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Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

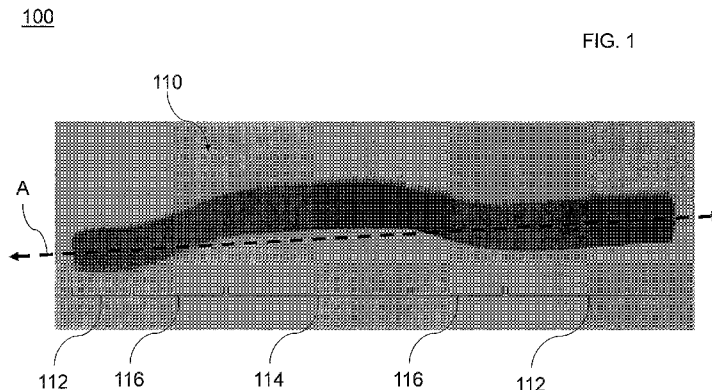
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- (54) **Title:** PROTECTIVE HEADBAND



(57) **Abstract:** Protective headbands are disclosed. One protective headband has a padding layer that includes a pair of first portions extending in a first direction along a first axis, a second portion extending in the first direction and spaced from the first axis, and a pair of angled portions connecting between the pair of first portions and the second portion. Another protective headband has a padding layer that includes a pair of first arcuate portions, and a second arcuate portion extending between the pair of first arcuate portions, the second arcuate portion curving in a same direction as the pair of first arcuate portions.

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PROTECTIVE HEADBAND

CROSS REFERENCE TO RELATED APPLICATIONS

This application is related to, and claims the benefit of priority of, U.S. Provisional Application No. 61/952,448, entitled PROTECTIVE HEADBAND, filed on 13 March, 2014, and U.S. Non-Provisional Application No. 14/262,935, entitled PROTECTIVE HEADBAND, filed on 28 April 2014, the contents of each of which are incorporated herein by reference in their entirety for all purposes.

FIELD OF THE INVENTION

The invention relates generally to the field of protective headgear, and more particularly, to impact-resistant padding for protective headbands.

BACKGROUND OF THE INVENTION

Conventionally, participants in "contact" sports (e.g., wrestling, football, rugby) wear protective headgear or headbands to cushion the force of impacts that are regularly received during those events. In recent years, the negative health effects of the impacts to the head experienced during such contact sports have been a matter of focus. These negative health effects can be diminished or minimized by effectively cushioning participants from the forces of impacts. Accordingly, improved structures, such as impact-resistant headbands, are desired to lessen the impact forces experienced by those participants.

SUMMARY OF THE INVENTION

Aspects of the invention are directed to protective headbands.

In accordance with one aspect of the present invention, a protective headband is disclosed. The protective headband has a padding layer. The padding layer includes a pair of first portions extending in a first direction along a first axis, a second portion extending in the first direction and spaced from the first axis, and a pair of angled portions connecting between the pair of first portions and the second portion.

In accordance with another aspect of the present invention, another protective headband is disclosed. The protective headband has a padding layer. The padding layer includes a pair of first arcuate portions, and a second arcuate portion extending between the pair of first arcuate portions, the second arcuate portion curving in a same direction as the pair of first arcuate portions.

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BRIEF DESCRIPTION OF THE DRAWINGS

The invention is best understood from the following detailed description when read in connection with the accompanying drawings, with like elements having the same reference numerals. When a plurality of similar elements are present, a single reference numeral may be assigned to the plurality of similar elements with a small letter designation referring to specific elements. When referring to the elements collectively or to a non-specific one or more of the elements, the small letter designation may be dropped. According to common practice, the various features of the drawings are not drawn to scale unless otherwise indicated. To the contrary, the dimensions of the various features may be expanded or reduced for clarity. Included in the drawings are the following figures:

FIG. 1 is a diagram illustrating an exemplary protective headband in accordance with aspects of the present invention;

FIG. 2 is a diagram illustrating the exemplary protective headband of FIG. 1 with a fabric cover; and

FIG. 3 is a diagram illustrating another exemplary protective headband in accordance with aspects of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The embodiments of the invention described herein relate to protective headbands and padding that incorporate impact-resistant materials to cushion the force of impacts to a user's head. As used herein, the term "impact-resistant" is intended to encompass any object that partially or fully lessens, diminishes, dissipates, deflects, or absorbs the mechanical force of an impact.

