



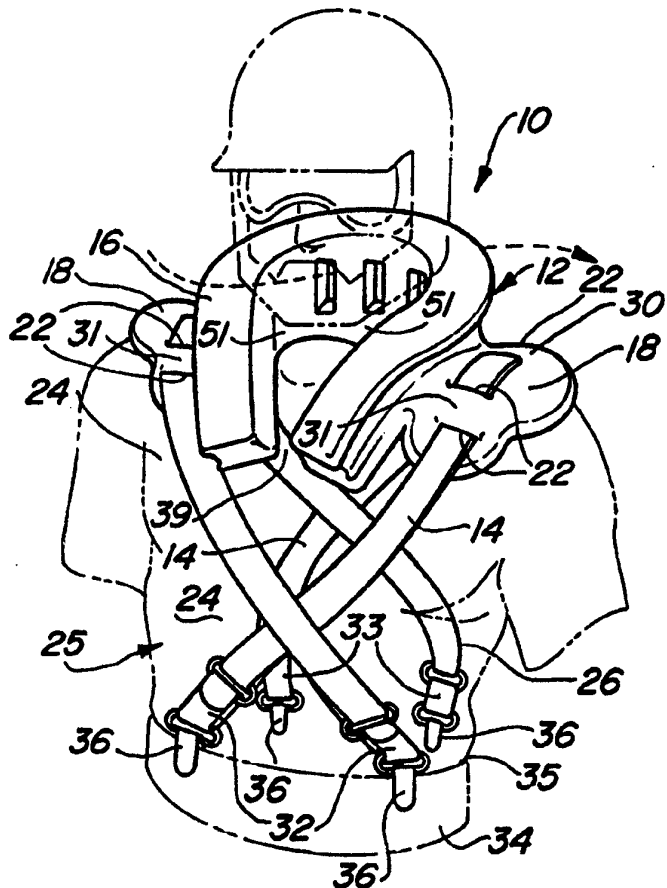
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US96/02701 (22) International Filing Date: 29 February 1996 (29.02.96) (30) Priority Data: 60/002,495 18 August 1995 (18.08.95) US (71) Applicant (for all designated States except US): POWER-SPORTS SAFETY COMPANY, L.L.C. [US/US]; 1551 E. Lincoln, Madison Heights, MI 48071 (US). (72) Inventor; and (75) Inventor/Applicant (for US only): GAJOR, Michael, J. [US/US]; 3681 Karen Parkway, Waterford, MI 48328 (US). (74) Agent: PERMUT, Steven, L.; Reising, Ethington, Barnard &amp; Perry, P.O. Box 4390, Troy, MI 48099 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report.</p>	

(54) Title: NECK, COLLAR BONE, AND SPINAL CORD PROTECTION DEVICE

(57) Abstract

A resilient elastomeric cervical protection device (10) has a U-shaped neck collar section (16) with ventilation slots (50) through a rear section thereof to provide for air flow from a front open end (39) and through the slots. The collar section is integrally formed with laterally extending wings (18) that have slots (22) to receive mounting straps (14). The ends of the mounting straps have clips (36) that can be anchored onto other apparel of the wearer to anchor the device (10) properly onto the wearers shoulders and about the wearer's neck.



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According to another aspect of the invention, the back section of the neck collar has vents completely extending through the neck collar to allow air flow from the open front of the collar, through the clearance  
5 formed between the neck and the inner wall of the collar and through the vents in the back section. A mounting device is connected to the collar to properly secure the collar upon the shoulders and about the neck of the  
10 wearer.

10

Air flow is also provided under the collar and wings by downwardly extending and spaced apart protrusions depending from the lower surface of the device. The protrusion may be in the form of dimples or other  
15 shaped embossments.

In a desired embodiment each wing has at least one slot to receive a strap member therethrough. Preferably a pair of slots is at a dorsal section of  
20 each wing and a pair of slots is at the frontal section of each wing. Each slot runs lateral in a direction from the neck collar to the outer end of the wing to receive straps therethrough. Alternatively, the straps may be molded directly in each wing and extend therefrom.

