(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 549 165 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
01.09.2010 Bulletin 2010/35

(21) Application number: **03773086.8**

(22) Date of filing: **01.10.2003**

(51) Int Cl.:
A41D 20/00 *(2006.01)* ***A61B 5/00*** *(2006.01)*

(86) International application number:
PCT/US2003/031208

(87) International publication number:
WO 2004/030480 (15.04.2004 Gazette 2004/16)

(54) **Use of a headband to indicate tension and system comprising an oximetry sensor and a headband**

Verwendung eines Kopfbandes zur Spannungsanzeige und System aus Oxymeter und Kopfband

Utilisation d'un bandeau pour indiquer la tension et un système comportant un capteur d'oxygène et un bandeau

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR

(30) Priority: **01.10.2002 US 415468 P**

(43) Date of publication of application:
06.07.2005 Bulletin 2005/27

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Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to headbands, and in particular to headbands that have a tension indicator for indicating when a headband is appropriately stretched and is thus capable of imparting an appropriate level of pressure to a wearer's bead.

[0002] Various headband devices are known- These include athletic type headband devices as well as more sophisticated headband devices, such as those used to mount devices carried on the head. Some headband devices are used to apply a certain level of pressure to the region under the headband. Such applied pressures are useful, for example, to support a medical sensor for the wearer of the headband. In such circumstances, there is a need for an improved headband having a tension indicator. A sweat band is known from US 5826277.

BRIEF SUMMARY OF THE INVENTION

[0003] It is an object of the present invention to provide for a head band with a tension indicator. This object can be achieved by the features as defined in the independent claims. Further enhamcements are characterized in the dependent claims. In one embodiment, the present invention provides the use of a headband having an elastic segment sized to fit around a wearer's head; and a non-elastic segment being smaller than and attached with the elastic segment. The non-elastic segment is sized to span a portion of the elastic segment when the elastic segment is stretched, and the non-elastic segment is larger than the portion of the elastic segment it spans when the elastic segment is not stretched.

In another embodiment, the present invention provides such a headband as a system in combination with an oximetry sensor.

[0004] In one aspect, the non-elastic segment is attached with the elastic segment in such a manner that the non-elastic segment projects out from the surface of the elastic portion when the headband is not sufficiently tight, thus creating a loop which provides a visual indication that the headband needs re-tightening.

[0005] In another aspect, the non-elastic segment is formed with a fold or a crease, which causes the non-elastic portion to project out from the surface of the elastic portion in a pronounced fashion as the elastic segment retracts.

[0006] In another aspect, the non-elastic segment is sized to not project out from the surface of the elastic portion when the headband is sufficiently tight, thus indicating an adequate level of tension corresponding with delivering a pressure in the range higher than the venous pressure and lower than the capillary pressure to the forehead of the wearer.

[0007] In an alternate embodiment, the present invention provides the use of a headband having an inelastic segment sized to fit around a wearer's head; and an elastic segment that is smaller than and attached with the inelastic segment. The elastic segment is sized to span a portion of the inelastic segment when the elastic segment is stretched, and the elastic segment is smaller than the portion of the inelastic segment it spans when the elastic segment is not stretched.

[0008] For a further understanding of the nature and advantages of the invention, reference should be made, by way of example, to the following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Fig. 1 is a diagram of a forehead oximetry sensor being applied to a patient.

[0010] Fig. 2 is a diagram of a forehead oximetry sensor being held to a patient's forehead with a headband.

[0011] Fig. 3 is a diagram of one embodiment of the headband in accordance with the present invention.

[0012] Fig. 4 is a diagram of an alternate embodiment of the headband in accordance with the present invention.

[0013] Fig. 4A is a top view detail diagram of the crease or fold of Fig. 4.

[0014] Fig. 5 is a front view diagram of an embodiment of the headband in accordance with the present invention shown worn by a user.

[0015] Fig. 6 is a top view diagram of an embodiment of the headband in accordance with the present invention shown in proper tension when worn by a user.

[0016] Fig. 7 is a top view diagram of an embodiment of the headband in accordance with the present invention shown in less than proper tension when worn by a user.

[0017] Fig. 8 is a diagram of an alternate embodiment of the headband in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0018] The embodiments of the present invention are directed towards a headband with a tension indicator. Such a headband may be used to support the administration of a health care related service to a patient. Such a service may include the placement of a sensor 101 on a patient's forehead, such as for example, an oximetry sensor (e.g., those manufactured by Nellcor Puritan Bennett, the assignee herein), as is shown in Fig. 1. A typical pulse oximeter measures two physiological parameters, percent oxygen saturation of arterial blood hemoglobin (SpO_2 or sat) and pulse rate. Oxygen saturation can be estimated using various techniques. In one common technique, the photocurrent generated by the photo-detector is conditioned and processed to determine the ratio of modulation ratios (ratio of ratios) of the red to infrared signals. This modulation ratio has been observed to correlate well to arterial oxygen saturation. The pulse oximeters and sensors are empirically calibrated by meas-

