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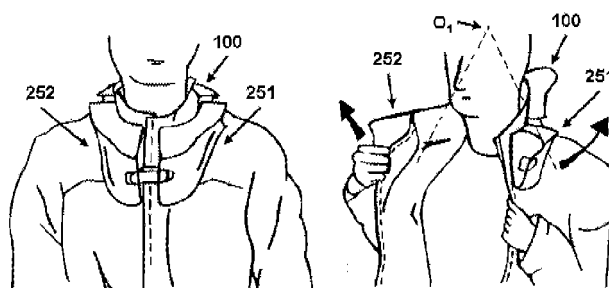
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(54) **NECK PROTECTOR**

(57) The neck protector is formed by a rear shield-shaped part (100), which rests on the shoulders and the upper part of the back, and two front shield-shaped parts (251) (252), which rest on the upper front part of the torso, one on either side of the neck. Said front shield-shaped parts (251) (252) are connected to the rear shield-shaped part (100) by articulation means, for example hinges (301) (302), the rotation pins of which are oriented towards the top, towards the back and towards the centre such that the point ( $O_1$ ) of intersection of which is located

above and below them. Not only the front shield-shaped parts (251) (252) but also the rear shield-shaped part (100) can be fastened to the clothing via connecting areas, and by virtue of the special orientation of the pins of the hinges (301) (302) it is possible for the neck protector (001) to be able to be placed and removed together with any clothing. The configuration of the protector allows a quick-connection device for the various elements to be incorporated plus a system for adjustment to various body sizes.



**FIG. 1**

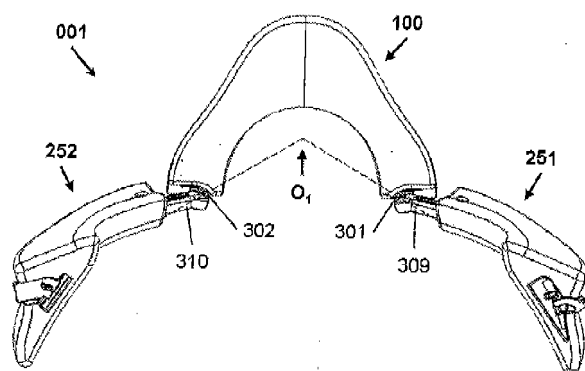


FIG. 9

## Description

### OBJECT AND FIELD OF INVENTION

**[0001]** The present invention relates to a neck protection device for persons subjected to risk of injury, and specifically for motorcycle users. It is a system that can be easily integrated with the clothing, and which when used together with a helmet reduces the risk of neck injury.

### BACKGROUND OF THE INVENTION

**[0002]** Neck-protection devices are increasingly being used in various sports, such as motorcycle riding. This is mainly due to the protection they provide to an area of the body that is particularly vulnerable.

**[0003]** The protection method of these devices is based on limiting extreme motions of the head, which would lead to neck injury, both towards the front (flexion) and towards the back (extension), as well as towards the sides.

**[0004]** Different types of neck protectors exist. The most basic ones are composed of a foam that surrounds the neck. Some examples of these are documents US 6058517 and WO 02089620.

**[0005]** These describe foams which, when placed around the neck, limit the movement of the helmet to a greater or lesser extent. They are fitted through a front opening closed by a strap, joined to one of the ends of the foam and attached to the other end by Velcro unions.

**[0006]** The main drawback of these protectors is that they are sometimes adjusted too close to the neck, which may make them uncomfortable, and other times do not stay in the optimum position for limiting the movement of the helmet, with the resulting loss in efficacy of the protection they must provide.

**[0007]** In addition to these, there are protectors that comprise a rigid structure on which the helmet rests, which extend over the back and chest and ensure an optimum position with respect to the neck and improve the load distribution. Some clear examples of this type are the devices described in documents WO 2005051251 and WO 2008105010.

**[0008]** Thus, document WO 2005051251 describes a device that comprises a ring placed around the neck, formed by two parts that are joined at the sides and a support, connected to the rear part of the ring, that extends over the user's back. The device described guarantees a greater stability, but it is difficult to place and take off, as its clasps are on the sides, it does not easily integrate with the user's clothing and it is cumbersome, complicating its transport and storage. Moreover, as the area that rests on the back is not completely covered in foam, it may become embedded in the spinal column and damage it.

