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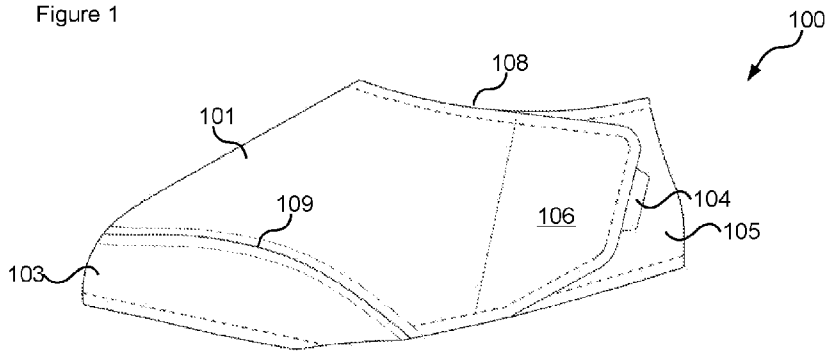
(54) **Title:** A THERMALLY INSULATIVE SKI BOOT

Figure 1



(57) **Abstract:** A thermally insulative ski boot covering comprising a body of unitary construction having an integrally formed vamp, toe box, longitudinal arch ladder, quarter and openable heel counter. These continually adjoining body parts comprise insulative material to provides whole-of-foot thermally insulative encapsulation including by having adequate coverage across the heel (which thermally insulates the Calcaneal branches of the Peroneal artery) and at the toes and which does not interfere with the bindings or purchase when walking.

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A thermally insulative ski boot

Field of the Invention

[1] This invention relates generally to thermally insulative coverings, mitts and the like for ski boots.

Background of the Invention

[2] Thermally insulative coverings for ski boots of various configurations exist including that which is disclosed in U.S. Pat. No. 3875687 A (Henderson) which discloses insulating covering for use on ski boots in unusually cold weather with provision at toe and heel for ski bindings.

[3] U.S. Pat. No. 20080295357 A1 (Long) discloses an insulating footwear cover which has an upper, and a wear-resistant sole portion extending beneath the bottom of the boot or shoe. The sole portion additionally overlaps a portion of the sides of the upper providing a wear-resistant patch over areas of the cover that are most susceptible to wear.

[4] U.S. Pat. No. 5893220 (Miller) provides a thermal ski boot cover made of elastomeric fabric, which covers primarily the toe portion of the boot, with the fabric ends of wrapped around the back of the foot and secured using releasable attaching means such as hook and loop fasteners. A bottom strip is present, which is sewn to each side of the boot cover and extends under the ski boot to hold the cover in place.

[5] A need exists for a ski boot covering which is easy to don and remove, which exposes the toe and heel bindings for ski connection and which maximises surface area coverage of the boot for maximising thermal insulation properties thereof and/or does not substantially affect footing purchase when walking.

[6] The present invention seeks to provide a thermally insulative ski boot covering, which will overcome or substantially ameliorate at least some of the deficiencies of the prior art, or to at least provide an alternative.

[7] 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

[8] There is provided herein a thermally insulative ski boot covering comprising a body of unitary construction having an integrally formed vamp, toe box, longitudinal arch ladder, quarter and openable heel counter.

[9] The longitudinal arch ladder is connected between medial and lateral rear edges of the toe box, thereby exposing a ball void through which a toe binding and ball of a ski boot is exposed. The vamp terminates at the quarter and the quarter has surface fasteners thereon. The quarter does not extend past an imaginary calf line. However, the heel counter has a longer length than that of the quarter, so as to thereby be able to extend around the calf line and has heel counter surface fasteners thereon for attachment to the quarter surface fasteners, thereby encircling a heel void through which a heel and heel bindings of the ski boot are exposed. The vamp overlays a throat line to form a top line with the heel counter.

[10] Preferably the quarter locates laterally and has the surface fasteners on an inner surface thereof which overlays the heel counter surface fasteners of the distal end of the heel counter extending thereunderneath.

[11] Unlike the aforedescribed prior art configurations, the present configuration allows for a ski boot covering which is easy to don and remove, which exposes toe and heel bindings for ski connection whilst providing effective thermal insulation (as is evident from the temperature drop-off observations shown in Figures 13 and 14) and which does not substantially affect purchase when walking.

[12] Specifically, with reference to Miller for example, the primary design consideration of Miller is for weather shielding whereas the present invention seeks to maximise thermal insulation properties without interfering with bindings.

[13] For example, the underside strip of Miller transitions under the ball of the boot, thereby interfering with the purchase thereof when walking. Conversely, the present covering comprises a longitudinal arch ladder which is more rearwardly located so as to go under the arch of the boot between the ball and heel voids, thereby leaving both the ball and the heel of the boot entirely or at least substantially exposed.

[14] With reference to Figure 6, the longitudinal arch ladder may locate rearwardly more than 30% of the length of the binding from the front. For example, for the exemplary length of 330 mm, the longitudinal arch ladder may start more than 100 mm from the front of the covering, such as at approximately 118 mm as shown, thereby substantially exposing the ball of the boot so as to not be tread upon in use.

[15] Furthermore, the configuration of Miller requires a very thin strip for walking on, unlike the longitudinal arch ladder which can be of a thicker more insulative material (such as neoprene) as the present longitudinal arch ladder is not stepped upon whilst walking,

thereby allowing for enhanced thermal insulation underfoot without affecting footing purchase when walking.

[16] Furthermore, Miller specifically states that the downward slope of the rearward upper edge is critical as it leaves the entire boot shaft exposed for access for boot adjustment mechanisms.

[17] However, such configuration exposes the heel to thermal loss. As such, the vamp and the openable heel counter of the present covering forms a topline which is not rearwardly sloped like Miller and does not leave the heel exposed. With reference to Figure 6, a topline intersecting plane is substantially horizontal (i.e. less than 20° or 10° from the horizontal) so as to adequately cover the heels.

[18] Furthermore, the present covering adequately covers the toes of the ski boot. In a preferred embodiment, the unitary construction covering is made from the constituent pieces is shown in Figures 11 and 12 such that stitching between the vamp and the toe box allows for fine control of the shape and/or configuration of the toe box allowing the toe box to lie closely against the toe box right down to the toe binding extending therefrom, thereby adequately covering the toe box unlike Miller which leaves a portion of the toe box exposed (see Figure 1 of Miller).