The exemplary protective headbands disclosed herein are particularly suitable for use by participants in athletic activities, including traditional "contact" sports, such as wrestling, American football, or rugby, where high-force impacts may be commonly experienced. While the exemplary embodiments of the invention are described herein with respect to athletic activities, it will be understood that the invention is not so limited. Suitable applications for the headbands of the present invention also include military helmets or construction helmets. Other suitable applications will be readily understood by one of ordinary skill in the art from the description herein.

Referring now to the drawings, FIG. 1 illustrates an exemplary protective headband 100 in accordance with aspects of the present invention. Headband 100 may be worn by a user during an athletic activity. Headband 100 may desirably be worn underneath one or more other pieces of protective headgear. As a general overview,

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headband 100 includes a padding layer 110. Additional details of headband 100 are described herein.

Padding layer 110 forms the body of headband 100. As shown in FIG. 1, padding layer 110 comprises a pair of first portions 112 extending in a first direction along an axis A. Further, padding layer 110 further comprises a second portion 114 extending in the same, first direction. As shown in FIG. 1, second portion 114 is spaced from axis A. Still further, padding layer 110 comprises a pair of angled portions 116 connecting between the first portions 112 and second portion 114. As shown in FIG. 1, angled portions 116 extend in an oblique direction relative to the first direction.

Padding layer 110 is formed from impact-resistant materials. For example, padding layer 110 may include a layer of elastomeric material. The elastomeric material may provide impact-resistance by absorbing and dissipating the force of impacts laterally along the surface of the elastomeric material. In one exemplary embodiment, padding layer 110 consists of only a single layer of elastomeric material. In another exemplary embodiment, padding layer 110 comprises two or more layers of elastomeric material. Padding layer 110 may include the layers of elastomeric material directly adjacent each other, or in a more preferred embodiment, may include a layer of high tensile strength fibrous material between the layers of elastomeric material.

Suitable materials for forming the elastomeric layer(s) include, but are not limited to, urethane rubbers, silicone rubbers, nitrile rubbers, butyl rubbers, acrylic rubbers, natural rubbers, styrene-butadiene rubbers, and the like. In general, any suitable elastomer material can be used to form the above-described elastomeric layers without departing from the scope of the present invention. Suitable materials for forming the layer of high tensile strength fibrous material include, but are not limited to, aramid fibers, fiberglass, or other high tensile strength fibers. The fibers may be woven to form a cloth layer that is disposed between and generally separates the opposing elastomeric layers. The high tensile strength fibrous material layer may desirably block and redirect impact energy that passes through one of the elastomeric layers. Additional description of materials for forming padding layer 110 may be found in U.S. Patent Application No. 09/978,130, the contents of which are incorporated herein by reference in their entirety for all purposes.

The materials and thickness of padding layer 110 can be selected such that padding layer 110 remains sufficiently flexible to allow the protective headband to maintain contact with a user's head along an entire circumference of the user's head. In an exemplary embodiment, padding layer 110 has a thickness of less than approximately 0.5 inches.

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Additionally, the order of materials in padding layer 110 may be important for providing optimal protection to the user. In an exemplary embodiment in which padding layer 110 includes a layer of elastomeric material and a layer of high-tensile strength fibrous material, the layer of high-tensile strength fibrous material is positioned closer to the user than the layer of elastomeric material. This may desirably protect the layer of high-tensile strength fibrous material from rips, tears, or punctures, as it may be more susceptible to such damage than the layer of elastomeric material.

It has been determined that headband 100 provides the greatest protection, and that the comfort of the user of headband 100 is enhanced, when second portion 114 is positioned over the user's lower forehead during use. Accordingly, angled portions 116 are desirably sized and shaped to position second portion 114 in the optimal position during use of headband 100. Additionally, second portion 114 may have a width that is greater than a width of the first portions 112 of padding layer 110 in order to provide greater protection to the user's forehead.