uring the modulation ratio over a range of in vivo measured arterial oxygen saturations (SaO_2) on a set of patients, healthy volunteers, or animals. The observed correlation is used in an inverse manner to estimate blood oxygen saturation (SpO_2) based on the measured value of modulation ratios of a patient. The estimation of oxygen saturation using modulation ratios is described in U.S. Patent No. 5,853,364, entitled "METHOD AND APPARATUS FOR ESTIMATING PHYSIOLOGICAL PARAMETERS USING MODEL-BASED ADAPTIVE FALTERING", issued December 29, 1998, and U.S. Patent No. 4,911,167, entitled "METHOD AND APPARATUS FOR DETECTING OPTICAL PULSES", issued March 27, 1990, and the relationship between oxygen saturation and modulation ratio is further described in U.S. Patent No. 5,645,059, entitled "MEDICAL SENSOR WITH MODULATED ENCODING SCHEME," issued July 8,1997, the disclosures of which are herein incorporated by reference in their entirety. Most pulse oximeters extract the plethysmographic signal having first determined saturation or pulse rate. An exemplary forehead oximetry sensor is described in a co-pending United States Patent Application No. 10/256,245, entitled: "Stacked Adhesive Optical Sensor," the disclosure of which is herein incorporated by reference in its entirety for all purposes.

[0019] The force applied to the oximetry sensor can be a factor in the proper functioning of the sensor. In certain clinical scenarios, a headband 200 is required to be used in conjunction with a forehead sensor 101 (e.g., an oximetry sensor), as is shown in Fig. 2. Fig. 2 shows the sensor leads extending from the sensor (not shown) outward from beneath the headband. Such clinical scenarios include scenarios where: patient is lying down with his/her head near or below chest level; patient is subject to elevated venous pressure; patient is diaphoretic; patient is moving excessively, such as during exercise; as well as other scenarios where venous pulsations can introduce errors in oximetry calculations. In those scenarios, without a headband, or force on the oximetry sensor, venous pulsations could cause an incorrect interpretation of the waveform, and therefore result in a less than accurate determination of the oxygen saturation and pulse rate values. The headband can be used to apply pressure to the oximetry sensor, thus reducing the effects of venous pulsations. When used to support an oximetry sensor, the amount of force applied by the sensor on the forehead should be greater than the venous pressure, but less than the arteriole pressure. Generally, a good pressure range is one where the applied pressure is higher than venous pressure (e.g., 3-5 mm Hg) and lower than the capillary pressure (e.g., 22 mm Hg). Preferably, this should be between 15 mm Hg and 20 mm Hg in the adult patient. The headband in accordance with the embodiments of the present invention may be adjusted for use with any size wearer by using an adjustable closure mechanism, such as for example a hook and loop closure mechanism. The user can apply a wide range of pressures to the forehead oximetry sensor depending on the amount of tension which has been applied to the headband during its placement around the wearer's head.

[0020] The embodiments of the present invention are intended to alleviate the guesswork by the caregivers by giving them a visual indicator of the proper amount of tension required in the headband during placement around the head. The required tension is related to the pressure being applied by the sensor when it is attached with the patient.

[0021] In one embodiment, shown in Fig. 3, an elastic headband 102 is shown in an unstretched position. A non-elastic fabric 104 is shown attached to the elastics portion 102 along two of its edges 106. The other two edges of the non-elastic portion are not attached to the elastic segment and are thus free to project outward away from the face of the elastic segment. The non-elastic segment is smaller the elastic segment. The non-elastic segment is sized to span a portion of the elastic segment when the elastic segment is stretched. The non-elastic segment is larger than the portion of the elastic segment it spans when the elastic segment is not stretched. As the elastic segment 102 is stretched from its non-stretched position, the non-elastic portion is pulled at its edges 106 along with the stretching elastic segment 102 until the elastic portion between the edges has stretched to a length equal to the length of the non-elastic portion. The headband also includes closure mechanisms (not shown), which are described below in conjunction with Fig. 4. Fag. 5 shows a front view diagram of an embodiment of the headband in accordance with the present invention shown worn by a user. It is noted that the headband may be used to hold and impart a pressure against a sensor, such as an oximetry sensor applied to a patient's forehead, as shown in Fig. 2. For clarity in describing the tension indicator, such a sensor is not shown in Figs. 5-7. Fig. 6 is a top view diagram of an embodiment of the headband 102 in accordance with the present invention shown in proper tension when worn by a user. As is shown in this figure, when the headband is properly tightened, the pressure indicator portion 104 is pulled tight across the elastic portion 102, thus not providing a visual indication that the headband needs to be retightened. On the other hand, Fig. 7 shows a top view diagram of an embodiment of the headband in accordance with the present invention shown in less than proper tension when worn by a user. As is shown in Fig. 7, when a less than adequate pressure is being applied by the headband to a user's forehead, or when the headband is not tight enough, the indicator 104 projects out from the surface creating a loop which provides a visual cue that the headband needs retightening.

[0022] When the headband is not stretched there is an amount of slack between the non-elastic and elastic portions. When the headband is stretched, the slack in the non-elastic strap is eliminated, giving the visual indication that the headband stretch is sufficient. The headband is chosen to be long enough to fit around the head of a user (or patient). The elastic material may be made of any

suitable fabric, such as an open cell urethane foam. The non-elastic strap, which is shorter than the elastic portion is sewn or attached otherwise (e.g., adhesively, etc.) onto the elastic headband at a spacing that is less than the lengths of the non-elastic portion. The non-elastic material maybe made of any suitable fabric, such a Dacron-type fabric.