[19] Furthermore, prior art coverings such as Miller employ strips of material to hold the ski boot cover to the boot whereas the present covering may be of integral construction in that the longitudinal arch ladder and the heel counter may be continuously adjoining and made of the same material as the vamp and/or toe box so as to more effectively enhance thermal insulation behind the heel and under the arch of the boot as compared to the non-insulative straps of Miller.

[20] As such, the present covering provides whole-of-foot thermally insulative encapsulation by having adequate coverage across the heel (which thermally insulates the Calcaneal branches of the Peroneal artery) and the toes with a high-grade neoprene barrier.

[21] Furthermore, an interior surface of the toe box may comprise a frictionally enhancing material such as a coating of rubber, silicon, latex or the like for sticking to the toe of the ski boot in use to prevent the toe box from riding up from the toe of the boot.

[22] Furthermore, in a preferred embodiment, the quarter of the present covering is laterally located and comprises the quarter surface fasteners on an inner surface thereof which lies over and attaches to the distal end of the heel counter there underneath having corresponding heel counter surface fasteners on an outer surface thereof.

[23] Such a manner of fastening prevents ingress of snow from the direction of travel and loosening of the attachment as compared to the arrangement of Miller which has the opposite configuration.

[24] According to one aspect, there is provided a thermally insulative ski boot covering comprising a body of unitary construction having an integrally formed vamp, toe box, longitudinal arch ladder, quarter and openable heel counter, the longitudinal arch ladder connecting between medial and lateral rear edges of the toe box, thereby exposing a ball void, the vamp extending to the quarter at one side, the quarter having quarter surface fasteners, the quarter not extending past a calf line, the vamp extending to the heel counter at an opposite side, the heel counter having a longer length than that of the quarter so as to be able to extend round the calf line and having heel counter surface fasteners for attachment to the quarter surface fasteners, thereby encircling a heel void, wherein the vamp overlays a throat line to form top line with the heel counter, the top line being substantially horizontal in that a top line plane intersecting the top line lies less than 20° from the horizontal and when ski boot is inserted into the covering in use, a toe binding thereof extends under the toe box, the ball thereof is substantially exposed by the ball void, a heel binding thereof extends under the heel counter, a heel thereof is covered rearwardly by the heel counter and is substantially exposed thereunderneath by the heel void and the longitudinal arch ladder transitions under the arch thereof.

[25] The ski boot covering may be integrally formed from at least one first piece stitched to at least one second piece at a stitch line, the stitch line intersecting between the vamp portion and the toe box portion.

[26] The longitudinal arch ladder may locate more than 30% along a longitudinal length of the covering from a front of the toe box.

[27] The longitudinal arch ladder may comprise a thickness of more than 2 mm.

[28] The heel counter may continually adjoin the vamp and comprise the same type of thermally insulative material as that of the vamp.

[29] The longitudinal arch ladder may continually adjoin the toe box and comprise the same type of thermally insulative material as that of the toe box.

[30] The thermally insulative material may comprise neoprene.

[31] The neoprene may comprise a thickness of more than 3 mm.

[32] The quarter may be laterally located and the heel counter may extend medially round the calf line.

[33] The quarter surface fasteners may be located on an inner surface of the quarter and wherein the heel counter surface fasteners may be located on an exterior surface thereof.

[34] An inner surface of the toe box may comprise a frictionally enhancing material.

[35] The frictionally enhancing material may comprise a coating of at least one of rubber, silicon and latex.

[36] The body may comprise neoprene.

[37] The neoprene may comprise a thickness of greater than 2 mm.

[38] The neoprene may comprise at least one of a metallic layer and metallic infusion.

[39] The at least one of a metallic layer and infusion may comprise copper.

[40] A rear edge of the quarter may comprise a pull tab extending rearwardly therefrom.

[41] The covering may comprise a length of between 300 and 350 mm along a longitudinal axis thereof.

[42] The ball void may comprise a length of between 100 and 130 mm along a longitudinal axis of the covering.

[43] The heel void may comprise a length of between 130 and 170 mm along a longitudinal axis of the covering.

[44] The longitudinal arch ladder may comprise a width of between 50 and 70 mm.

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

Brief Description of the Drawings

[46] 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:

[47] Figure 1 shows a left side elevation view of a thermally insulative ski boot covering in accordance with an embodiment;

[48] Figure 2 shows an underside view of the covering;

[49] Figure 3 shows a front perspective view of the covering;

[50] Figure 4 shows a front perspective view of the covering when open;

[51] Figure 5 shows a rear perspective view of the covering when open;

[52] Figure 6 shows a side elevation view of the covering with example you dimensions in accordance with an embodiment;

[53] Figure 7 shows a top view of the covering;

[54] Figure 8 shows an underside view of the covering;

[55] Figure 9 shows a front elevation view of the covering;

[56] Figure 10 shows a rear elevation view of the covering;

[57] Figures 11 and 12 show flat pieces sewn together for the formation of the covering of unitary construction; and

[58] Figures 13 and 14 shows thermal drop-off results for the covering at toe and heel regions respectively.

Description of Embodiments

[59] A thermally insulative ski boot covering 100 comprises a body of unitary construction.

[60] The ski boot covering 100 may be provided in mirrored left and right-handed configurations. A left-handed configuration ski boot covering 100 may be formed by stitching together to flat pieces 117 along corresponding edges 115, 116 is shown in Figure 11. A flat toe piece 118 may then be stitched to the corresponding edges 115, 116 as shown.

[61] The body has an integrally formed vamp 101, toe box 103, longitudinal arch ladder 111, quarter 106 and heel counter 105.

[62] As is shown in Figure 2, the longitudinal arch ladder connected between medial and lateral rear edges of the toe box 103, thereby exposing a ball void 111. The vamp 101 terminates at the quarter 106, the quarter 106 not extending past the imaginary calf line 113 shown in Figure 3.

[63] The quarter 106 comprises surface fasteners 106, preferably on an interior surface thereof.

[64] The heel counter 105 has a longer length than that of the quarter 106 as illustrated in Figure 4. The heel counter 105 extends around the calf line 113 as shown in Figure 3 and has heel counter surface fasteners 120 as shown in Figure 5 for attachment to the quarter surface fasteners 119 of the quarter 106, thereby encircling a heel void 112.