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The strap may have a snap fit fastener at each distal end which is connectable to a complementary fastener on the inside surfaces of a chest protector. Alternatively, each strap may have one distal end sewn into a wearing apparel such as a shirt, upper section of a wet suit, or overall type driving suit. The other end of the strap has a fastener such as a snap or Velcro™ fastener patch attached thereto which is connectable to a complementary fastener attached onto the wearing apparel. The neck collar may be attached to a strap that forms part of a seat belt restraining system in a race car or other vehicle that uses retaining shoulder straps.

In accordance with another aspect of the invention, a resilient pad having a neck collar section and laterally extending engagement wings are retained on the wearer by straps that engage or are connected to the wings and downwardly depend to the waist section of the wearer. A loop for example a belt, vest or pants, circumscribes the body and is fastened to the straps to retain the collar and wings in place about the neck of the wearer.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Reference now is made to the accompanying drawings in which:

5           Figure 1 is a front perspective view of an embodiment of the device in accordance with the invention shown in place on a wearer;

          Figure 2 is a side elevational view of the embodiment shown in figure 1;

10           Figure 3 is a front elevational view thereof;

          Figure 4 is top view thereof;

          Figure 5 is a back view thereof;

          Figure 6 is a bottom plan view thereof;

          Figure 7 is a cross-sectional view taken along  
15 lines 7-7 shown in figure 3;

          Figure 8 is a perspective view of the neck collar in accordance with the invention connected to a chest protector;

          Figure 9 is a top plan view of the neck collar  
20 and straps shown in Figure 8;

          Figure 10 is a perspective view of a neck collar according to the invention with a strap system attached to a shirt;

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Figure 11 is a perspective view of a neck collar according to the invention attached to straps that form a seat belt retaining system for a motor vehicle seat; and

5           Figure 12 is a fragmentary view similar to Figure 6, illustrating another embodiment of a neck collar according to the invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

10

Referring now to figure 1, a cervical protective device generally indicated as 10 includes a one piece cushioning pad 12 and harness straps 14. The cushioning pad 12 is shaped to provide a u-shaped neck collar 16 and a mounting device 17 that includes integrally formed shoulder wings 18 that extend from a lower edge 20 of the neck collar 16.

As more clearly shown in figure 4, each wing 20 18 has a plurality of laterally extending slots 22 therethrough that are spaced in the fore and aft direction to allow the harness straps 14 to be threaded therethrough and extend down both the chest 24 and back 26 of the wearer 25. The straps 14 may crisscross along

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both the chest 24 and back 26 of the wearer as shown in figure 1.

As shown in the figures 2 and 3, each wing 18  
5 is contoured to fit on the upper shoulder collar 27 of the wearer 25 and contoured to have a frontal section 28 and dorsal section 29. The slots 22 are paired off to provide a dorsal overlay strip 30 and frontal overlay strip 31 that retain the harness straps 14 down on the  
10 wings 18. Of course, the straps and wings may be operably secured to each other in other fashion, for example snaps, Velcro™, or buckles.

Referring back to figure 1, the front lower  
15 ends 32 and rear lower ends 33 of the straps 14 have a clip 36 that can fasten onto the wearers pants 34 or a life vest (not shown), underpants (not shown) or belt (not shown) that surround the waist 35 of the wearer 25. It is also contemplated that the rear ends 33 or front  
20 ends 32 may be permanently attached to a belt line strap that can be buckled or otherwise fastened about the wearer's waist. The clip 36 can be substituted with other kinds of fasteners such as buttons, snaps, or Velcro™.



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The neck collar 16 is generally u-shaped with a frontal opening 39. Its outer wall 38 has an outwardly extending lower flange 40 and upper flange 42 as clearly shown in figure 2. The inner wall 44 is  
5 straight and is normally spaced approximately 3/4" from the neck 15 of the wearer to form clearance 51. The inner wall may be otherwise contoured for design considerations. The front tips 46 are bent downwardly to rest against the upper section of the wearer's chest 24 as  
10 shown in figures 1 and 2 and to make clearance for the wearer's chin 45 as the wearer turns his head to the left and right.