[0023] Fig. 4 is a diagram of an alternate embodiment of the headband in accordance with the present invention- An elastic headband 102 is shown in an unstretched position. A non-elastic fabric 104 is shown attached to the elastics portion 102 along two of its edges 106. The other two edges of the non-elastic portion are not attached to the elastic segment and are thus free to project outward away from the face of the elastic segment. The non-elastic segment 104 is smaller the elastic segment 102. The non-elastic segment is sized to span a portion of the elastic segment when the elastic segment is stretched. The non-elastic segment is larger than the portion of the elastic segment it spans when the elastic segment is not stretched. As the elastic segment 102 is stretched from its non-stretched position, the non-elastic portion is pulled at its edges 106 along with the stretching elastic segment 102 until the elastic portion between the edges has stretched to a length equal to the length of the non-elastic portion.

[0024] Fig. 4 also shows the non-elastic portion to include a permanent crease or a fold 110. As shown in Fig. 4A, such a fold 110 may be made by overlapping the non-elastic portion to form a fold and then heat pressing or heat sealing the fabric to form a permanent fold or crease. In one embodiment, the fold or crease is made in the middle of the inelastic segment, which causes it to project outward in a sharp, angular fashion as the elastic band 102 retracts or relaxes. In operation, it has been shown that the sharp, angular crease or fold acts as a mechanical amplifier and provides a more distinct visual cue and better sensitivity as to when the threshold of minimal headband tension has been passed. The creased tension indicator 110 exhibits increased sensitivity to a loss in headband tension by projecting further away from the elastic band in a skewed fashion. The creased tension indicator 110 provides a more pronounced visual cue both from the perspective of looking directly at the forehead and from looking down at the top (edge) of the headband. The material chosen for the inelastic portion having a fold or a crease can be similar to the non-creased or non-folded inelastic material. In addition, a material such a polyester webbing material, which is capable of holding a fold or a crease, may also be used. The elastic material may be made of a material as is described above, or made using other suitable material such as a terry band.

[0025] When the headband is not stretched there is an amount of slack between the non-elastic and elastic portions. When the headband is stretched, the slack in the non-elastic strap is eliminated, giving the visual indication that the headband stretch is sufficient.

[0026] Also shown in Fig. 4, and applicable to the embodiment described in conjunction with Fig. 3, is the closure device 108. One such closure device is a hook and loop type closure. The headband in accordance with the embodiments of the present invention may use other closure mechanisms such as snaps, buttons, adhesives, pins, or combinations thereof, as well as others known to those of skill in the relevant arts. Alternately, the headband may be a pre-formed loop, without a separate closure mechanism.

[0027] The headband described above includes a sensor attachment pressure indicator. As described above, the headband may be used to allow a sensor's attachment pressure with the patient's tissue location (e.g. forehead, and so on) to be chosen which is greater than venous pulsations (e.g., 5-10 mm Hg) but less than a maximum amount (e.g., 30 mm Hg, or so). As described above, such a pressure indicator is attached with the headband. Alternately, the pressure indicator maybe attached with the sensor, such as an oximetry sensor. One embodiment of the pressure indicator is a tension indicator as described above with reference to Figs. 3-4. Other pressure indicating means include pressure or force sensors small and light enough to be included with either the sensor or the headband assembly.

[0028] The information provided by the pressure indicator may be used to help establish an acceptable windows of pressure for the sensor's attachment with a patient. The acceptable window of pressure may also be enhanced to include the affects of the patient's head elevation relative to the patient's heart.

[0029] Additionally, the concept of using a headband to ensure an acceptable sensor attachment pressure is extendible to other patient body locations; locations where a sensor attachment pressure can help provide a more accurate sensor reading.

[0030] An alternate embodiment of the tension or pressure indicating headband in accordance with the present invention is shown in Fig. 8. As is shown in Fig. 8, the headband includes an inelastic portion 604 and an elastic portion 602. The tension indicating portion 606 is also made of an inelastic material. The tension indicating portion 606 maybe a creased or folded as described in conjunction with Fig. 4 or as is shown uncreased or unfolded as described in conjunction with Fig. 3. The description of the closure devices and how the elastic and inelastic portions are attached to one another are also set forth above. In this embodiment, the main stretchable portion is elastic portion 602. Once the headband has been stretched such that section 602 is stretched to match the length of section 606, the headband's stretch will be limited. This embodiment by having a shorter elastic portion limits the extension of the headband and hence limits the range of pressures that can be applied by the headband against a user's forehead or the sensor applied to a user's forehead.

[0031] As will be understood by those skilled in the art, the present invention may be embodied in other specific

forms without departing from the essential characteristics thereof. These other embodiments are intended to be included within the scope of the present invention, which is set forth in the following claims.

Claims

1. Use of a headband to indicate tension, the headband comprising:

an elastic segment (102) sized to fit around a wearer's head; and
a non-elastic segment (104) being smaller than and attached with said elastic segment (102), said non-elastic segment (104) sized to span a portion of said elastic segment when said elastic segment (102) is stretched, said non-elastic segment (104) being larger than said portion of said elastic segment (102) it spans when said elastic (102) segment is not stretched, wherein the non-elastic segment (104) provides a visual indication of the tension of the headband.

2. The use of claim 1, wherein the headband further comprising a closure mechanism (108) coupled with said elastic portion.

3. The use of claim 2 wherein said closure mechanism (108) is a hook and loop closure, a snap, a button, an adhesive, a pin, or combinations thereof.

