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(54) Title: A HEAD RESTRAINT

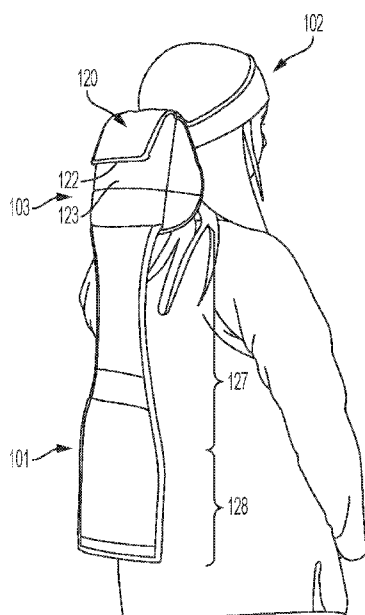


FIG. 1

(57) Abstract: A head restraint has a flexible tension strap, a forehead band and a shaped cushioning wedge member connected between the strap and the forehead band. The tension strap anchors the lower edge of the wedge member which acts as a fulcrum and the wedge member comprises structural integrity to be sufficiently rigid to act as a load arm to apply rearward load force on the forehead band against effort force applied against the front of the wedge member by the user's neck.



A head restraint

Field of the Invention

[0001] The present invention relates to a head restraint for use in a seated position.

Background of the Invention

[0002] Proper body positioning in a seated position is especially challenging, especially for that of the head.

[0003] Various devices have been developed to facilitate sleeping in a seated position including U-shaped stuffed or inflated pillows which go behind the neck. Whereas these pillows may prevent the head from lolling sideways somewhat, they are generally deficient in holding the head back. Furthermore, airline safety regulations may prevent attachment of head restraints to headrests of airline seats.

[0004] As such, various other prior art devices have been devised to specifically hold the head back without attachment to the headrest including those which use rigid support frames which anchor between the users back and the seat including US 9833025 B2 (KNAPP) 05 December 2017 which uses a rigid frame comprising a pair of rods, US 7004545 B2 (MILLER) 28 February 2006 which employs a rigid support holding back securing means for the head, US 9283878 B2 (IPNOS TECHNOLOGIES LLC) 15 March 2016 which has a rigid member which secures a head using support apparatus 105 and US 10343572 B2 (KNAPP) 09 July 2019 which uses a locking up brace and forehead support.

[0005] However, these rigid frames are cumbersome and hinder portability.

[0006] Other apparatus avoids rigid frames including US D670035 S (MIETH et al.) 30 October 2012 which uses a flexible tension strap connecting to a head attachment going over and in front of the head, US 2015/0042143 A1 (MCCARTER et al.) 12 February 2015 which uses a harness which is sat upon and which applies tension to a headpiece, US 4560201 A (SCOTT) 24 December 1985 which uses a similar arrangement as that of MCCARTER et al. but which may be wound around the forearm, US 8820838 B1 (PALMER) 02 September 2014 which discloses a similar

arrangement which attaches to a baseball cap and US 2011/0054372 A1 (MURNAGHAN) 03 March 2011 which uses a sheet connected to a cap.

[0007] However, these tension strap only head restraints may not sufficiently hold the head back and apply undesirous compressive force to the cervical spine when under tension.

[0008] The present invention seeks to provide a head restraint, which will overcome or substantially ameliorate at least some of the deficiencies of the prior art, or to at least provide an alternative.

[0009] It is to be understood that, if any prior art information is referred to herein, such reference does not constitute an admission that the information forms part of the common general knowledge in the art, in Australia or any other country.

Summary of the Disclosure

[0010] There is provided herein a head restraint which is devoid of the cumbersome rigid frames of the prior art arrangements and furthermore improves head restraint ability as compared to the nonrigid arrangements of the prior art.

[0011] The present head restraint comprises a flexible tension strap and a forehead band which holds the head back in a natural balanced position to enable rest whilst seated. The head restraint further comprises a shaped cushioning wedge member connected between the strap and the forehead band.

[0012] The wedge member has a generally planar rear continuing from the strap and a front being convex in vertical cross section. The front transitions rearwardly to a lower edge thereof to meet the strap and transitions rearwardly to an upper region thereof from where the forehead band is connected.

[0013] The convex front surface extends forwardly between the lower edge and the upper region such that, in use, when the tension strap is frictionally anchored between the users back and a seat, the tension strap anchors the lower edge of the wedge member which thereby acts as a fulcrum.

[0014] Furthermore, the wedge member comprises structural integrity to be sufficiently rigid to act as a load arm to apply a rearward load force to the forehead band against force applied against the front of the wedge member by the user's neck.

[0015] As such, as compared to the rigid frame arrangements of the prior art, the present apparatus is devoid of a rigid frame and can therefore be more easily handled and stowed, including by rolling up to compact form as is disclosed herein.