In a preferred embodiment, angled portions 116 extend at an angle between approximately 15° and approximately 23° relative to the first direction (along which extend first portions 112). In a more preferred embodiment, angled portions 116 extend at an angle between approximately 17° and approximately 21° relative to the first direction. Through extensive testing, the inventors have determined that these angular ranges provide the optimal balance of protection and comfort to the user of headband 100.

In another preferred embodiment, angled portions 116 have a length of between approximately 2-4 inches, and second portion 114 has a length of between approximately 4-7 inches. The particular lengths of second portion 114 and angled portions 116 may be selected based on the size of the user's head. Second portion 114 is preferably spaced from the first axis A by a distance of between approximately 0.5-2.0 inches.

As shown in FIG. 1, second portion 114 has a substantially straight shape (i.e., is substantially parallel to axis A). However, it will be understood that the invention is not so limited. In an alternative embodiment, second portion 114 may have a substantially arcuate shape (i.e., second portion 114 may be curved toward first axis A).

FIG. 2 shows protective headband 100 with an exemplary fabric layer 130 in accordance with aspects of the present invention. Fabric layer 130 is configured to surround padding layer 110. Fabric layer 130 may desirably provide a more comfortable feeling for the user of headband 100 than directly contact with padding layer 110.

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As shown in FIG. 2, fabric cover 130 may comprise at least one attachment mechanism 132 for attaching an end of one of the first portions 112 of padding layer 110 to the end of the other first portion 112 of padding layer 110. In an exemplary embodiment, attachment mechanism 132 comprises a hook and loop fastener. Alternative attachment mechanisms will be known to those of ordinary skill in the art. Examples of such mechanisms include buttons, snaps, buckles, clasps, etc. Attachment mechanism 132 desirably enables headband 100 to be adjustable in circumference to allow headband to snugly and comfortably fit on the user's head during use.

FIG. 3 illustrates another exemplary protective headband 200 in accordance with aspects of the present invention. Headband 200 may be worn by a user during an athletic activity. Headband 200 may desirably be worn underneath one or more other pieces of protective headgear. As a general overview, headband 200 includes a padding layer 210. Headband 200 includes substantially the same features of headband 100 except as described below.

As shown in FIG. 3, padding layer 210 comprises a pair of first arcuate portions 212 and a second arcuate portion 214 extending between the pair of first arcuate portions 212. Second arcuate portion 214 is curved in the same direction as the pair of first arcuate portions 212 (e.g., a counter-clockwise curve from left to right in FIG. 3). Padding layer 210 may be formed from any of the impact-resistant materials described above with respect to padding layer 110.

It has been determined that headband 200 provides the greatest protection, and that the comfort of the user of headband 200 is enhanced, when second arcuate portion 214 is positioned over the user's lower forehead during use. Accordingly, the length and radius of curvature of second arcuate portion 214 are desirably selected to place second arcuate portion 214 in the optimal position during use of headband 200.

In a preferred embodiment, second arcuate portion 214 has a different radius of curvature than the pair of first arcuate portions 212. For example, second arcuate portion 214 may have a radius of curvature between approximately 9-12 inches, and first arcuate portions 212 may have a radius of curvature between approximately 7-10 inches. Through extensive testing, the inventors have determined that these radii of curvature provide the optimal balance of protection and comfort to the user of headband 200. In particular, headband 200 desirably conforms more tightly to the user's head during athletic activities, and may increase compression on the head to prevent accidental dislodgement during athletic activities.

Padding layer 210 may further comprise one or more notches 216. Notches 216 can be formed at one or both ends of second arcuate portion 214. Notches 216 are formed on the inside of the curve of second arcuate portion 214 (*i.e.*, on the top side in

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FIG. 3). Notches 216 desirably allow padding layer 210 to better contour to the user's head during athletic activities, thereby providing better protection and a decreased change of dislodgement.

5 In an exemplary embodiment, notches 216 have a triangular shape, as shown in FIG. 3. However, it will be understood to one of ordinary skill in the art that the shape of notches 216 shown in FIG. 3, is illustrative, and is not intended to be limiting. Other suitable shapes for notches 216 will be known to one of ordinary skill in the art from the description herein.

10 Although the invention is illustrated and described herein with reference to specific embodiments, the invention is not intended to be limited to the details shown. Rather, various modifications may be made in the details within the scope and range of equivalents of the claims and without departing from the invention. In particular, any of the features described herein with respect to one embodiment may be provided in any of the other embodiments.