[65] The vamp 101 overlays an imaginary throat line 114 of the body to form a topline 108 with the heel counter 105.

[66] The manufacture of the covering 100 from the constituent pieces 117 118 shown in Figures 11 and 12 allows the heel counter 105 to continually adjoin the vamp 101 and comprise the same type of thermally insulative material as that of the vamp 101 for enhanced thermal insulation. Similarly, and the longitudinal arch may ladder 111 continually adjoin the toe box 103 and comprise the same type of thermally insulative material as that of the toe box 103 for enhanced thermal insulation. The toe box 103 and the vamp 101 may similarly comprise the same type of thermally insulative material.

[67] With reference to Figure 6, the topline 108 is substantially horizontal such that the heel is substantially covered by the heel counter 105. For example, a topline intersecting plane 126 may lie within 20° of the horizontal 125, preferably less than 10° of the horizontal 125.

[68] With further reference to Figure 6, there is shown the heel counter 105 of sufficient height so as to adequately cover the rear of the heel of the boot in use. In this regard, the heel counter 105 preferably has a height of greater than 6 cm and further preferably a height of greater than 9 cm. The embodiments shown in Figure 6 shows the heel counter 105 comprising a height of approximately 93 mm.

[69] Stitching 109 may interface the vamp 101 and the toe box 103 and may comprise a welded seal backing for watertightness. In embodiments, a flat seam may be employed to enhance aerodynamic performance across the interface of the vamp 101 of the toe box 103.

[70] The stitching 109 may interface the at least one flat piece 117 forming the vamp 101, the quarter 106 and the heel counter 105 and the at least one second flat piece 118 forming the toe box 103. As such, the unitary construction of these pieces and the stitching 109 therebetween allows for the fine control of the shape and/or configuration of the toe box 103, thereby allowing the toe box 103 to lie snugly against the entire toe of the boot covering the toe with just the toe binding exposed there underneath.

[71] The quarter 106 may comprise a plastic pull tab 104 extending from a rear edge thereof.

[72] In embodiments, an interior surface of the toe box 103 may comprise gripping 113, such as a rubberised, silicon, latex or the like coating to enhance the frictional engagement of the toe of the ski boot in use.

[73] In a preferred embodiment, the left-handed configuration of the covering 100 comprises the quarter 106 at the lateral side thereof is shown in Figure 1 and the right-handed configuration of the covering 100 therefore comprises the mirrored version thereof.

[74] Furthermore, in a preferred embodiment, the quarter 106 has the quarter surface fasteners 119 on an inner surface thereof whereas the heel counter 105 comprises the heel counter surface fasteners 120 on an outer surface thereof.

[75] As such, each covering 100 may be opened by grabbing rear edges of each quarter 106 (or the pulling tabs 104 respectively thereof) and pulling each quarter 106 forwardly. Each covering 100 may be closed in the opposite manner.

[76] In a preferred embodiment, the body comprises 3.5 mm thickness neoprene.

[77] In a further preferred embodiment, the neoprene comprises a metallic layer or infusion, such is of copper.

[78] In embodiments, the body comprises layering of a combination of nylon and neoprene wherein nylon is sandwiched or bonded between two outer neoprene layers, thereby enhancing installation.

[79] Figure 13 shows observed temperature drop-offs from just over 25°C over a period of 8000 seconds within an interior toe region for an uncovered ski boot 124, a ski boot 123 comprising the covering 100 and a ski boot 122 comprising the covering 100 comprising the metallic foil liner from the assessment by the University of New South Wales Canberra entitled "SNUX - Smart Boot Thermal Assessment" of December 2018 by Tahtali et at the entire contents of which I herein incorporated by reference.

[80] Figure 14 shows observed temperature drop-offs at a heel region for the control uncovered ski boot 124 and the ski boot 123 covered with the covering 100.

[81] The thermally insulative properties provided by the particular configuration of the covering 100 is evident in contradistinction to that of the uncovered control boot 124 both at the toe and heel regions.

[82] 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.

Claims

1. A thermally insulative ski boot covering comprising a body of unitary construction having an integrally formed vamp, toe box, longitudinal arch ladder, quarter and openable heel counter, the longitudinal arch ladder connecting between medial and lateral rear edges of the toe box, thereby exposing a ball void, the vamp extending to the quarter at one side, the quarter having quarter surface fasteners, the quarter not extending past a calf line, the vamp extending to the heel counter at an opposite side, the heel counter having a longer length than that of the quarter so as to be able to extend round the calf line and having heel counter surface fasteners for attachment to the quarter surface fasteners, thereby encircling a heel void, wherein the vamp overlays a throat line to form top line with the heel counter, the top line being substantially horizontal in that a top line plane intersecting the top line lies less than 20° from the horizontal and when ski boot is inserted into the covering in use, a toe binding thereof extends under the toe box, the ball thereof is substantially exposed by the ball void, a heel binding thereof extends under the heel counter, a heel thereof is covered rearwardly by the heel counter and is substantially exposed thereunderneath by the heel void and the longitudinal arch ladder transitions under the arch thereof.

2. A ski boot covering as claimed in claim 1, wherein the ski boot covering is integrally formed from at least one first piece stitched to at least one second piece at a stitch line, the stitch line intersecting between the vamp portion and the toe box portion.

3. A ski boot covering as claimed in claim 1, wherein the longitudinal arch ladder locates more than 30% along a longitudinal length of the covering from a front of the toe box.

4. A ski boot covering as claimed in claim 1, wherein the longitudinal arch ladder comprises a thickness of more than 2 mm.

5. A ski boot covering as claimed in claim 1, wherein the heel counter continually adjoins the vamp and comprise the same type of thermally insulative material as that of the vamp.

6. A ski boot covering as claimed in claim 1, wherein the longitudinal arch ladder continually adjoins the toe box and comprise the same type of thermally insulative material as that of the toe box.

7. A ski boot covering as claimed in claim 5, wherein the thermally insulative material comprises neoprene.

8. A ski boot covering as claimed in claim 7, wherein the neoprene comprises a thickness of more than 3 mm.

9. A ski boot covering as claimed in claim 1, wherein the quarter is laterally located and wherein the heel counter extends medially round the calf line.