The rear section 48 of the neck collar 16 has  
15 a plurality of optional vent slots 50 therethrough to provide for cooling air flow therethrough as clearly shown in figures 5 and 7. The air flow enters the open front end 39 of the collar and passes through the clearance 51 between the neck 15 and neck collar 16 and  
20 out through the vent slots 50. The cooling air flow is naturally provided when the wearer is racing in motocross or water-cross events where high speeds that produce an air flow relative to the rider are normal.

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To provide further comfort and increased coolness to the user, the bottom surface 54 of the wings 18 and collar 16 are provided with a series of embossments 56 as shown in figures 2 and 6 such as hemispheres  
5 to decrease the surface to surface contact with the pad and provide for air flow therebetween. The embossments may take a variety of other shapes such as ribs, frustoconical or cylindrical protuberances. Figure 12 illustrates an embodiment having fore and aft extending  
10 ribs 57 on both sides of each strap 14. Alternatively, a plurality of semi-spherical or other shaped cavities may also be formed in the lower surface to accomplish the same results.

15 The collar 16 has a height of approximately 4" such that its upper surface 58 and outer upper flange 42 are vertically spaced below the lower edge 62 of a helmet 60 to provide unrestricted motion of the helmet during minor motion. However, during severe jolting or  
20 shaking, the lower edge 62 of the helmet 60 engages the top surface 58 such that the collar 16 resiliently dampens and curtails the jolting and shocks to the head and restricts excessive motion to the head and consequently the neck and spinal chord. In order to assure

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proper engagement of the edge 62 to the top surface 58, the collar 16 needs to be at least 2" thick from the inner wall 44 that is spaced from neck 15.

5           The pad 12 can be made from a variety of commercially available elastomeric compounds that provide for the needed resilient dampening bias. One such material is Renisol Urethane No. 6832. Of course, the pad can be designed with other compounds and be  
10 designed with more or less resilient damping effect depending on the roughness of the moto-cross or jet-ski race, as well as the amount of flex desired by the wearer.

15           An alternate method of attachment is shown in figures 8 and 9 where the mounting is to a chest protector 61. In this embodiment, the straps 14 are shortened and each have a snap fit fastener 63 at a front and rear distal section 64 and 66. The chest protector also has  
20 complementary snap fasteners 68 that securely engage with the snap fastener 63 to mount the cervical collar device 10 in place. The chest protector has conventional shoulder pads 65 overlying the wings 18. The protector also has conventional lower ties 69 that connect the

- 10 -

front chest pad 65 to the back chest pad 67 to completely surround the torso of the wearer.

Figure 10 shows a modified mounting device 70 which incorporates straps 72 having a rear distal end 74 permanently sewn onto a rear shoulder section 76 of a shirt 78. The front distal section 82 of the strap 72 has a Velcro® fastener section 83 sewn thereon. The shirt 78 has on its frontal shoulder section a complementary Velcro® fastener 85 to securely and removably mount the front section of strap 72. The straps 72 may engage the slots 22 in the same fashion as described above or be threaded through the slots 22 as shown in Figure 10 to securely position the one piece collar pad 12 onto the shoulders of the wearer.

The neck collar pad device 12 can be incorporated directly into a seat belt and strap arrangement 90 of a racing vehicle seat 92. The strap 90 passes through the slots 22 of the swings 18 in the same fashion as described above. The fastener buckle assembly 94 when coupled provides for secure and proper positioning of the collar pad 12 about the neck and onto the shoulders of the wearer. Uncoupling of the buckle

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allows the wearer to leave the seat 92 and one piece pad device 12 without interference from the neck collar 16 due to its open front end 39.

5           In this fashion, a protective cervical collar is constructed that is easily mounted onto the wearer and provides for a comfortable fit and adequate ventilation about the neck and shoulders of the wearer to eliminate undue heat build up as found in prior art  
10 devices.

Other variations and modifications are possible without departing from the scope and spirit of the present invention as defined by the appended claims.