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What is Claimed:

1. A protective headband, the protective headband having a padding layer comprising:

5 a pair of first portions extending in a first direction along a first axis;

a second portion extending in the first direction and spaced from the first axis; and

a pair of angled portions connecting between the pair of first portions and the second portion.

10 2. The headband of claim 1, wherein the pair of angled portions extend in an oblique direction relative to the first direction.

3. The headband of claim 1, wherein the pair of angled portions extend at an angle between approximately 15° and approximately 23° relative to the first direction.

15 4. The headband of claim 3, wherein the pair of angled portions extend at an angle between approximately 17° and approximately 21° relative to the first direction.

5. The headband of claim 1, wherein the pair of angled portions have a length of between approximately 2-4 inches.

20 6. The headband of claim 1, wherein the second portion is spaced from the first axis a distance of between approximately 0.5-2.0 inches.

7. The headband of claim 1, wherein the padding layer comprises at least one layer of elastomeric material and at least one layer of high tensile strength fibrous material.

25 8. The headband of claim 7, wherein the at least one layer of high tensile strength fibrous material is configured to be positioned closer to the user than the at least one layer of elastomeric material when the headband is worn by a user.

30 9. The headband of claim 1, wherein the padding layer is sufficiently flexible to maintain contact with a user's head along an entire circumference of the user's head.

10. The headband of claim 1, wherein the second portion has a width greater than a width of either of the pair of first portions.

11. The headband of claim 1, wherein the second portion has a substantially straight shape.

12. The headband of claim 1, wherein the second portion has a substantially arcuate shape.

5 13. The headband of claim 1, further comprising a fabric layer surrounding the padding layer.

14. The headband of claim 1, wherein the fabric layer comprises at least one attachment mechanism for attaching an end of one of the first portions of the padding layer to an end of the other first portion of the padding layer.

10 15. A protective headband, the protective headband having a padding layer comprising:

a pair of first arcuate portions; and

a second arcuate portion extending between the pair of first arcuate portions, the second arcuate portion curving in a same direction as the pair of first arcuate portions.

15 16. The headband of claim 15, wherein the second arcuate portion has a radius of curvature different from a radius of curvature of the pair of first arcuate portions.

17. The headband of claim 16, wherein the radius of curvature of the second arcuate portion is between approximately 9-12 inches.

20 18. The headband of claim 16, wherein the radius of curvature of the pair of first arcuate portions is between approximately 7-10 inches.

19. The headband of claim 15, wherein the padding layer comprises at least one layer of elastomeric material and at least one layer of high tensile strength fibrous material.

25 20. The headband of claim 19, wherein the at least one layer of high tensile strength fibrous material is configured to be positioned closer to the user than the at least one layer of elastomeric material when the headband is worn by a user.

30 21. The headband of claim 15, wherein the padding layer is sufficiently flexible to maintain contact with a user's head along an entire circumference of the user's head.

22. The headband of claim 15, further comprising a fabric layer surrounding the padding layer.

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23. The headband of claim 22, wherein the fabric layer comprises at least one attachment mechanism for attaching an end of one of the first portions of the padding layer to an end of the other first portion of the padding layer.

5 24. The headband of claim 15, wherein the padding layer further comprises a notch formed at either end of the second arcuate portion, the notch formed on an inside of a curve of the second arcuate portion.