10. A ski boot covering as claimed in claim 9, wherein the quarter surface fasteners are located on an inner surface of the quarter and wherein the heel counter surface fasteners are located on an exterior surface thereof.

11. A ski boot covering as claimed in claim 1, wherein an inner surface of the toe box comprises a frictionally enhancing material.

12. A ski boot covering as claimed in claim 11, wherein the frictionally enhancing material comprises a coating of at least one of rubber, silicon and latex.

13. A ski boot covering as claimed in claim 1, wherein the body comprises neoprene.

14. A ski boot covering as claimed in claim 13, wherein the neoprene comprises a thickness of greater than 2 mm.

15. A ski boot covering as claimed in claim 13, wherein the neoprene comprises at least one of a metallic layer and metallic infusion.

16. A ski boot covering as claimed in claim 15, wherein the at least one of a metallic layer and infusion comprises copper.

17. A ski boot covering as claimed in claim 1, wherein a rear edge of the quarter comprises a pull tab extending rearwardly therefrom.

18. A ski boot covering as claimed in claim 1, wherein the covering comprises a length of between 300 and 350 mm along a longitudinal axis thereof.

19. A ski boot covering as claimed in claim 18, wherein the ball void comprises a length of between 100 and 130 mm along a longitudinal axis of the covering.

20. A ski boot covering as claimed in claim 18, wherein the heel void comprises a length of between 130 and 170 mm along a longitudinal axis of the covering.

21. A ski boot covering as claimed in claim 18, wherein the longitudinal arch ladder comprises a width of between 50 and 70 mm.

22. A ski boot covering as claimed in claim 1, wherein the heel counter comprises a height at the calf line of greater than 6cm.