[0016] Furthermore, as compared to the nonrigid frame arrangements of the prior art which employ tension straps going up close in behind the head, the present structurally integral wedge member can apply greater rearward head restraining force higher up the head and at more of a horizontal angle as compared to the above prior art arrangements.

[0017] The wedge member may transition rearwardly at a lower region thereof to define an undersurface which bears downwardly on shoulders of the user in use.

[0018] The undersurface may be 45° or more with respect to a plane defined by the seat.

[0019] The wedge member may comprise structural sides either side of a core.

[0020] The structural sides may comprise semi-resilient foam pieces.

[0021] The structural sides may be shaped to define convex curvature of the wedge member.

[0022] Structural sides may be shaped to extend more forwardly at lower regions thereof.

[0023] The core may comprise less dense material as compared to the structural sides.

[0024] The structural sides and core may be covered with a material covering.

[0025] When the user's neck presses against the front in use, the material covering may presses inwardly into the core to pull the structural sides close in to wedge against sides of the neck for lateral stability.

[0026] The wedge member further may comprise a structural backboard at the rear thereof.

[0027] The structural backboard may comprise longitudinal formations along a vertical axis to enhance bending resilience thereof with respect to the vertical axis.

[0028] The forehead band may comprise relatively thin, stretchable and breathable material.

[0029] The forehead band may comprise material thinner than that of the strap.

[0030] The forehead band may widen towards a front thereof.

[0031] The head restraint may further comprise a flap which folds over an upper edge of the wedge member to secure the forehead band thereunderneath.

[0032] The flap may be secured along a front edge across the front of the wedge member and attachable to a rear of the wedge member at a rear edge thereof.

[0033] The rear edge may attach using hook and loop fasteners along a vertical length of the rear of the wedge member.

[0034] A head restraint may be provided with a plurality of forehead bands of differing diameters, each of which may be selected according to a head size.

[0035] The flap may comprise an interior concealed pocket within which the plurality of forehead bands may be stored.

[0036] A lower edge of the strap may comprise a widthwise fastener which attaches to a widthwise fastener strip along the strap and on an opposite side of the strap when the head restraint may be rolled up.

[0037] The widthwise fastener of the lower edge may be on a rear surface of the strap and the widthwise fastener along the strap may be on a front surface of the strap.

[0038] The strap further may comprise a widthwise carry strap between the widthwise fasteners.

[0039] The strap may comprise neoprene.

[0040] The strap may comprise sufficient length to extend to a lumbar region.

[0041] The strap may comprise in sufficient length to avoid being sat upon in use.

[0042] The strap may comprise a length from the wedge member of approximately 50 centimetres.

[0043] In use, the restraint may allow for hands-free adjustment wherein a user can adjust the tension applied by the strap by leaning forward to free the strap to tilt the head forwards or backwards before lying back again to reengage the strap to apply user adjustable tension.

[0044] The strap may be approximately 18 centimetres wide.

[0045] The strap may comprise an upper narrowed thoracic region section and a lower widened lumbar region section.

[0046] The widened lumbar region may comprise substantially the same width of that of the wedge member.

[0047] Other aspects of the invention are also disclosed.

Brief Description of the Drawings

[0048] Notwithstanding any other forms which may fall within the scope of the present invention, preferred embodiments of the disclosure will now be described, by way of example only, with reference to the accompanying drawings in which:

[0049] Figure 1 shows a rear perspective view of a head restraint being worn by a user;

[0050] Figure 2 shows a side perspective view of the head restraint;

[0051] Figures 3 and 4 show interior horizontal plane cross-sectional views of a shaped cushioning wedge member of the head restraint in accordance with an embodiment;

[0052] Figure 5 illustrates the application of the head restraint and the various forces applied thereby to restrain the head;

[0053] Figure 6 shows a front perspective view of the head restraint;

[0054] Figure 7 shows a rear perspective view of the head restraint;

[0055] Figure 8 illustrates the head restraint rolled up into compact form; and

[0056] Figure 9 illustrates physical forces applied by the cushioning wedge member.

Description of Embodiments

[0057] A head restraint 100 comprises a flexible material tension strap 101, a retaining forehead band 102 and a shaped cushioning wedge member 103 connected between the strap 101 and the forehead band 102.

[0058] As best shown in Figure 5, the wedge member 103 has a generally planar rear 106 continuing from the strap 101 at a lower edge 107 thereof.

[0059] The wedge member 103 comprises a front 108 being generally convex in side view vertical cross section which transitions rearwardly to the lower edge 107 to meet

the strap 101 and transitions rearwardly to an upper region 109 from where the forehead band 102 is connected.

[0060] As shown in Figure 5, and with further reference to Figure 9, when the tension strap 101 is frictionally anchored between the spine of a user and a seat 110, the lower edge 107 acts as a fulcrum 113. The wedge member 103 comprises structural integrity to be sufficiently rigid to act as a load arm 114 to apply rearward load force 111 on the forehead band 102 against effort force 112 applied against the front 108 by the user's neck 119.