**[0009]** Document WO 2008105010 describes a similar device, which comprises a ring formed by two arms joined

by articulation means at a vertical shaft on the rear and which opens in the front, and a support that runs from the ring on the upper part of the user's back. A second shaft, horizontal and parallel to the user's back, allows changing the angle between the ring formed by the two arms and the rear support. The design of this device simplifies its installation, as it is opened and closed on the front, its transport and its storage, as its various component parts can be easily disassembled, but presents some serious drawbacks. Among these is that, although it can admit a conventional clothing item open in the middle, it can only be joined to the collar at the rear protector area, due to the vertical shaft, and that its opening system does not allow incorporating any mechanism for adjusting it to different user sizes.

**[0010]** Finally, there are devices in which the structure that conforms the collar is jointed to the helmet or incorporated in a specific clothing item.

**[0011]** Thus, document WO 2005079614 describes a protection device for motorcycle users composed of a helmet and a collar that are joined to each other, behind the neck, by a mechanism that allows moving the head freely without exceeding the limits beyond which there is a risk of serious injury to the neck. The collar is composed of two arms articulated about a central part. Among the main drawbacks of this device is that it cannot be used with any commercially available helmet, as the helmet and collar are joined, and the deficient support on the user's upper body, which among other reasons is due to the absence of a support that extends over the back.

**[0012]** In document WO 2008/050303, in contrast to the above-described device, the collar is incorporated in a motorcycle riding suit instead of being joined to the helmet. The collar comprises two parts and is separated at a junction line that is prolonged in a side opening made in the riding suit for this purpose.

**[0013]** None of the devices described above can be placed or removed together with the user's clothing, and must be fitted before or after the clothing (jacket, riding suit, shirt, etc.).

**[0014]** Therefore, it is an object of the present invention to provide a neck protector allowing a simple and quick integration with the user's clothing.

**[0015]** A further object of the present invention to provide a neck protector that can be placed and removed together with the user's clothing.

**[0016]** Yet another object of the present invention to provide a neck protector that can be adjusted to different sizes in a simple manner and without requiring to change parts.

### DESCRIPTION OF THE INVENTION

**[0017]** To achieve the aforementioned objectives, a neck protector has been conceived composed of a rear shield that rests on the shoulders and on the upper part of the back, and two front shields that rest on the upper front part of the torso, one on either side of the neck. Said

front shields are connected to the rear shield by articulation means having their rotation axes oriented towards the top, towards the back and towards the centre, such that their point of intersection is above and behind them. These articulation means can be embodied in different ways. In a first variant they can consist of rigid hinges. In a second variant, the articulation means can be deformable and consist of a simple flexible sheet, such as a rubber sheet or a textile strap. In this case the rotation axes are not fixed and admit a certain spatial play, which further simplifies the handling of the device.

**[0018]** The basis of the invention lies in that the rotation axes of the articulation means follow, in some way, the natural line of the shoulders.

**[0019]** Both the front and rear shields can be fastened to the clothing by Velcro type attachment areas or other fast-clip systems.

**[0020]** In turn, thanks to the special orientation of the pins of the hinges that articulate the rear and front shields, the neck protector can be placed and removed jointly with the clothing.

**[0021]** The front and rear shields that conform the neck protector are advantageously built from a rigid frame and a deformable foam-like covering, meant to cushion the contact between the helmet and the protector, and between the latter and the thorax.

**[0022]** The possibility is foreseen of incorporating specific protections surrounding the rear frame, both in the upper area to cushion possible impacts between the driver and a passenger in the back, and in the lower area to prevent damage to the user's spinal column in case of penetration of the lower part of the frame

**[0023]** The two front shields can be separated from each other in the chest area, at a distance such that it is possible to raise and lower the zipper of a clothing item, providing a quick access to its interior. This arrangement also allows an increased ventilation.

**[0024]** Optionally, it has a system for joining the two front shields composed of a slide that retracts inside on one of them and which, when extended, is fastened to a clasp placed on the other front shield.

**[0025]** In order to simplify its storage and transport, a quick connection system can be incorporated between the front and rear shields that allows separating the three parts of the neck protector.

**[0026]** Optionally, a guide-slide system can be included with several locking positions, which allows adjusting the neck protector to different body sizes without requiring changing any parts.

**[0027]** The advantages of the neck protector of the invention are many:

- Limiting, by gradual deceleration, extreme movements of the head that can cause damage to the neck.
- Allowing a simple integration of the protector with the user's clothing.
- Allowing to place and remove the protector jointly

with the clothing.