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**CLAIMS**

The embodiments in which an exclusive property or privilege is claimed are defined as follows:

5

1. A resilient cervical collar device for a wearer of a helmet characterized by:

a central collar section sized to fit about a person's neck under a lower edge of a helmet assembly;

10

a pair of shoulder wings laterally extending sideways from the central collar section to rest on the shoulders of the wearer;

each wing being operably connected to a strap extending fore and aft to the dorsal and frontal sides of the wearer, said straps having distal sections being anchored to a member secured to the wearer.

15

2. A resilient cervical collar device as defined in claim 1 further characterized by:

20

said shoulder wings being integrally and simultaneously formed with the collar section, said wings and said collar section being made from the same resilient elastomeric material.

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3. A resilient cervical collar device as defined in claim 2 further characterized by:

said wings each having a plurality of slots therein that receive each strap therethrough.

5

4. A resilient cervical collar device as defined in claim 3 further characterized by:

said straps having one distal end sewn to a piece of upper apparel wear and a second distal end having a fastener element; and

10

said upper apparel wear having a complementary fastener secured thereto for removable engagement with said fastener element on said strap.

15

5. A resilient cervical collar device as defined in claim 3 further characterized by:

said straps having each distal end having a fastener element secured thereto; and

20

said upper apparel wear having a complementary fastener secured thereto for removable engagement with a respective fastener element on said strap.

6. A resilient cervical collar device as defined in claim 2 further characterized by:

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a lower surface of each wing having embossments to decrease the amount of direct contact of the lower surface with the shoulder of the wearer.

5           7. A resilient cervical collar device as defined in claim 2 further characterized by:

said collar section being generally U-shaped with a front open end and a rear section of the collar section having an air vent extending therethrough to  
10 provide air passage from the open end and through the air vent about the neck of the wearer.

8. A resilient cervical collar device for a wearer of a helmet characterized by:

15           a central collar section sized to fit about a person's neck under a lower edge of a helmet assembly;

a pair of shoulder wings laterally extending sideways from the central collar section to rest on the shoulders of the wearer;

20           each wing being constructed such that it can operably connect to a fastener strap;

said shoulder wings being integrally and simultaneously formed with the collar section, said



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wings and said collar section being made from the same resilient elastomeric material.

9. A resilient cervical collar device as  
5 defined in claim 8 further characterized by:

said wings each having a plurality of slots therein that are able to receive straps therethrough.

10. A resilient cervical collar device as  
10 defined in claim 8 further characterized by:

a lower surface of each wing having embossments to decrease the amount of direct contact of the lower surface with the shoulder of the wearer and to provide air flow therebetween.

15

11. A resilient cervical collar device as defined in claim 8 further characterized by:

said collar section being generally U-shaped with a front open end and a rear section of the collar  
20 section having an air vent extending therethrough to provide air passage from the open end and through the air vent about the neck of the wearer.

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12. A resilient cervical collar device for a wearer of a motor vehicle helmet characterized by:

a central generally U-shaped collar section made from resilient elastomeric material and sized to  
5 fit about a person's neck under a lower edge of a helmet assembly;

said U-shaped collar section having a front open end and an inner upright wall normally spaced from the wearer's neck to form a gap therebetween and an  
10 upper wall normally spaced from a bottom edge of the helmet; and

an air vent extending through the inner upright wall at a rear section thereof for allowing air flow from the open front end and through the gap and out  
15 through the air vent;

a mounting mechanism for securing the u-shaped collar section in position about the neck of the wearer.

13. A resilient cervical collar device as  
20 defined in claim 12 further characterized by:

said mounting mechanism including a pair of shoulder wings laterally extending sideways from the central collar section to rest on the shoulders of the wearer;

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each wing being operably connectable to a strap extending down the dorsal and frontal sides of the wearer, said straps having distal sections being anchored to a member secured to the wearer.

5

14. A resilient cervical collar device as defined in claim 13 further characterized by:

said shoulder wings being integrally and simultaneously formed with the collar section, said wings and said collar section being made from the same resilient elastomeric material.

10

15. A resilient cervical collar device as defined in claim 13 further characterized by:

said wings each having a plurality of slots therein that receive each strap therethrough.