[0061] As is further illustrated in Figure 5, the wedge member 103 may transition rearwardly at relatively steep angle at a lower region thereof to define an undersurface 115 of 45° or more with respect to a plane defined by the seat which may bear downwardly on the shoulders on the user in use, thereby additionally pivoting the wedge member 103 rearwardly about the lower edge 107/fulcrum 113 to apply additional rearward load force 111 to the forehead band 102 to hold the head back.

[0062] The wedge member 103 may comprise interior structural members to provide the sufficient resilience to act as the load arm 114. The interior structural members may comprise foam pieces.

[0063] With reference to Figure 3, the wedge member 103 may comprise structural sides 116 either side of a core 117. The structural sides 116 may comprise semi-resilient foam pieces which may be shaped to define the convex shape illustrated in Figure 5. The structural sides 116 may be shaped to extend more forwardly at lower regions thereof so as to conform forwardly around the neck region as compared to an upper head region.

[0064] The core 117 may comprise less dense foam or non-integral pieces, such as stuffing, shredded foam pieces and or the like. The core 117 may comprise memory foam.

[0065] The wedge member 103 may be covered at the front within a material covering 118. The rear of the wedge member 103 may comprise the same material as that of the strap 101, such as of neoprene.

[0066] In embodiments, the core 117 may allow a gap between a front surface thereof and the material covering 118.

[0067] As is illustrated in Figure 4, when the user's neck 119 presses against the front 108, the material covering 118 may be pressed inwardly into the core 117 to pull in the structural sides 112 close in as is illustrated to wedge in against the sides of the neck 119, thereby providing lateral support to prevent the head lolling sideways.

[0068] The wedge member 103 may further comprise a structural backboard 129 such as of card or plastic. The structural backboard 129 may comprise longitudinal formations (such as corrugations or fluting) along a vertical axis to enhance the bending resilience thereof with respect to the vertical axis.

[0069] Whereas in embodiments the forehead band 102 may be adjustable, in accordance with a preferred embodiment, forehead band 102 is of fixed length. The forehead band 102 may be of relatively thin, slightly stretchable and breathable material to comfortably engage across the forehead without inducing sweat buildup. As shown in Figure 5, the forehead band 102 may widen towards a front thereof.

[0070] In embodiments, the forehead band may comprise a pair of lateral buttons or similar attachments such as approximately collocating to the position of the ears to which a facemask may be attached, rather than around the ears.

[0071] As is shown in Figures 1, 6 and 7, a flap 120 may fold over an upper edge of the wedge member 103 to secure the forehead band 102 thereunderneath. The flap 120 may be secured along a front edge 121 thereof across the front 108 of the wedge member 103 are shown in Figure 6 and attached to a rear of the wedge member 103 at a rear edge 122 thereof. The rear edge 122 may attach using hooks and loop fasteners. Specifically, the rear edge 122 may comprise a hook strap which attaches anywhere along the length of a loop backing 123.

[0072] The head restraint 102 may be provided with a plurality of forehead bands 102, each of which may be selected depending on the size of one's head. The flap 120 may comprise an interior concealed pocket there underneath (not shown) within which a plurality of these forehead bands may be stored, along with other accessories, such

as headphones, eye patches and the like. Alternatively, the flap 120 may allow the user to use another forehead band 102 of one's own choice.

[0073] The head restraint 100 may be rolled up in the manner illustrated in Figure 8. The head restraint 100 may attach to itself using hook and loop fasteners. Specifically, with reference to Figure 1, a rear lower edge of the strap 101 may comprise a rear widthwise fastener strip 124 which attaches to a front widthwise fastener strip 125 along the strap 101.

[0074] To roll up the head restraint 101, the wedge member 103 may be rolled along a rear surface of the strap 101 until the rear fastener strip 104 can attach to the front fastener strip 125. The strap 101 may comprise a front widthwise carry strap 126 between the rear fastener strip 124 and the front fastener strip 125.

[0075] The strap 101 preferably comprises neoprene which was found to provide sufficient resilience yet slight stretchability, comfort and frictional engagement ability to wedge behind the back of the user. The neoprene may be approximately 4 mm thick. In embodiments, the neoprene may comprise perforations for breathability and to reduce sweating, especially such as towards the upper back, neck region. Such perforations may further reduce the overall weight of the restraint 100 by approximately 5%.

[0076] As illustrated in Figure 1, the strap 101 may have sufficient length to extend along a thoracic region 127 of the user. In a preferred embodiment, the strap 101 has sufficient length to extend additionally along a lumbar region 128. The strap 101 however is preferably not too long to avoid being sat upon in use.

[0077] In this regard, the strap 101 comprise a length from the wedge member 103 of approximately 50 centimetres.