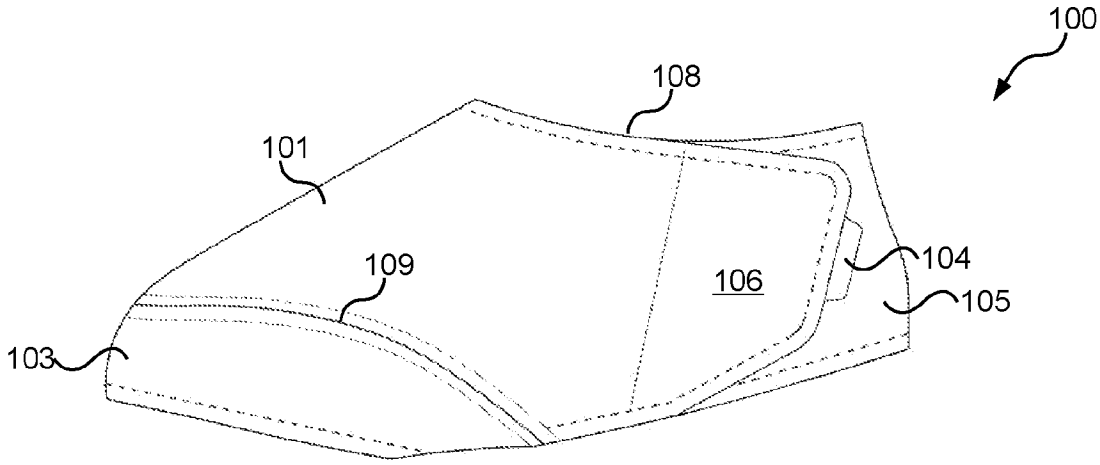

Figure 1

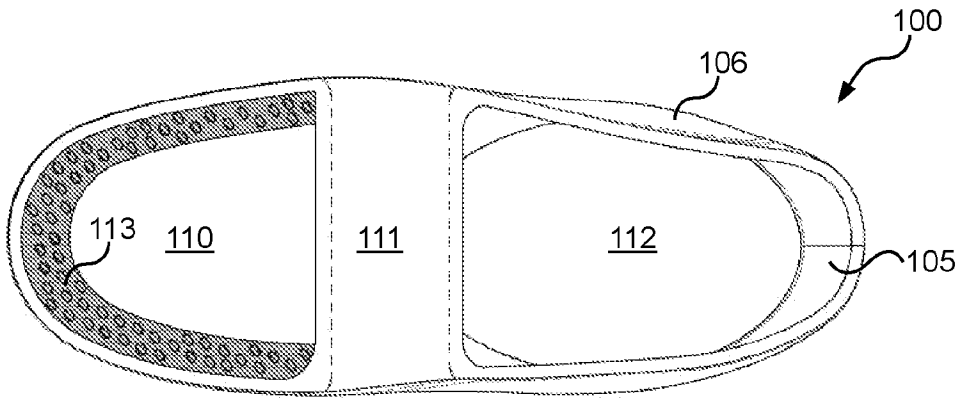

Figure 2

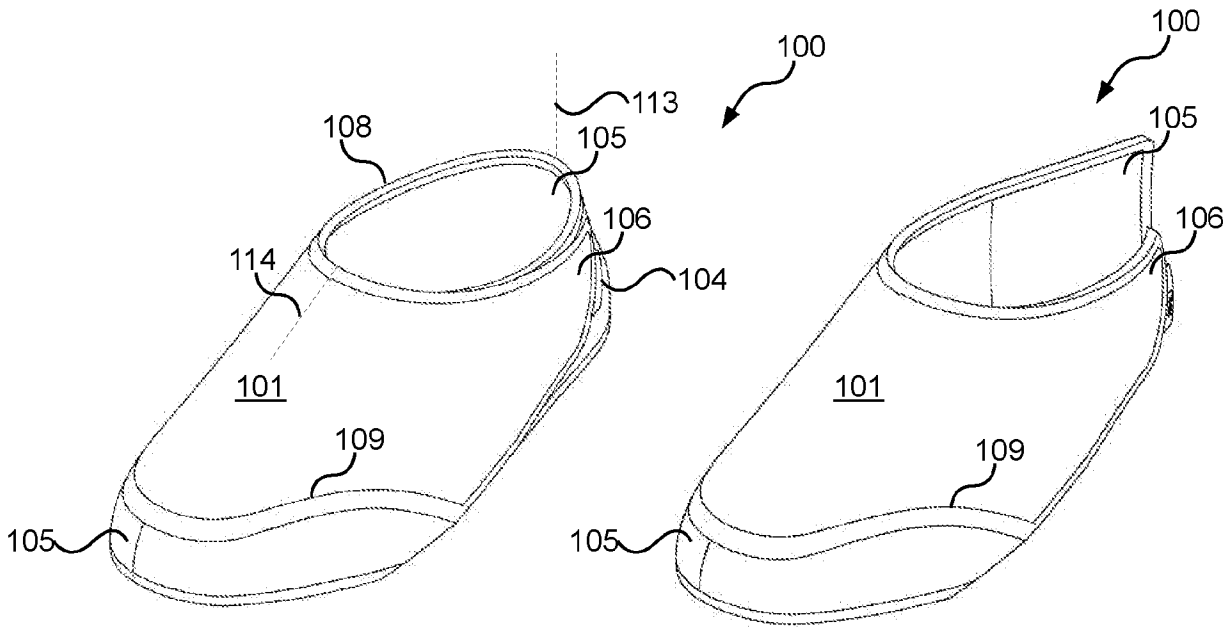

Figure 3

Figure 4

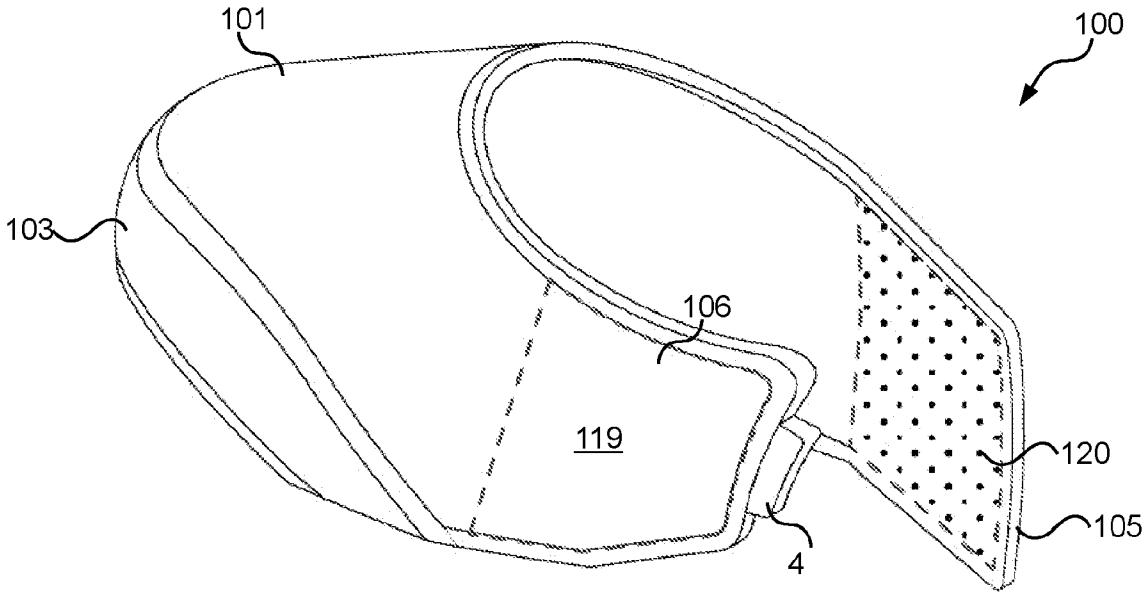

Figure 5

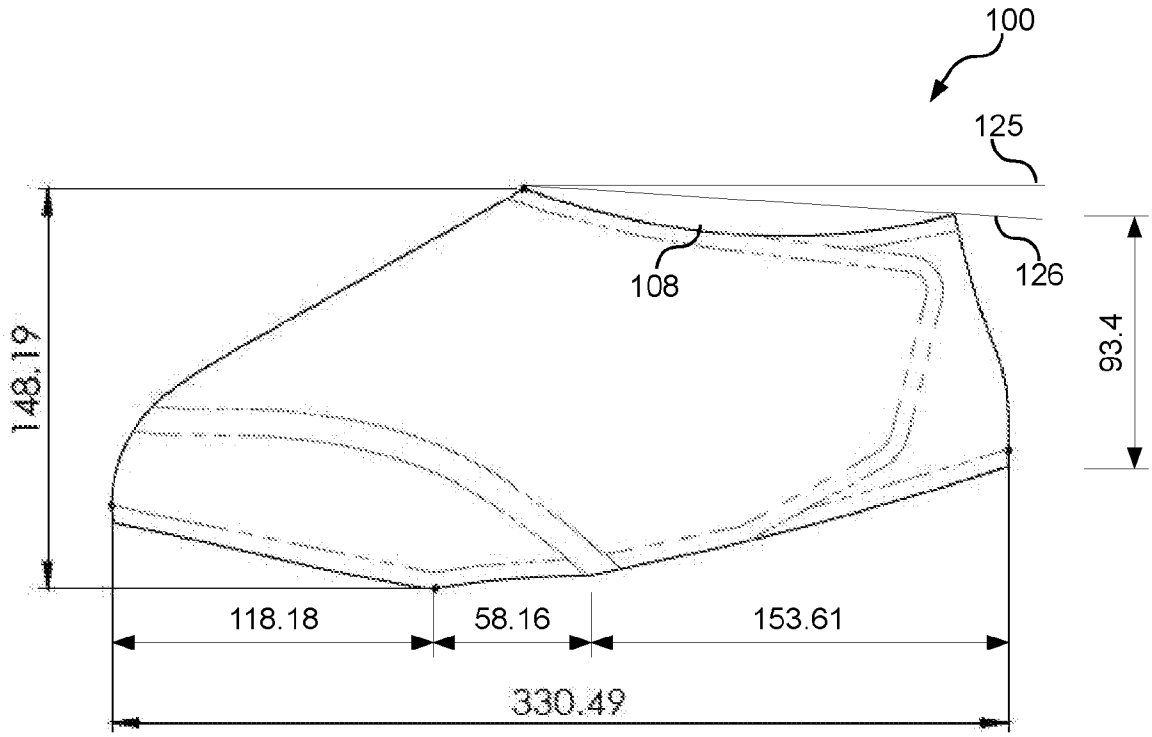

Figure 6

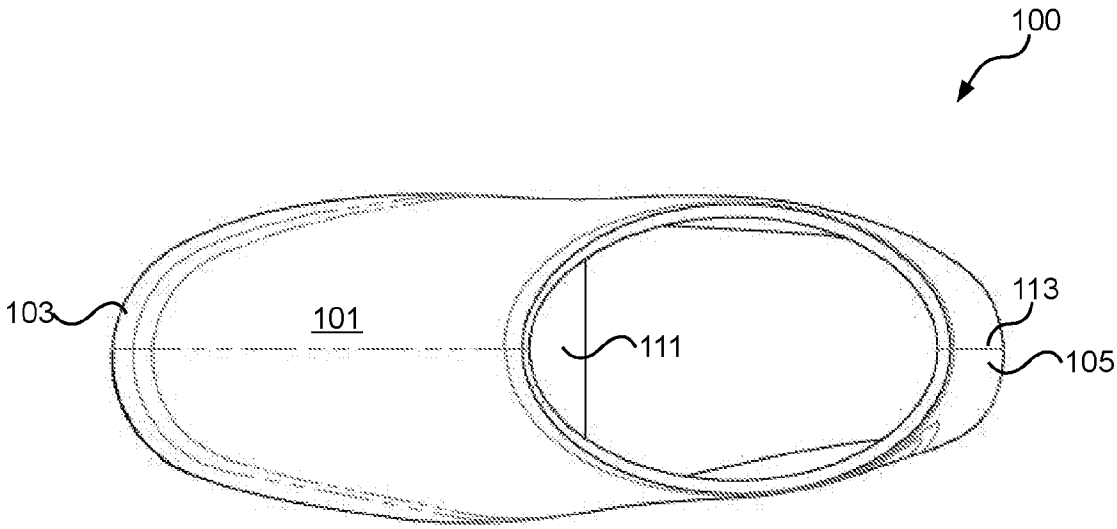

Figure 7

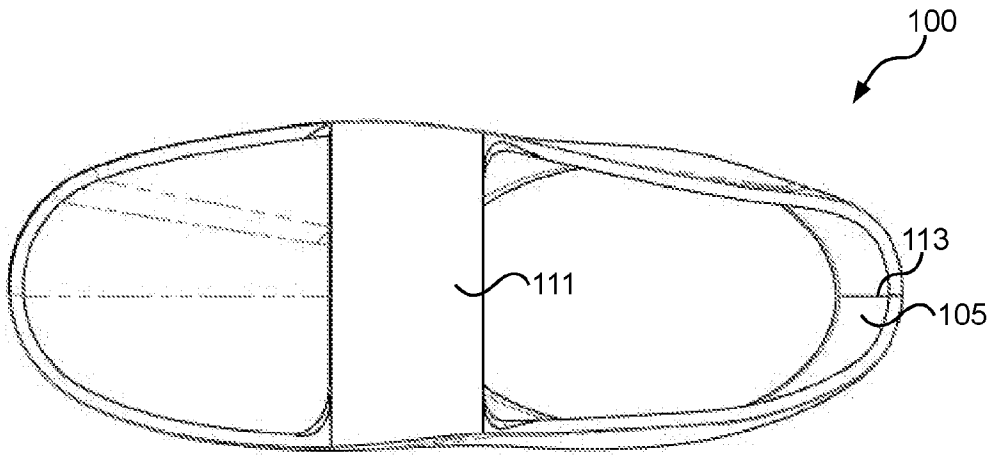

Figure 8

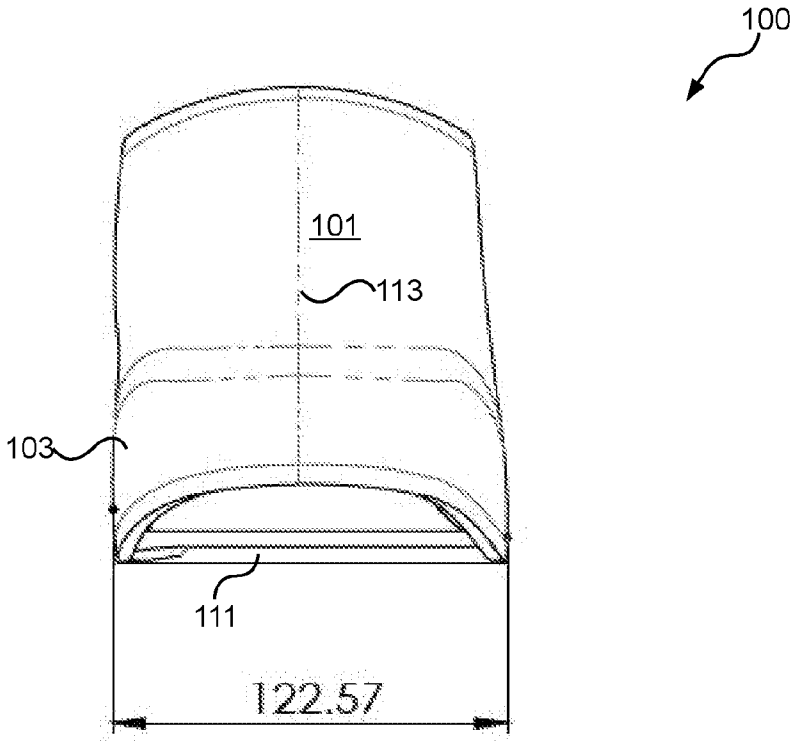

Figure 9

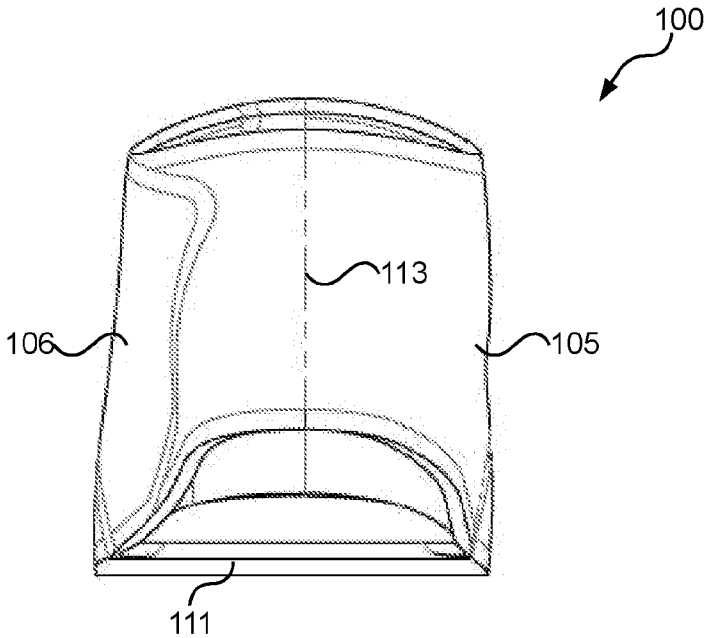

Figure 10

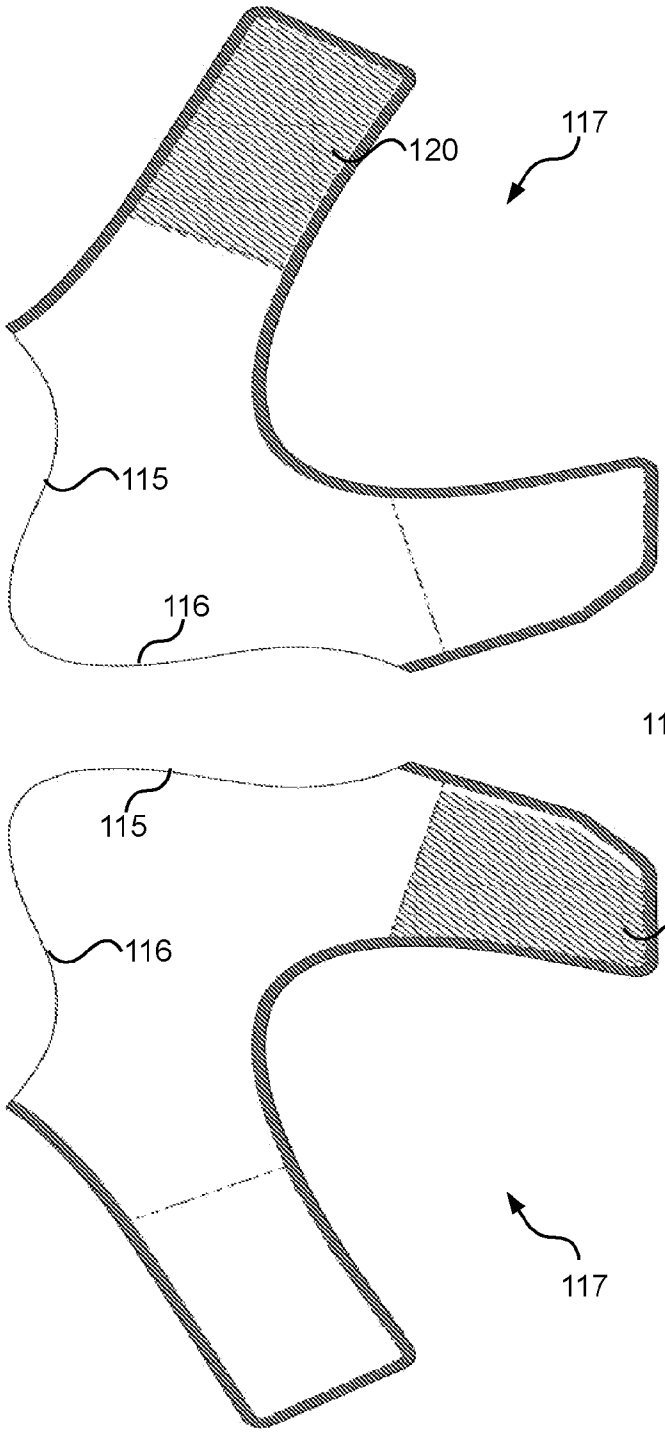

Figure 11

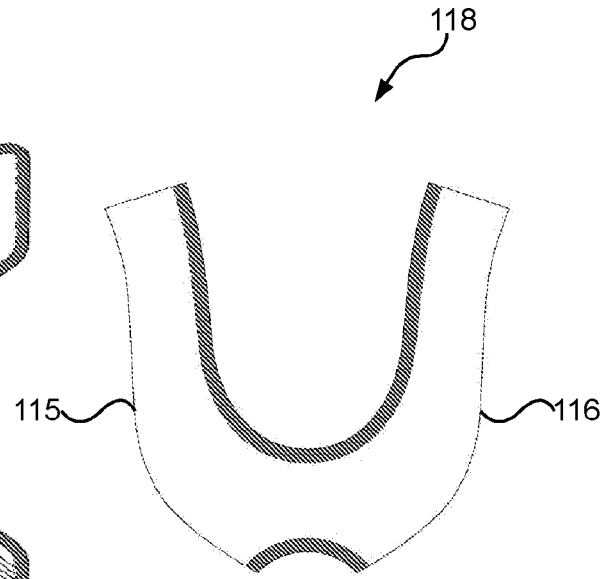

Figure 12

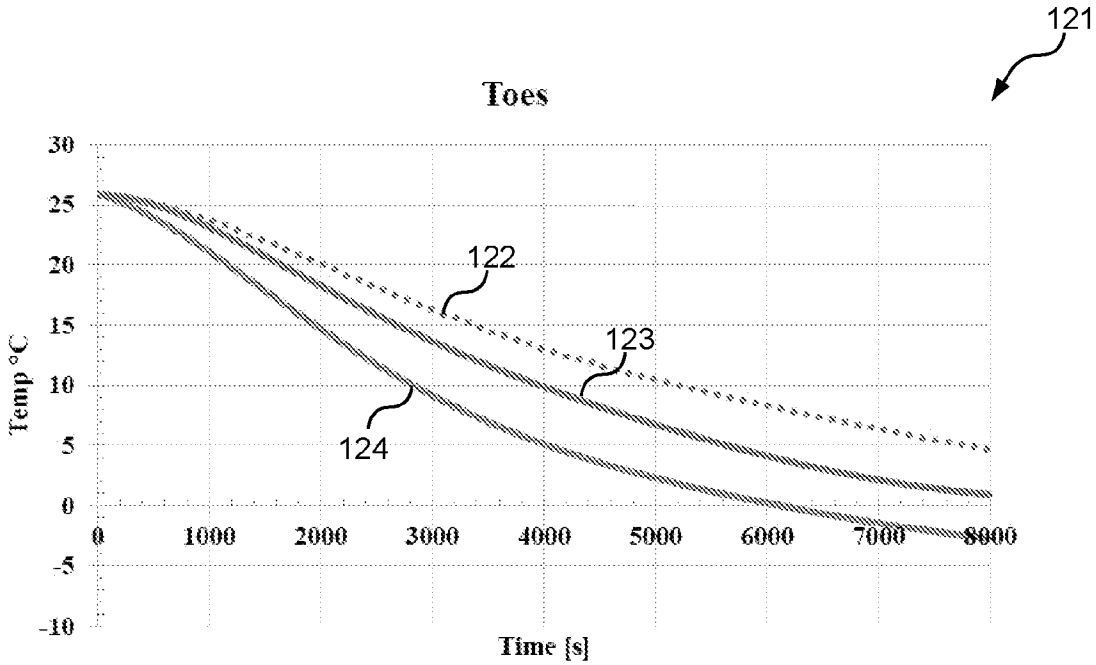

Figure 13

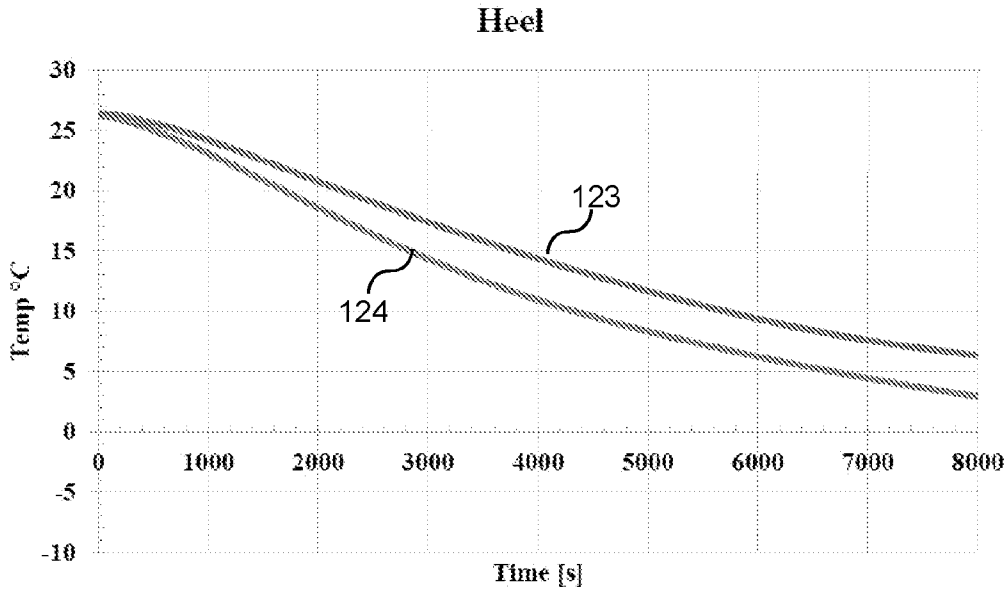

Figure 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2019/050340

A. CLASSIFICATION OF SUBJECT MATTER