15

16. A resilient cervical collar device as defined in claim 14 further characterized by:

a lower surface of each wing having embossments to decrease the amount of direct contact of the lower surface with the shoulder of the wearer and to provide air flow therebetween.

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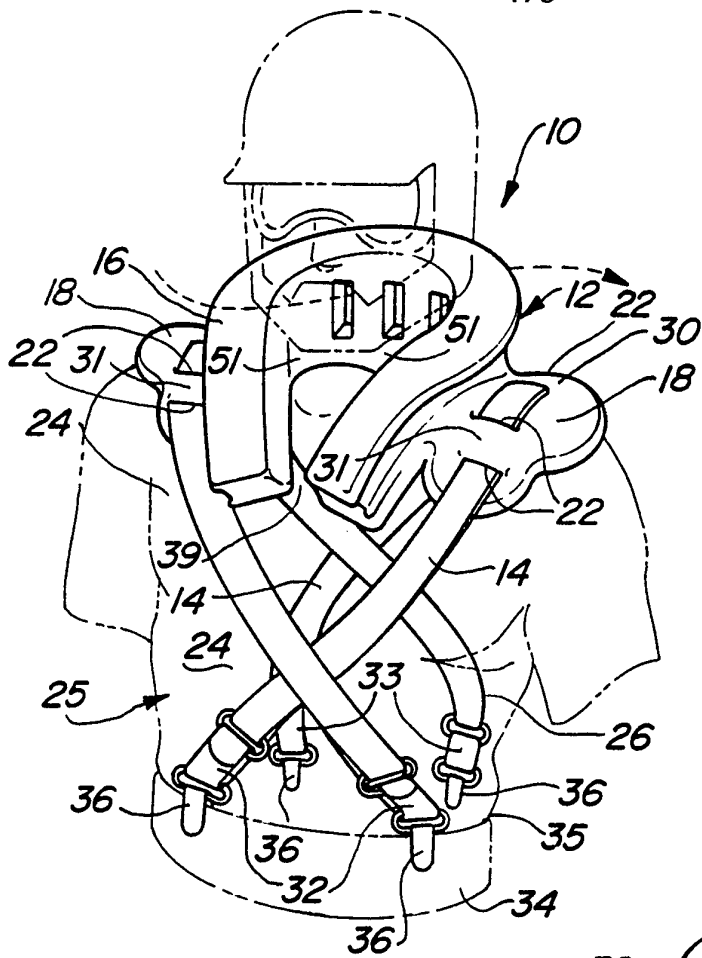