[0078] In embodiments, the strap 101 may be length adjustable by folding the strap 101 back on itself. For example, with reference to Figure 7, the rear widthwise fastener strip 124 may comprise hook fasteners. Furthermore, the entire or substantially entire rear surface of the strap 101 may comprise loop fasteners. As such, the user may fold the bottom end of the strap 101 back on itself such that the rear widthwise fastener strip engages and holds along the strap 101. In this way, for

example for example, the user may adjust the length of the strap to between approximately 20 cm – 50 cm.

[0079] The length of the strap 101 allows the user to adjust the tension applied thereby by leaning forward to free the strap 101 wherein the head can be tilted forwards or backwards before lying back again to reengage the strap 101 to apply user adjustable tension.

[0080] The strap 101 may be sufficiently wide to provide sufficient frictional engagement and prevent slippage in use. The strap 101 may be approximately 18 centimetres wide. The strap 101 may comprise an upper narrowed section 104 at the thoracic region 127 which widens to a lower wider section 105 at the lumbar region 108 to gain most frictional purchase at the lower wider section 105 which extends further rearwardly against the seat. Furthermore, the wider section 105 may encapsulate the wedge member 103 when the restraint 100 is rolled in the manner shown in Figure 8. The narrowed section may reduce the overall weight of the restraint 100. The wider section 105 may comprise substantially the same width of that of the wedge member 103.

[0081] In embodiments, smaller versions of the restraint 100 may be produced for use by children.

[0082] The foregoing description, for purposes of explanation, used specific nomenclature to provide a thorough understanding of the invention. However, it will be apparent to one skilled in the art that specific details are not required in order to practise the invention. Thus, the foregoing descriptions of specific embodiments of the invention are presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed as obviously many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the following claims and their equivalents define the scope of the invention.

[0083] The term “approximately” or similar as used herein should be construed as being within 10% of the value stated unless otherwise indicated.

Claims

1. A head restraint comprising
a flexible tension strap;
a forehead band;
a shaped cushioning wedge member connected between the strap and the forehead band, wherein:

the wedge member has a generally planar rear continuing from the strap and a front being convex in vertical cross section which transitions rearwardly to a lower edge thereof to meet the strap and to an upper region thereof from where the forehead band is connected and wherein the convex front surface extends forwardly between the lower edge and the upper region such that, in use, when the tension strap is caught between a user's back and a seat, the tension strap anchors the lower edge of the wedge member which acts as a fulcrum and the wedge member comprises structural integrity to be sufficiently rigid to act as a load arm to apply rearward load force on the forehead band against effort force applied against the front of the wedge member by the user's neck.
2. The head restraint as claimed in claim 1, wherein the wedge member transitions rearwardly at a lower region thereof to define an undersurface which bears downwardly on shoulders of the user in use.
3. The head restraint as claimed in claim 1, wherein the undersurface is 45° or more with respect to a plane defined by the seat.
4. The head restraint as claimed in claim 1, wherein the wedge member comprises structural sides either side of a core.
5. The head restraint as claimed in claim 4, wherein the structural sides comprise semi-resilient foam pieces.
6. The head restraint as claimed in claim 4, wherein the structural sides are shaped to define convex curvature of the wedge member.
7. The head restraint as claimed in claim 4, wherein structural sides are shaped to extend more forwardly at lower regions thereof.

8. The head restraint as claimed in claim 4, wherein the core comprises less dense material as compared to the structural sides.
9. The head restraint as claimed in claim 4, wherein the structural sides and core is covered with a material covering.
10. The head restraint as claimed in claim 9, wherein, when the user's neck presses against the front in use, the material covering presses inwardly into the core and pulls the structural sides close in to wedge against sides of the neck for lateral stability.
11. The head restraint as claimed in claim 1, wherein the wedge member further comprises a structural backboard at the rear thereof.
12. The head restraint as claimed in claim 11, wherein the structural backboard comprises longitudinal formations along a vertical axis to enhance bending resilience thereof with respect to the vertical axis.
13. The head restraint as claimed in claim 1, wherein the forehead band comprises relatively thin, stretchable and breathable material.
14. The head restraint as claimed in claim 1, wherein the forehead band comprises material thinner than that of the strap.
15. The head restraint as claimed in claim 1, wherein the forehead band widens towards a front thereof.
16. The head restraint as claimed in claim 1, further comprising a flap which folds over an upper edge of the wedge member to secure the forehead band thereunderneath.
17. The head restraint as claimed in claim 16, wherein the flap is secured along a front edge across the front of the wedge member and attachable to a rear of the wedge member at a rear edge thereof.
18. The head restraint as claimed in claim 17, wherein the rear edge attaches using hook and loop fasteners along a vertical length of the rear of the wedge member.