25. The headband of claim 24, wherein the padding layer comprises the notch at both ends of the second arcuate portion.

26. The headband of claim 24, wherein the notch has a triangular shape.

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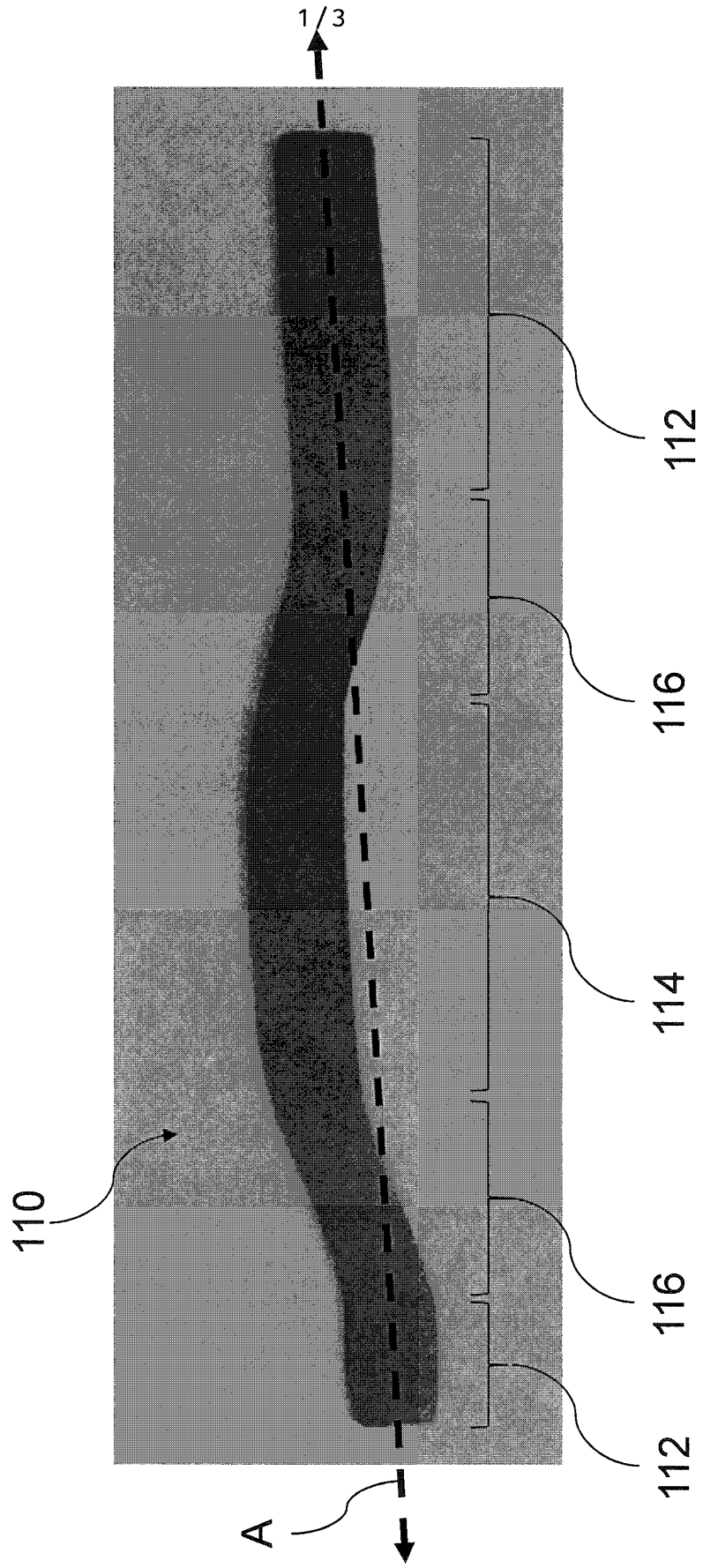