4. The use of claim 1 wherein said elastic segment (102) is rectangular shaped having a long and a short dimension, and said non-elastic segment (104) is attached along a set of its edges with said elastic segment, wherein said set of edges are generally parallel to said short dimension.

5. The use of the headband of claim 1 wherein said non-elastic segment (104) is attached with said elastic segment (102) in such a manner that said non-elastic segment (104) projects out from the surface of the elastic portion when said headband is not sufficiently tight, thus creating a loop which provides a visual indication that the headband needs re-tightening.

6. The use of claim 1 wherein said non-elastic segment (104) is formed with a fold or a crease, which causes said non-elastic portion to project out from the surface of the elastic portion in a pronounced fashion as the elastic segment retracts.

7. The use of claim 5 wherein said non-elastic segment (104) is sized to not project out from the surface of the elastic portion when said headband is sufficiently tight thus indicating an adequate level of tension corresponding with delivering a pressure in the range higher than the venous pressure and lower than the capillary pressure to the forehead of the wearer.

8. Use of a headband to indicate tension, the headband comprising:

an inelastic segment (604, 606) sized to fit around a wearer's head; and
an elastic segment (602) being smaller than and attached with said inelastic segment (604, 606), said elastic segment (602) sized to span a portion of said inelastic segment (604, 606) when said elastic segment (602) is stretched, said elastic segment (602) being smaller than said portion of said inelastic segment (604, 606) it spans when said elastic segment (602) is not stretched,
wherein said elastic segment (602) is attached with said inelastic segment (604, 606) in such a manner that said non-elastic segment (606) projects out from the surface adjacent to a user's forehead when said headband is not sufficiently tight, thus creating a loop which provides a visual indication that the headband needs re-tightening.

9. The use of claim 8, the headband further comprising a closure mechanism coupled with said elastic portion.

10. The use of claim 9 wherein said closure mechanism is a hook and loop closure, a snap, a button, an adhesive, a pin, or combinations thereof.

11. The use of claim 8 wherein said inelastic segment (604, 606) is rectangular shaped having a long and a short dimension, and said elastic segment (602) is attached along a set of its edges with said inelastic segment (604, 606), wherein said set of edges are generally parallel to said short dimension.

12. The use of claim 8 wherein said non-elastic segment (606) is sized to not project out from said surface when said headband is sufficiently tight thus indicating an adequate level of tension corresponding with delivering a pressure in the range higher than venous pressure and lower than capillary pressure to the wearer's forehead.

13. The use according to any one of the preceding claims for holding an oximetry sensor on the forehead of a patient.

14. A system comprising an oximetry sensor and a headband for holding the oximetry sensor on the forehead of a patient, wherein:

the headband comprises an elastic segment (102) sized to fit around a wearer's head, and a non-elastic segment (104) being smaller than and attached with said elastic segment (102), said non-elastic segment (104) sized to span a portion of said elastic segment when said elastic segment (102) is stretched, said non-elastic segment (104) being larger than said portion of said elastic segment (102) it spans when said elastic (102) segment is not stretched, wherein the non-elastic segment (104) provides a visual indication of the tension of the headband, and the elastic segment (102) is sized to fit around a patient's head and over an oximetry sensor located on the forehead of a patient.

15. The system of claim 14 wherein said non-elastic segment (104) is sized to not project out from the surface of the elastic portion (102) when said headband is sufficiently tight thus indicating an adequate level of tension corresponding with delivering a pressure in the range higher than the venous pressure and lower than the capillary pressure to the oximetry sensor applied to the forehead of the patient.

Patentansprüche

1. Verwendung eines Kopfbandes zur Spannungsanzeige, wobei das Kopfband aufweist:

ein elastisches Segment (102), das so bemessen ist, dass es um den Kopf eines Trägers passt; und
ein nichtelastisches Segment (104), das kleiner ist als das und befestigt ist am elastischen Segment (102), wobei das nichtelastische Segment (104) bemessen ist, um einen Abschnitt des elastischen Segmentes zu überbrücken, wenn das elastische Segment (102) gedehnt wird, wobei das nichtelastische Segment (104) größer ist als der Abschnitt des elastischen Segmentes (102), den es überbrückt, wenn das elastische Segment (102) nicht gedehnt wird, wobei das nichtelastische Segment (104) eine visuelle Anzeige der Spannung des Kopfbandes vorlegt.

2. Verwendung nach Anspruch 1, bei der das Kopfband außerdem einen Verschlussmechanismus (108) aufweist, der mit dem elastischen Abschnitt verbunden ist.

3. Verwendung nach Anspruch 2, bei der der Verschlussmechanismus (108) ein Klettverschluss, ein Druckknopf, ein Knopf, ein Haftmittel, eine Stecknadel oder eine Kombination davon ist.

4. Verwendung nach Anspruch 1, bei der das elastische Segment (102) mit einer langen und einer kurzen Abmessung rechteckig geformt ist, und bei der das nichtelastische Segment (104) entlang einer Reihe seiner Ränder am elastischen Segment befestigt ist, wobei die Reihe der Ränder im Allgemeinen parallel zur kurzen Abmessung verläuft.