19. The head restraint as claimed in claim 16, wherein a head restraint is provided with a plurality of forehead bands of differing diameters, each of which may be selected according to a head size.
20. The head restraint as claimed in claim 19, wherein a flap comprises an interior concealed pocket within which the plurality of forehead bands are stored.
21. The head restraint as claimed in claim 1, wherein a lower edge of the strap comprises a widthwise fastener which attaches to a widthwise fastener strip along the strap and on an opposite side of the strap when the head restraint is rolled up.
22. The head restraint as claimed in claim 21, wherein the widthwise fastener of the lower edge is on a rear surface of the strap and the widthwise fastener along the strap is on a front surface of the strap.
23. The head restraint as claimed in claim 21, wherein the strap further comprises a widthwise carry strap between the widthwise fasteners.
24. The head restraint as claimed in claim 1, wherein the strap comprises neoprene.
25. The head restraint as claimed in claim 1, wherein the strap comprises sufficient length to extend to a lumbar region.
26. The head restraint as claimed in claim 25, wherein the strap comprises in sufficient length to avoid being sat upon in use.
27. The head restraint as claimed in claim 26, wherein the strap comprises a length from the wedge member of approximately 50 centimetres.
28. The head restraint as claimed in claim 1, wherein, in use, a user can adjust the tension applied by the strap by leaning forward to free the strap to tilt the head forwards or backwards before lying back again to reengage the strap to apply user adjustable tension.
29. The head restraint as claimed in claim 1, wherein the strap is approximately 18 centimetres wide.
30. The head restraint as claimed in claim 29, wherein the strap comprises an upper narrowed thoracic region section and a lower widened lumbar region section.

31. The head restraint as claimed in claim 30, wherein the widened lumbar region comprises substantially the same width of that of the wedge member.

32. The head restraint as claimed in claim 1, wherein the strap is length adjustable by folding the strap back on itself wherein the strap comprises a rear widthwise fastener strip at a lower edge thereof and a substantial portion of the rear surface of the strap comprises corresponding fastener material, the rear widthwise fastener strip and the corresponding fastener material comprising hook and loop fasteners, so that, when the bottom edge of the strap is folded back on itself, the rear widthwise fastener strip engages and holds along the strap corresponding fastener material.