Fig-1

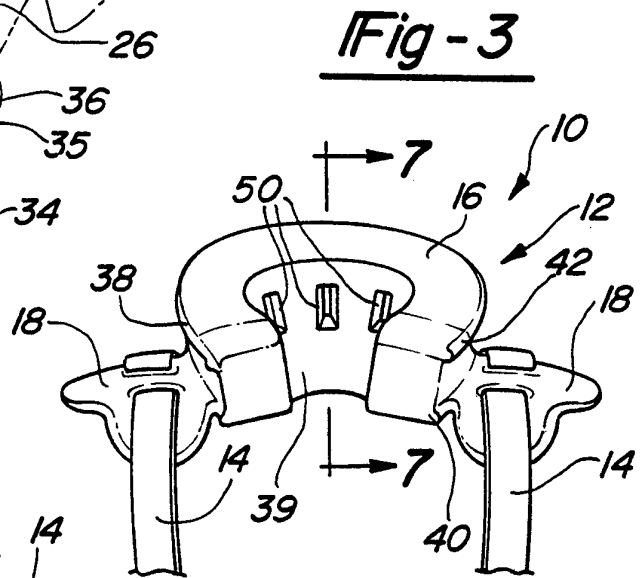


Fig-3

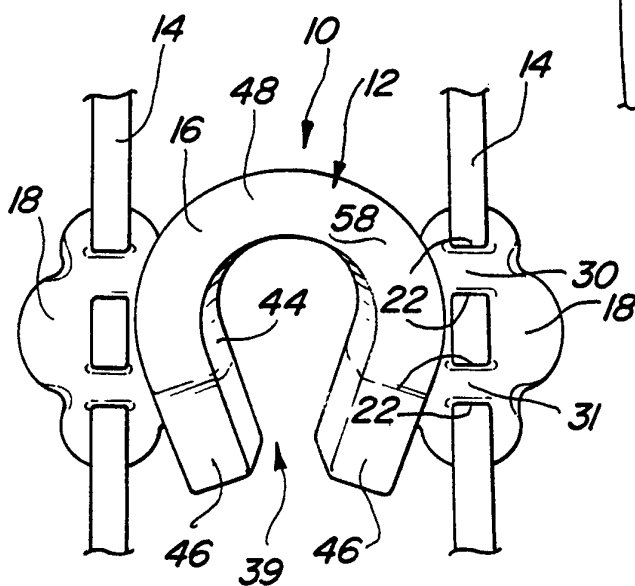


Fig-4

Fig - 5

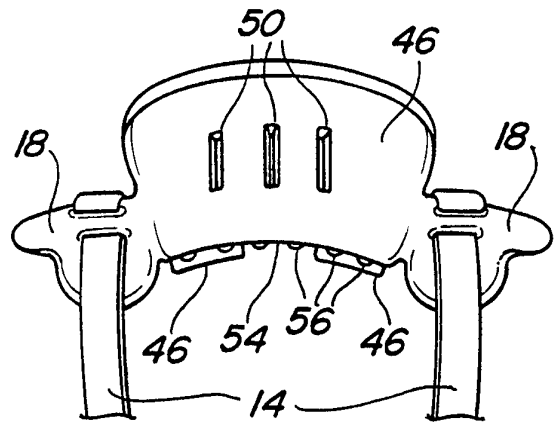