5. Verwendung des Kopfbandes nach Anspruch 1, bei der das nichtelastische Segment (104) am elastischen Segment (102) so befestigt ist, dass das nichtelastische Segment (104) aus der Oberfläche des elastischen Abschnittes herausragt, wenn das Kopfband nicht ausreichend straff ist, wodurch eine Schlinge gebildet wird, die einen visuellen Hinweis darauf liefert, dass das Kopfband nachgespannt werden muss.

6. Verwendung nach Anspruch 1, bei der das nichtelastische Segment (104) mit einer Falte oder einer Knitterfalte ausgebildet ist, die bewirkt, dass der nichtelastische Abschnitt aus der Oberfläche des elastischen Abschnittes in einer deutlichen Weise herausragt, während sich das elastische Segment zurückzieht.

7. Verwendung nach Anspruch 5, bei der das nichtelastische Segment (104) so bemessen ist, dass es nicht aus der Oberfläche des elastischen Abschnittes herausragt, wenn das Kopfband ausreichend straff ist, wodurch ein angemessenes Spannungsniveau angezeigt wird, das der Zuführung eines Druckes in dem Bereich, der höher ist als der Venendruck und niedriger ist als der Kapillardruck, zur Stirn des Trägers entspricht.

8. Verwendung eines Koptbandes zur Spannungsanzeige, wobei das Kopfband aufweist:

ein unelastisches Segment (604, 606), das so bemessen ist, dass es um den Kopf eines Trägers passt; und
ein elastisches Segment (602), das kleiner ist als das und befestigt ist am unelastischen Segment (604, 606), wobei das elastische Segment (602) bemessen ist, um einen Abschnitt des unelastischen Segmentes (604, 606) zu überbrükken, wenn das elastische Segment (602) gedehnt wird, wobei das elastische Segment (602) kleiner ist als der Abschnitt des unelastischen Segmentes (604, 606), den es überbrückt, wenn das elastische Segment (602) nicht gedehnt wird,
bei der das elastische Segment (602) am unelastischen Segment (604, 606) so befestigt ist, dass das nichtelastische Segment (606) aus der Oberfläche angrenzend an die Stirn eines Benutzers herausragt, wenn das Kopfband nicht ausreichend straff ist, wodurch eine Schlinge

gebildet wird, die einen visuellen Hinweis darauf liefert, dass das Kopfband nachgespannt werden muss.

9. Verwendung nach Anspruch 8, bei der das Kopfband außerdem einen Verschlussmechanismus aufweist, der mit dem elastischen Abschnitt verbunden ist.

10. Verwendung nach Anspruch 9, bei der der Verschlussmechanismus ein Klettverschluss, ein Druckknopf, ein Knopf, ein Haftmittel, eine Stecknadel oder eine Kombination davon ist.

11. Verwendung nach Anspruch 8, bei der das unelastische Segment (604, 606) mit einer langen und einer kurzen Abmessung rechteckig geformt ist, und bei der das elastische Segment (602) entlang einer Reihe seiner Ränder am unelastischen Segment (604, 606) befestigt ist, wobei die Reihe der Ränder im Allgemeinen parallel zur kurzen Abmessung verläuft.

12. Verwendung nach Anspruch 8, bei der das nichtelastische Segment (606) so bemessen ist, dass es nicht aus der Oberfläche herausragt, wenn das Kopfband ausreichend straff ist, wodurch ein angemessenes Spannungsniveau angezeigt wird, das der Zuführung eines Druckes in dem Bereich, der höher ist als der Venendruck und niedriger ist als der Kapillardruck, zur Stirn des Trägers entspricht.

13. Verwendung nach einem der vorhergehenden Ansprüche für das Halten eines Oximetersensors auf der Stirn eines Patienten.

14. System, das ein Oximetersensor und ein Kopfband für das Halten des Oximetersensors auf der Stirn eines Patienten aufweist, bei dem:

das Kopfband ein elastisches Segment (102), das so bemessen ist, dass es um den Kopf eines Trägers passt, und ein nichtelastisches Segment (104) aufweist, das kleiner ist als das und befestigt ist am elastischen Segment (102), wobei das nichtelastische Segment (104) bemessen ist, um einen Abschnitt des elastischen Segmentes zu überbrücken, wenn das elastische Segment (102) gedehnt wird, wobei das nichtelastische Segment (104) größer ist als der Abschnitt des elastischen Segmentes (102), den es überbrückt, wenn das elastische Segment (102) nicht gedehnt wird, wobei das nichtelastische Segment (104) eine visuelle Anzeige der Spannung des Kopfbandes vorlegt, und
das elastische Segment (102) so bemessen ist, dass es um den Kopf eines Patienten und über ein Oximetersensor passt, der auf der Stirn eines Patienten angeordnet ist.

15. System nach Anspruch 14, bei dem das nichtelastische Segment (104) so bemessen ist, dass es nicht aus der Oberfläche des elastischen Abschnittes (102) herausragt, wenn das Kopfband ausreichend straff ist, wodurch ein angemessenes Spannungsniveau angezeigt wird, das der Zuführung eines Druckes in dem Bereich, der höher ist als der Venendruck und niedriger ist als der Kapillardruck, zum Oximetersensor entspricht, der auf der Stirn des Patienten angebracht ist.