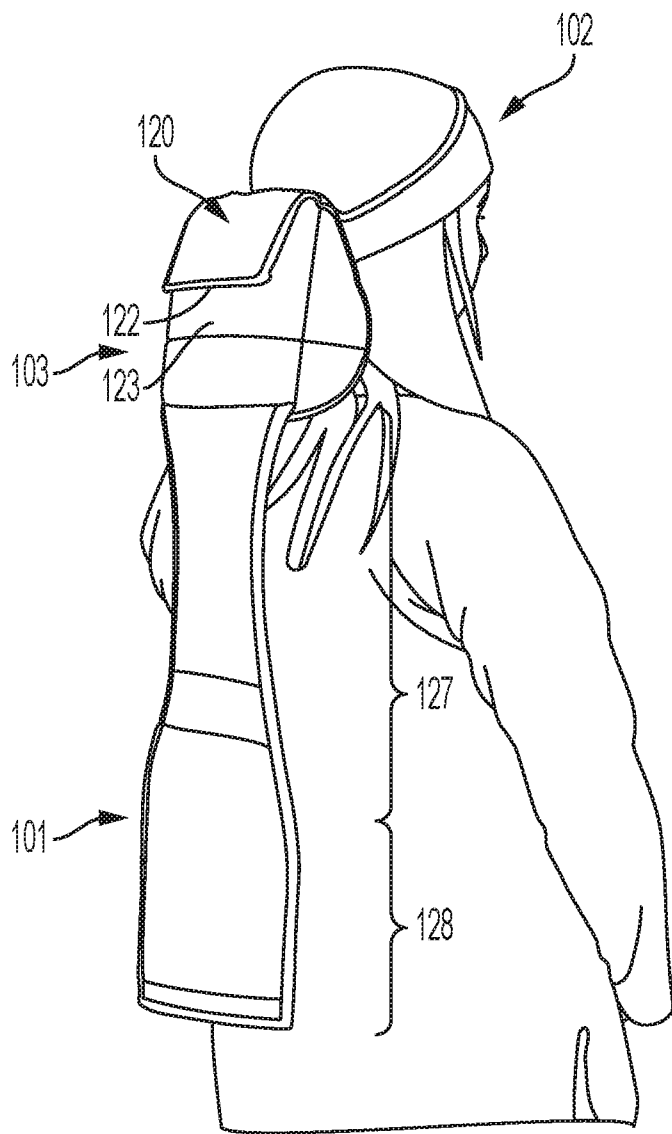


FIG. 1

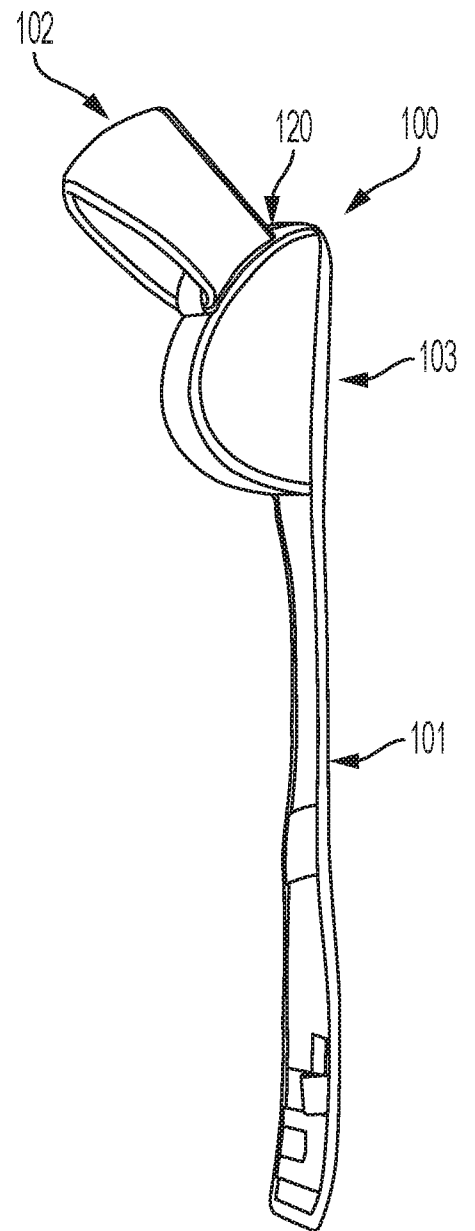


FIG. 2

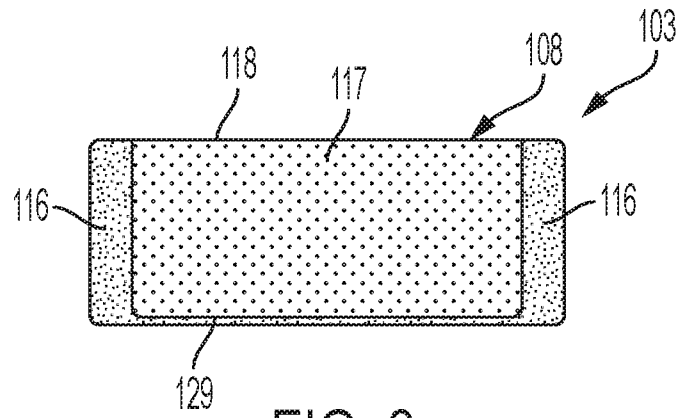


FIG. 3

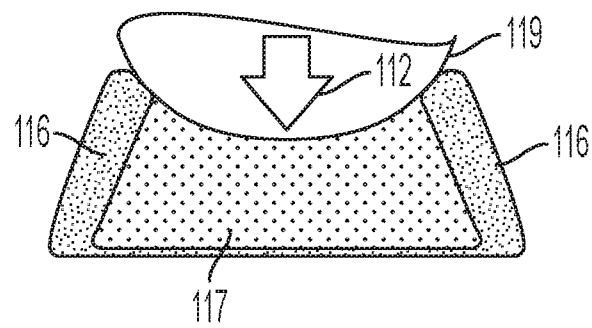