Fig - 6

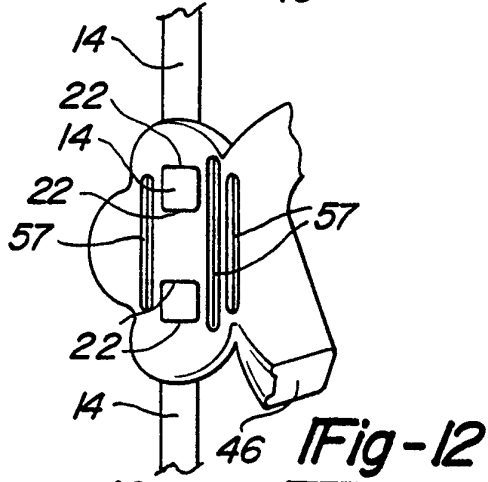
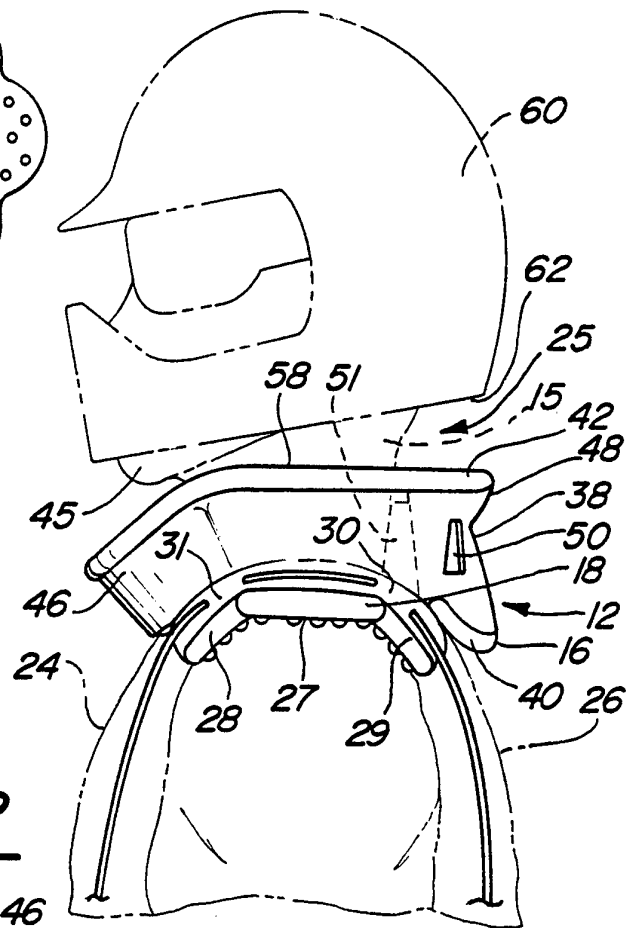
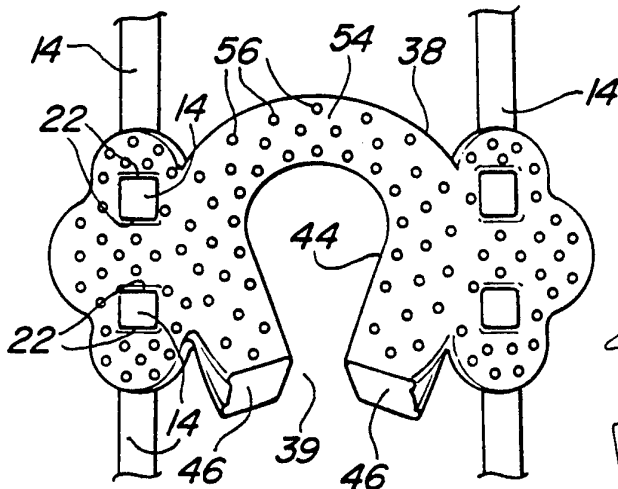