Revendications

1. Utilisation d'un bandeau pour indiquer la tension, le bandeau comprenant :

un segment élastique (102), dimensionné de sorte à pouvoir être ajusté autour de la tête d'un utilisateur : et
un segment non élastique (104), plus petit que ledit segment élastique (102) et fixé sur celui-ci, ledit segment non élastique (104) étant dimensionné de sorte à s'étendre sur une partie dudit segment élastique lorsque ledit segment élastique (102) est étiré, ledit segment non élastique (104) étant plus grand que ladite partie dudit segment élastique (102) sur laquelle il s'étend lorsque ledit segment élastique (102) n'est pas étiré, le segment non élastique (104) fournissant une indication visuelle de la tension du bandeau.

2. Utilisation selon la revendication 1, dans lequel le bandeau comprend en outre un mécanisme de fermeture (108) accouplé à ladite partie élastique.

3. Utilisation selon la revendication 2, dans laquelle ledit mécanisme de fermeture (108) est une fermeture auto-aguppante, un bouton-pression, un bouton, un adhésif, une broche ou une combinaison de ces éléments.

4. Utilisation selon la revendication 1, dans laquelle ledit segment élastique (102) a une forme rectangulaire, ayant une dimension longue et une dimension courte, ledit segment non élastique (104) étant fixé le long d'un ensemble de ses bords sur ledit segment élastique, ledit ensemble de bords étant en général, parallèle à ladite dimension courte.

5. Utilisation du bandeau selon la revendication 1, dans laquelle ledit segment non élastique (104) est fixé sur ledit segment élastique (102) de sorte que ledit segment non élastique (104) déborde hors de la surface de la partie élastique lorsque ledit bandeau n'est pas suffisamment serré, formant ainsi une boucle

fournissant une indication visuelle du fait que le bandeau doit être resserré.

6. Utilisation selon la revendication 1, dans laquelle ledit segment non élastique (104) comporte un pliage ou un pli, entraînant le débordement prononcé de ladite partie non élastique hors de la surface de la partie élastique lors de la rétraction du segment élastique.

7. Utilisation selon la revendication 5, dans laquelle ledit segment non élastique (104) est dimensionné de sorte à ne pas déborder hors de la surface de la partie élastique lorsque ledit bandeau est suffisamment serré, indiquant ainsi un niveau de tension approprié, correspondant à l'application d'une pression comprise dans l'intervalle des valeurs supérieures à la pression veineuse et inférieures à la pression capillaire appliquée au front de l'utilisateur.

8. Utilisation d'un bandeau pour indiquer la tension, le bandeau comprenant :

un segment non élastique (604, 606) dimensionné de sorte à pouvoir être ajusté autour de la tête d'un utilisateur ; et
un segment élastique (602), plus petit que ledit segment inélastique (604, 606) et fixé sur celui-ci, ledit segment élastique (602) étant dimensionné de sorte à s'étendre sur une partie dudit segment inélastique (604, 606) lorsque ledit segment élastique (602) est étiré, ledit segment élastique (602) étant plus petit que ladite partie dudit segment inélastique (604, 606) sur laquelle il s'étend lorsque ledit segment élastique (602) n'est pas étiré ;
ledit segment élastique (602) étant fixé sur ledit segment inélastique (604, 606) de sorte que ledit segment non élastique (606) déborde hors de la surface adjacente au front d'un utilisateur lorsque ledit bandeau n'est pas suffisamment serré, formant ainsi une boucle fournissant une indication visuelle du fait que le bandeau doit être resserré.

9. Utilisation selon la revendication 8, le bandeau comprenant en outre un mécanisme de fermeture accouplé à ladite partie élastique.

10. Utilisation selon la revendication 9, dans laquelle ledit mécanisme de fermeture est une fermeture autoagrippante, un bouton-pression, un bouton, un adhésif, une broche ou une combinaison de ces éléments.

11. Utilisation selon la revendication 8, dans laquelle ledit segment inélastique (604, 606) a une forme rectangulaire, ayant une dimension longue et une dimension courte, ledit segment élastique (602) étant fixé le long d'un ensemble de ses bords sur ledit segment inélastique (604, 606), ledit ensemble de bords étant en général parallèle à ladite dimension courte.

12. Utilisation selon la revendication 8, dans laquelle ledit segment non élastique (606) est dimensionné de sorte à ne pas déborder hors de ladite surface lorsque ledit bandeau est suffisamment serré, indiquant ainsi un niveau de tension approprié, correspondant à l'application d'une pression comprise dans l'intervalle des valeurs supérieures à la pression veineuse et inférieures à la pression capillaire au front de l'utilisateur.

13. Utilisation selon l'une quelconque des revendications précédentes, pour retenir un capteur d'oxymétrie sur le front d'un patient.

14. Système comprenant un capteur d'oxymétrie et un bandeau pour retenir le capteur d'oxymétrie sur le font d'un patient, dans lequel :

le bandeau comprend un segment élastique (102) dimensionné de sorte à pouvoir être ajusté autour de la tête d'un utilisateur, et un segment non élastique (104), plus petit que ledit segment élastique (102) et fixé sur celui-ci, ledit segment non élastique (104) étant dimensionné de sorte à s'étendre sur une partie dudit segment élastique lorsque ledit segment élastique (102) est étiré, ledit segment non élastique (104) étant plus grand que ladite partie dudit segment élastique (102) sur laquelle il s'étend lorsque ledit segment élastique (102) n'est pas étiré, ledit segment non élastique (104) fournissant une indication visuelle de la tension du bandeau ; et
le segment élastique (102) étant dimensionné de sorte à pouvoir être ajusté autour de la tête d'un patient et au-dessus d'un capteur d'oxymétrie agencé sur le front d'un patient.