FIG. 4

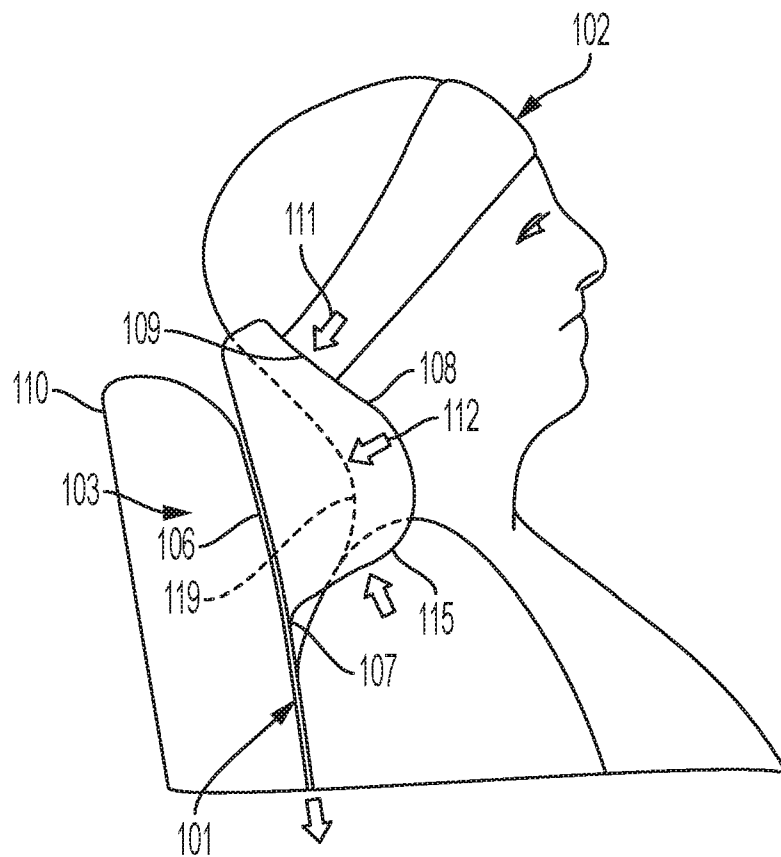
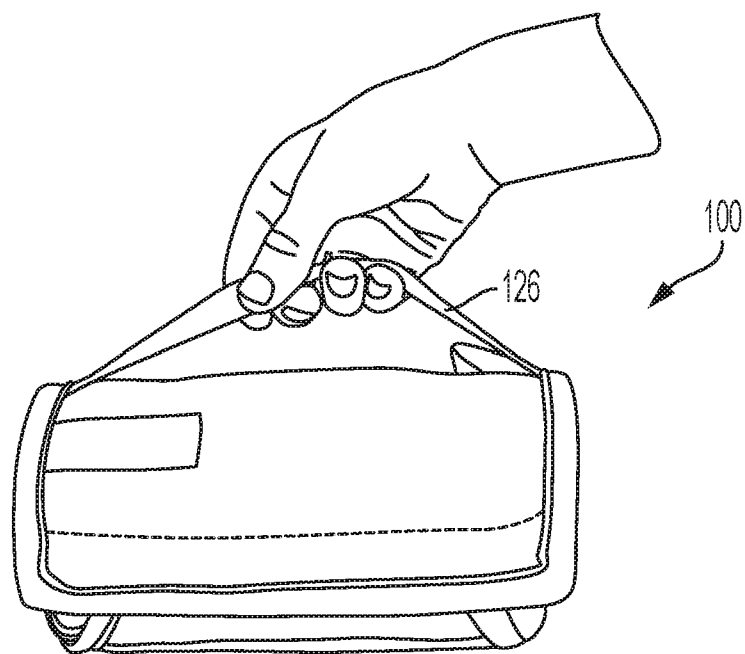
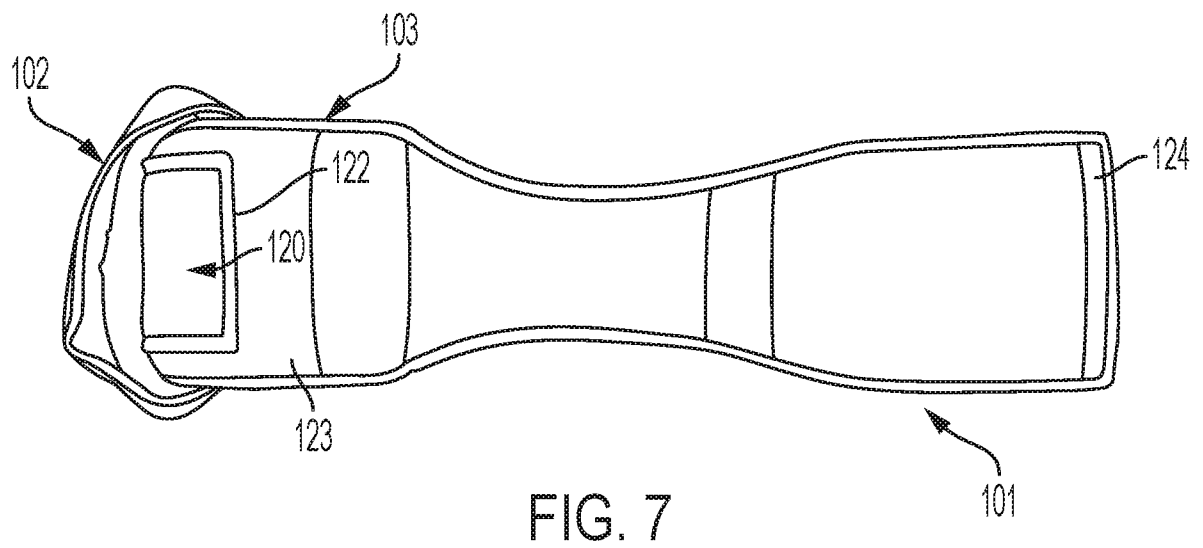
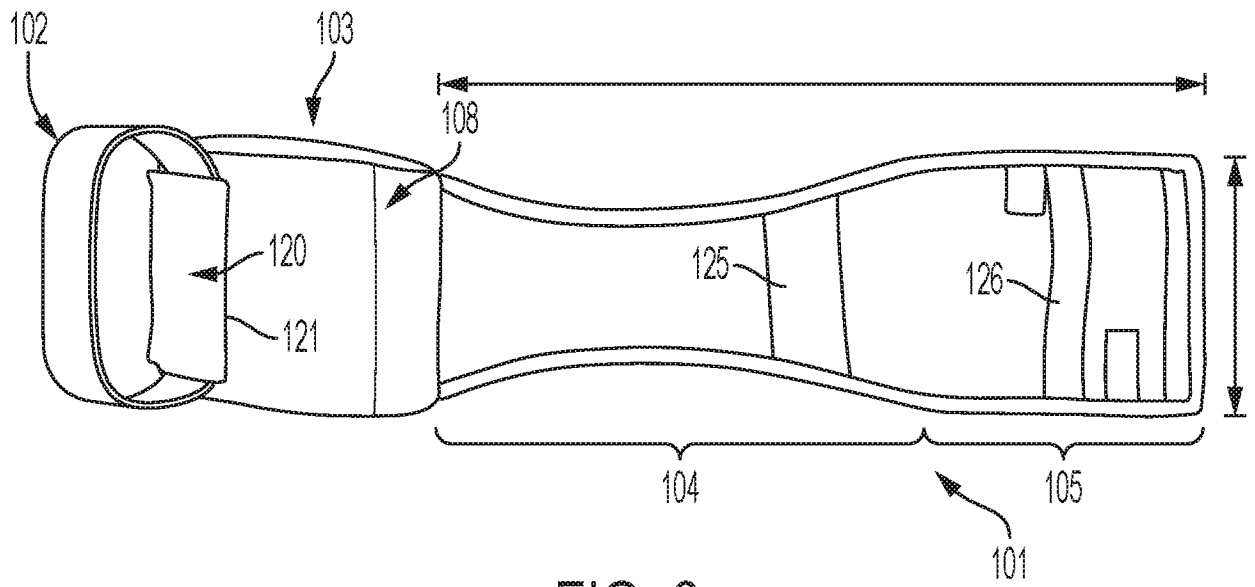


