment, while the difficulty in doing so for others not trained will deter them from using it and instead direct them to use other adjustment methods provided.

[0180] In some configurations, the hook tab 3302 comprises a forked configuration with at least one recessed region 3306. In some such configurations, the hook tab 3302 comprises a plurality of fingers 3308. The plurality of fingers 3308 need be raised simultaneously in order to release the hook tab 3302 from the underlying loop material of the strap 3304, for example but without limitation. A variety of tab configurations are illustrated in Figures 115 and 116a-116i. In many of the

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A headgear assembly for use with a patient interface, the headgear assembly comprising:

   at least one strap, the at least one strap comprising an end with a hook tab,

   the hook tab being securable to a loop material of the strap,

   the hook tab comprising at least two fingers that are spaced apart from each other by a gap such that lifting one of the at least two fingers will not result in lifting of the other of the at least two fingers.

2. The headgear assembly of Claim 1, wherein the at least two fingers are symmetrical with each other.

3. The headgear assembly of Claim 1, wherein the at least two fingers are asymmetrical with each other.

4. The headgear assembly of any one of Claims 1 to 3, wherein the gap results in the at least two fingers defining a forked configuration.

5. The headgear assembly of Claim 1, wherein the gap is centrally positioned along the hook tab.

6. The headgear assembly of Claim 1, wherein one of the at least two fingers at least partially circumscribes another of the at least two fingers.

7. The headgear assembly of Claim 6, wherein one of the at least two fingers fully circumscribes another of the at least two fingers.

8. The headgear assembly of Claim 7, wherein one of the at least two fingers defines a central tab and another of the at least two finger defines an outer tab that circumscribes the central tab.

9. The headgear assembly of Claim 1, wherein one of the at least two fingers only partially circumscribes another of the at least two fingers.

10. The headgear assembly of Claim 1, wherein the gap extends inwardly from a lateral edge of the hook tab.

11. The headgear assembly of Claim 1 or Claim 10, wherein a second gap extends inwardly from a second lateral edge of the hook tab and two fingers are defined with a narrow section connecting to a wide end.

12. The headgear assembly of Claim 1, wherein one of the at least two fingers extends further along the strap than another of the at least two fingers.

13. The headgear assembly of Claim 1, wherein the hook tab further comprises a wide free end connected to a second portion via a narrow section.

14. The headgear assembly of Claim 13, wherein the at least two fingers are located on one side of the narrow section.

15. The headgear assembly of Claim 13, wherein one of the at least two fingers are located on a first side of the narrow section, and another of the at least two fingers are located on a second side of the narrow section.