15. Système selon la revendication 14, dans lequel ledit segment non élastique (104) est dimensionné de sorte à ne pas déborder hors de la surface de la partie élastique (102) lorsque ledit bandeau est suffisamment serré, indiquant ainsi un niveau de tension approprié, correspondant à l'application d'une pression comprise dans l'intervalle des valeurs supérieures à la pression veineuse et inférieures à la pression capillaire au capteur d'oxymétrie appliqué sur le font du patient.

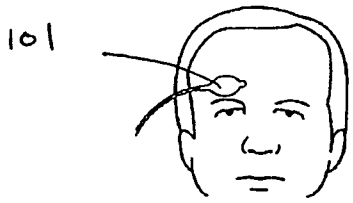

Fig. 1

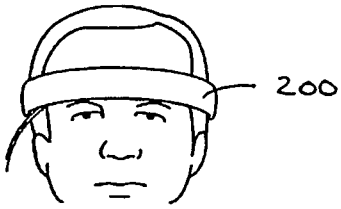

Fig. 2

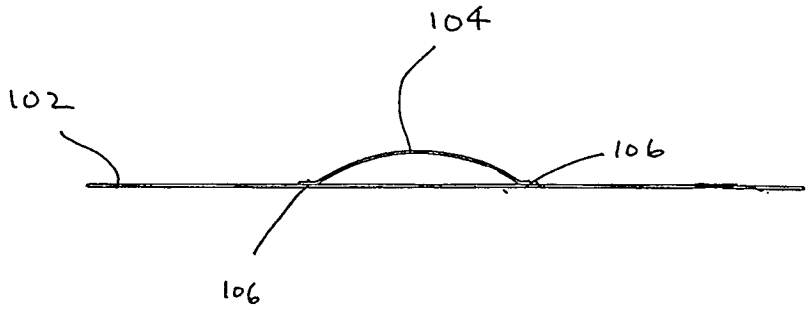

Fig. 3

Fig. 4A

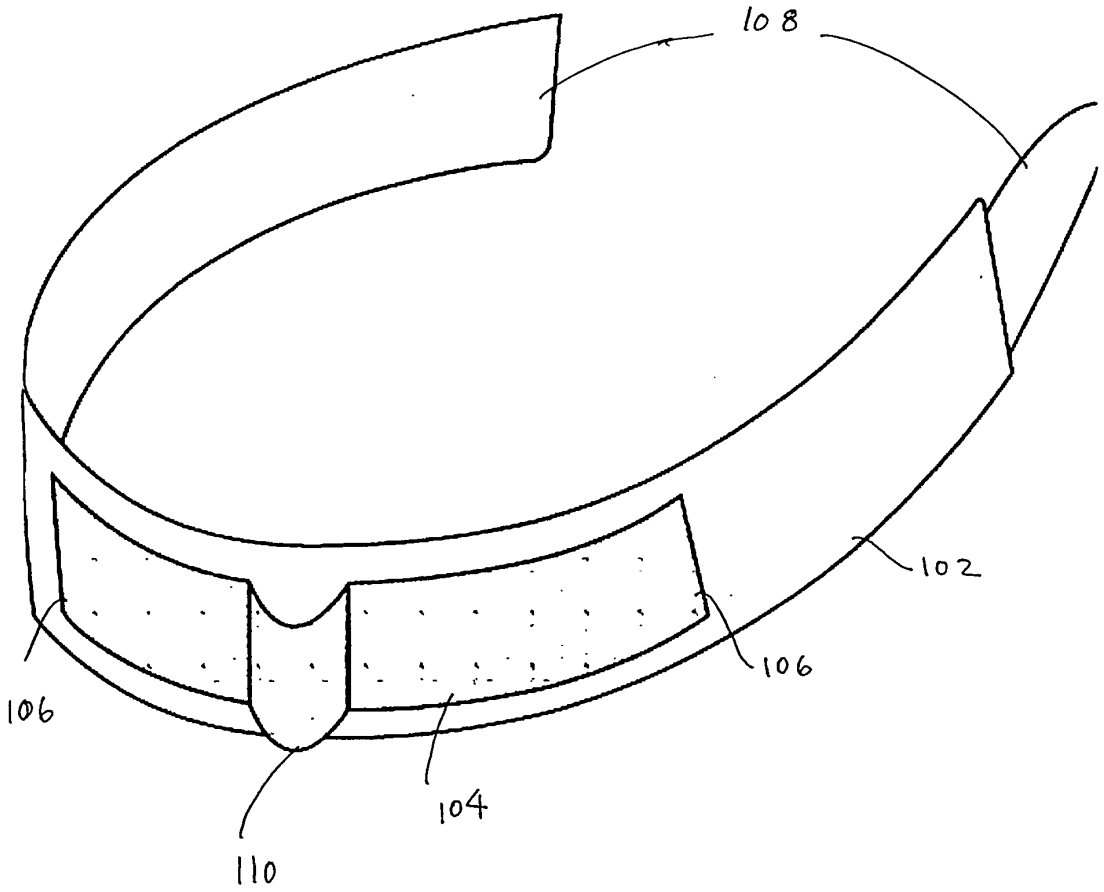

Fig. 4

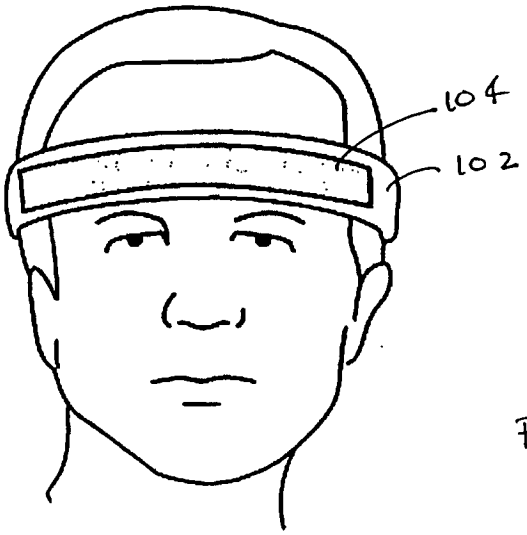

Fig. 5

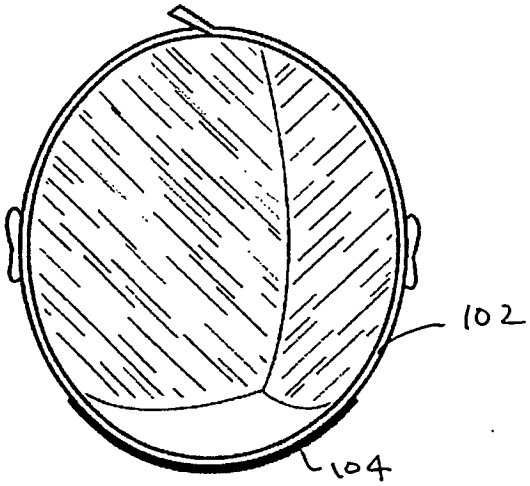

Fig. 6

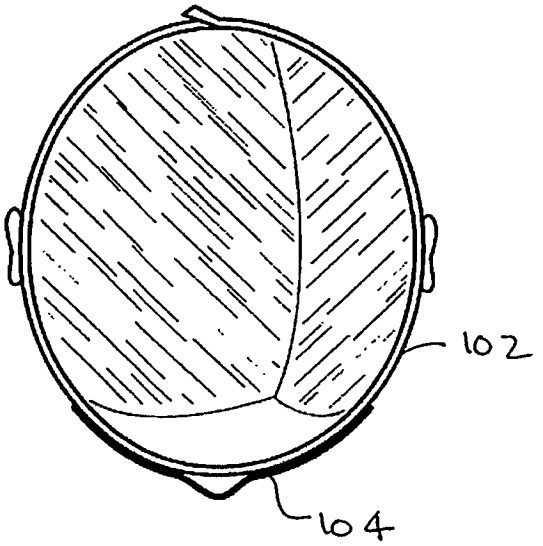

Fig. 7

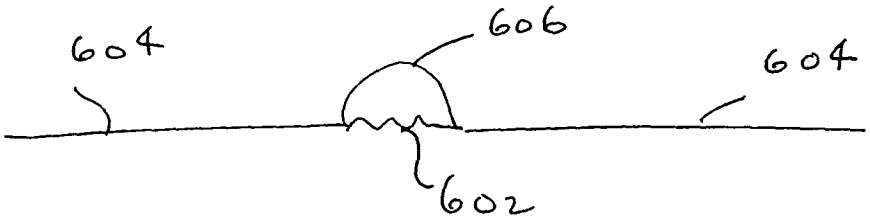

Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- US 5853364 A **[0018]**
- US 4911167 A **[0018]**
- US 5645059 A **[0018]**
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专利名称(译)	使用头带来指示张力和包括血氧测量传感器和头带的系统		
公开(公告)号	EP1549165B1	公开(公告)日	2010-09-01
申请号	EP2003773086	申请日	2003-10-01
[标]申请(专利权)人(译)	内尔科尔普里坦贝内特公司		
申请(专利权)人(译)	NELLCOR PURITAN BENNETT INCORPORATED		
当前申请(专利权)人(译)	NELLCOR PURITAN BENNETT LLC		
[标]发明人	HANNULA DON COAKLEY JOSEPH		
发明人	HANNULA, DON COAKLEY, JOSEPH		
IPC分类号	A41D20/00 A61B5/00		
CPC分类号	A61B5/6814 A41D20/00 A61B5/01 A61B5/14552		
优先权	60/415468 2002-10-01 US		
其他公开文献	EP1549165B8 EP1549165A1		
外部链接	Espacenet		

摘要(译)

一种头带（102），其具有张力指示器（110），该张力指示器（110）具有弹性部分（102），该弹性部分（102）的尺寸适于围绕佩戴者的头部;非弹性段（104）小于弹性段（102）并与弹性段（102）连接。当弹性段被拉伸时，非弹性段（104）的尺寸设计成跨越弹性段（102）的一部分，并且非弹性段（104）大于弹性段（102）的部分。当弹性段（102）未被拉伸时跨越。非弹性段（104）与弹性段连接，使得当头带不够紧时非弹性段（104）从弹性部分的表面突出，从而形成环（110））提供头带需要重新收紧的视觉指示。

Fig. 1

Fig. 2