FIG. 5



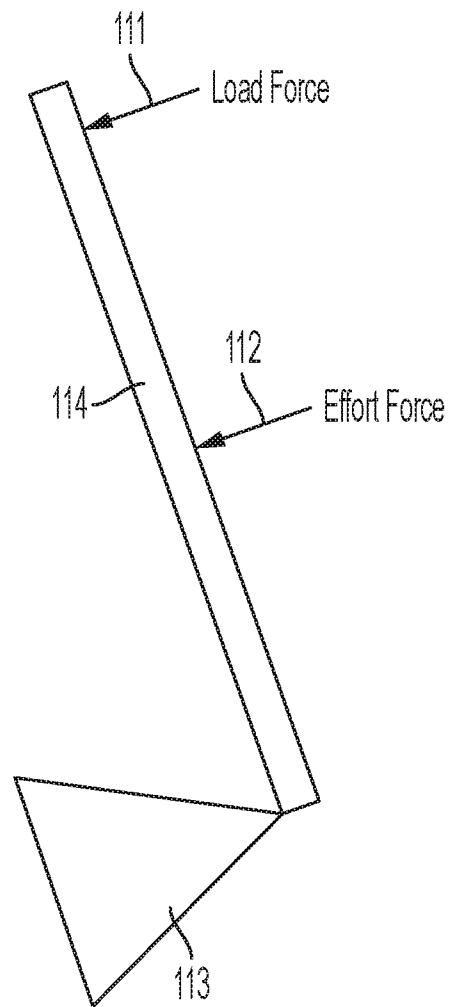


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2020/051086

A. CLASSIFICATION OF SUBJECT MATTER

A47C 7/38 (2006.01) A47C 16/00 (2006.01) B60N 2/882 (2018.01)

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PATENW: IPC/CPC (A47C7/383, A47C7/38, B60N2/882, A47C16/00, A47G9/1081, A61F5/3707, A61F5/055) and keywords (HEAD RESTRAINT, THORACIC, LUMBAR, SPINE, SPINAL, HEADBAND, CUSHION, PILLOW, CONVEX, SUPPORT, FRAME) and like terms.

Google Patents: (Head restraint, travel, pillow, cushion, thoracic, lumbar, support, press, force) and like terms.

Espacenet: A47c16 AND head AND flexible strap; A47c16 AND head AND (flexible OR elastic OR stretch) AND strap

Applicant and Inventor search in PATENW, AUSPAT and IP Australia internal databases.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



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	"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
"D"	document cited by the applicant in the international application	"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
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"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
19 January 2021Date of mailing of the international search report
19 January 2021

Name and mailing address of the ISA/AU

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INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2020/051086
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 9833025 B2 (Travis Lyn Knapp) 05 December 2017 Figs. 3, 4 and 15; Col 2 lines 48 - 50	1 - 32
X	US 10343572 B2 (Travis Lyn Knapp) 09 July 2019 Fig. 9 and col 9 lines 36 - 46	1 - 32
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