A43B 3/16 (2006.01) ***A43B 3/18 (2006.01)*** ***A43B 5/04 (2006.01)*** ***A43B 5/18 (2006.01)*** ***A43B 7/34 (2006.01)*** ***A63C 13/00 (2006.01)***

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)

WPIAP & EPODOC: IPC & CPC; (A43B3/16/LOW, A43B5/[04, 0415, 18], A63C[11/00, A63C13/00) & KEYWORD SEARCH: KEYWORDS;(SKI, SKATE, BOARD, MITT, OVERSHOE, THERMAL, HEAT, MOISTURE, WATER, INSULATE, CONVECTION, NEOPRENE, POLYCHLOROPRENE, UNDER, BOTTOM, UNDER, SOLE, STRAP, WEB, TOE,BALL, HEEL, ANCKLE, VOID,HOLE, VELCRO, HOOK & LOOP, BINDING, CONNECT) and like terms in various combinations. GOOGLE INTERNET; KEYWORDS (BENJAMIN PRICE, SNOW, SKI, BOOT, COVER, GLOVE, MITT, OVERSHOE, NEOPRENE, VELCRO, INSULATING, WATERPROOF) and like terms in various combinations and AUSPAT & EspaceNet Applicant and Inventor Names.

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	

[X] Further documents are listed in the continuation of Box C [X] 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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 May 2019	31 May 2019
Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	Stefan Ochsenbein AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. +61262832269

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	**PCT/AU2019/050340**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5893220 A (MILLER) 13 April 1999 Figures 1-2 & 5 Items 10, 30, 36, 38, 40 & 42; TITLE, Column 5 Lines 31 & 36, Column 7 Lines 3-4	1-22
Y	US 3875687 A (HENDERSON) 08 April 1975 Figures 1-3 Items 16-18, 20-22; ABSTRACT, column 2 Lines 20 & 22	1-22
A	JP S5975103 U (SANTO SPORTS SERVICE CO. LTD.) 22 May 1984 Whole Document	1-22
A	CH 631632 A5 (SCHENK) 31 August 1982 Whole Document	1-22
A	US 20080295357 A1 (LONG) 04 December 2008 Whole Document	1-22
A	CA 2864552 A1 (LOUIS GARNEAU SPORTS INC.) 19 September 2014 Whole Document	1-22
A	EP 0024143 A1 (DAVISON) 25 February 1981 Whole Document	1-22

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2019/050340**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
US 5893220 A	13 April 1999	US 5893220 A	13 Apr 1999
US 3875687 A	08 April 1975	US 3875687 A	08 Apr 1975
JP S5975103 U	22 May 1984		
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US 20080295357 A1	04 December 2008	US 2008295357 A1	04 Dec 2008
CA 2864552 A1	19 September 2014	CA 2864552 A1	11 Dec 2014
		US 2016081422 A1	24 Mar 2016
EP 0024143 A1	25 February 1981	EP 0024143 A1	25 Feb 1981

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.