Fig - 12

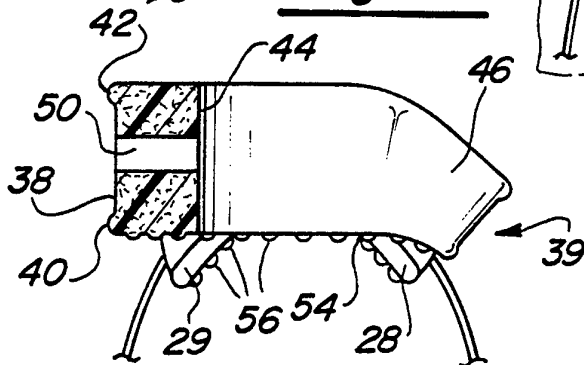
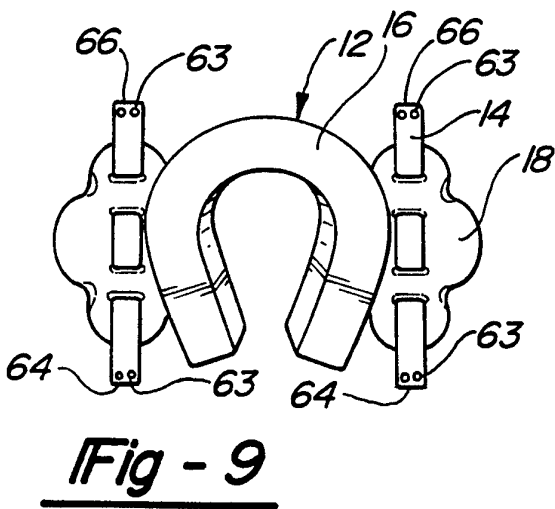
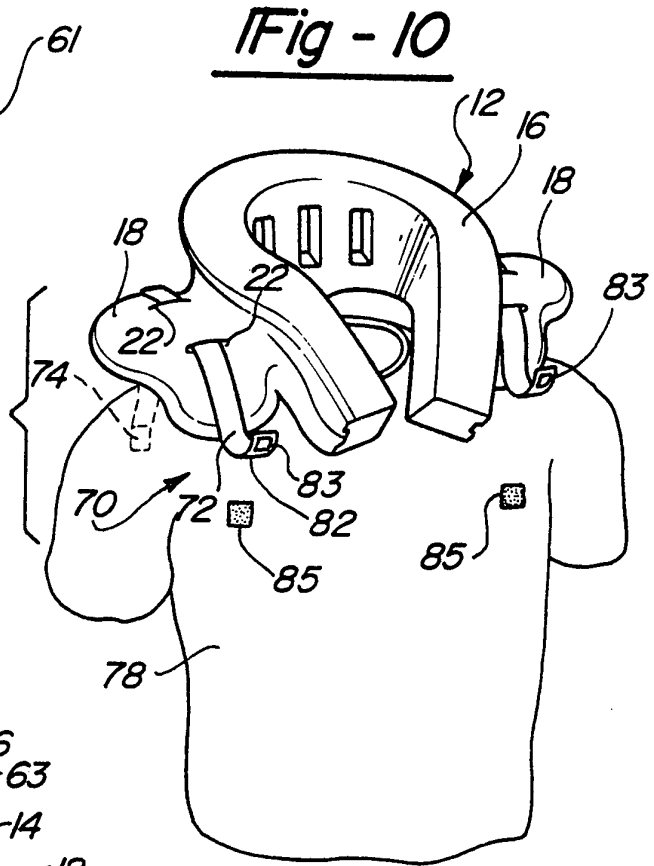
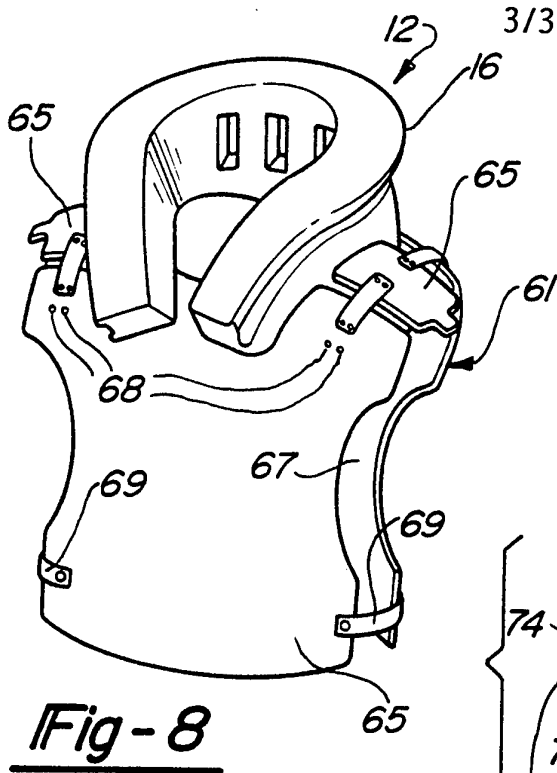


Fig - 7

Fig - 2



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/02701

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :A41D 13/00

US CL :2/2, 415

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)

U.S. : 2/2, 415, 425, 908

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----	US, A, 4,821,339 (FAIR) 18 April 1989, see entire document.	1, 2, 8, 9 ----
Y		6, 7, 10-14, 16
X ----	US, A, 4,996,720 (FAIR) 05 March 1991, see entire document.	1, 2, 8, 9 ----
Y		6, 7, 10-14, 16
X ----	EP, A, WO 91/03178 (POLSON) 21 March 1991, see entire document.	1, 2, 8 ----
Y		6, 7, 10-14, 16
Y	US, A, 5,168,576 (KRENT ET AL) 08 December 1992, see entire document.	6, 7, 10-14, 16

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

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Date of the actual completion of the international search

30 MAY 1996

Date of mailing of the international search report

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PCT/US96/02701

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,338,685 (LAPORTA, JR) 13 July 1982, see entire document.	1-16
A	US, A, 3,514,784 (MCDAVID) 02 June 1970, see entire document.	1-16
A	US, A, 4,449,251 (GAUTHIER) 22 May 1984, see entire document.	1-16
A	US, A, 4,825,476 (ANDREWS) 02 May 1989, see entire document.	1-16
A	US, A, 5,353,437 (FIELD ET AL) 11 October 1994, see entire document.	1-16
A	US, A, 5,404,590 (MONICA, JR) 11 April 1995, see entire document.	1-16