FIG. 1

100



FIG. 2

200

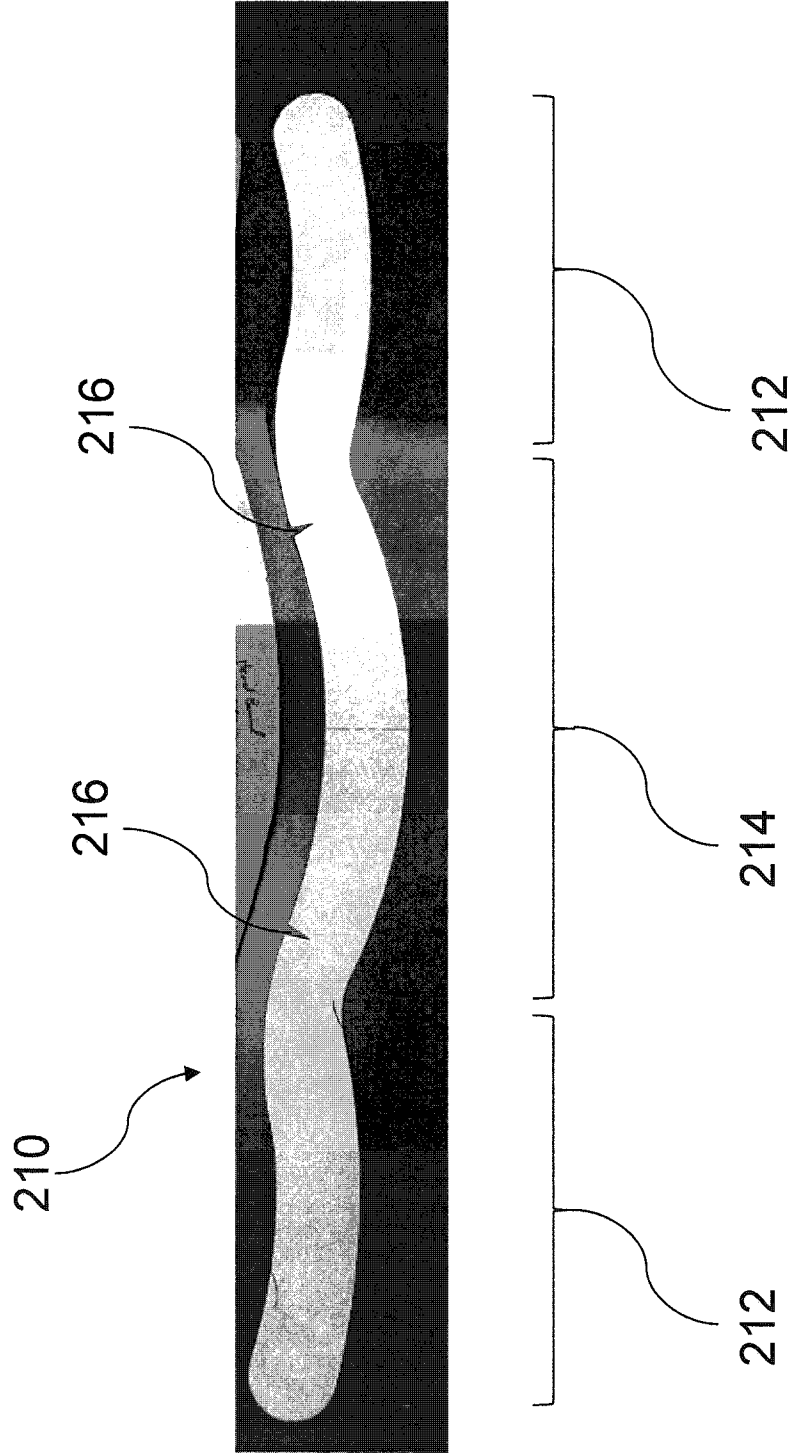


FIG. 3

A. CLASSIFICATION OF SUBJECT MATTER**A41D 13/00(2006.01)i, A42B 1/22(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
A41D 13/00; A42B 106; A41D 20/00; A63B 71/10; A42B 3/00; A63B 71/10; A42B 1/22Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: protective headbnd, padding layer, angle portion**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6438761 B1 (MCGARRITY, S.) 27 August 2002 See abstract; claims 1-3, 7; and columns 2-3, lines 1-56; and figure 3.	1-26
A	US 6000062 A (TRAKH, M.) 14 December 1999 See claims 1-4, 8; and figure 3.	1-26
A	US 6397399 B1 (LAMPE, J. K. et al.) 4 June 2002 See abstract; claim 1; and figures 3-5.	1-26
A	US 2005-0204456 A1 (PIPER, D. et al.) 22 September 2005 See abstract; claims 1-5; and figures 2a-3b.	1-26
A	US 6381760 B1 (LAMPE, J. K. et al.) 7 May 2002 See abstract; claim 1; and figures 1, 4, 6.	1-26

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family


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Name and mailing address of the ISA/KR

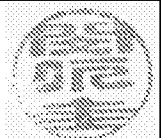

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2015/015590

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6438761 B1	27/08/2002	None	
US 06000062 A	14/12/1999	None	
US 6397399 B1	04/06/2002	None	
US 2005-0204456 A1	22/09/2005	None	
US 6381760 B1	07/05/2002	None	