- Allowing a fast access to the interior of the clothing.
- Improving ventilation.
- Simplifying its fast and safe removal after an accident, for example, if the user must remain immobilised.
- Cushioning impacts between the user and a passenger on the back.
- Preventing damages to the spinal column due to forces applied in localised areas.
- Adjusting the protector to different sizes in a simple manner.
- Minimising the space it occupies when disassembled, in order to simplify its storage.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0028]** To complete the preceding description, and in order to aid a better understanding of the characteristics of the invention, a detailed description of a preferred embodiment will be made with reference to a set of drawings that accompany this specification where, for purposes of illustration and in a nonlimiting sense, the following is shown.

Figure 1 shows two use situations in which the neck protector is connected to a jacket, the first one being in a closed position and the second one being completely removed with the jacket to which it is connected.

Figure 2 shows a perspective view of the device from the front.

Figure 3 shows a perspective view of the device from the back

Figure 4 shows a side view of the device with the front shields closed.

Figure 5 shows a side view of the device with the front shields open.

Figure 6 shows a perspective view of the quick connection, hinge and size adjustment mechanisms.

Figure 7 shows a top view of the device.

Figure 8 shows a bottom view of the device

Figure 9 shows a plan view of the device with the front shields open.

Figure 10 shows a perspective view of the device from: the front and a detail of the front closing system.

**[0029]** In the above figures the numerical labels correspond to the following parts and elements:

- 001. Neck protector,
- 100. Rear shield.
- 101. Rear frame.
- 102. Rear deformable coating.
- 111. Rear connection area.
- 112. Middle connection area.
- 121. Upper protection.
- 122. Lower protection.

- 201. Front left frame
- 202. Front right frame.
- 203. Front left deformable coating.
- 204. Front right front deformable coating.
- 211. Front left connection area.
- 212. Front right connection area.
- 251. Front left shield.
- 252. Front right shield.
- 301. Left hinge.
- 302. Right hinge.
- 309. Left stem.
- 310. Right stem.
- 311. Left housing.
- 312. Right housing.
- 313. Left guide locking screw.
- 314. Right guide locking screw.
- 315. Left guide locking nut.
- 316. Right guide locking nut.
- 317. Left lateral guide.
- 318. Right lateral guide.
- 401. Clasp support.
- 405. Front closure clasp.
- 412. Sliding box.
- 416. Front closure slide.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

**[0030]** The figures show an embodiment of the neck protector (001) of the invention, which comprises a rear shield (100) that rests on the shoulders and the upper part of the user's back, and two front shields (251) (252) that rest on the upper front part of the user's torso.

**[0031]** The rear shield (100) is composed of a rigid rear frame (101) and a rear deformable coating (102). It has an opening in the area on which it rests on the back in order to improve ventilation and reduce its weight.

**[0032]** The front left shield (251) is composed of a front left frame (201) and a front left deformable coating (203).

**[0033]** Similarly, the front right shield (252) is composed of a front right frame (202) and a front right deformable coating (204).

**[0034]** The deformable coating (102) (203) (204) of all the described parts comprises a viscoelastic foam sensitive to the deformation speed, meant to increase user comfort and absorb energy in case of an accident, slowing down in a programmed manner the impact of the helmet against the neck protector (001), and that of the latter against the user's body. This reduces the biomechanical injury values, such as the rotational acceleration of the head.

**[0035]** On the rear frame (101), specific foam areas have been introduced (see figure 3) that cover it to constitute an upper protection (121), meant to cushion potential impacts between the driver and a passenger in the rear, and a lower protection (122), meant to prevent possible damage to the user's spinal column, by minimising the localised forces that can be transmitted to the

column.

**[0036]** In order to place and remove the neck protector (001), hinges (301) (302) have been fitted that articulate the front shields (251) (252) with respect to the rear shield (100), their axes of rotation being oriented towards the top, towards the back and towards the centre, so that their point of intersection ( $O_1$ ) is located above and behind them. In this way, the front shields (251) (252) open to the sides and upward. See figures 5 and 9.

**[0037]** The front shields (251) (252) are connected to the rear shield (100) by a quick connection system that allows a simple separation of the three parts of the neck protector (001), allowing on one hand its storage in a reduced space and on the other its quick and safe removal after an accident.

**[0038]** This attachment system comprises some housings (311) (312) disposed on the rear shield (100) and the corresponding forks joined to the hinges (301) (302) (shown in figure 6) which, when inserted in said housings (311) (312), are attached to them.

**[0039]** In the surface of contact with the user's body, union areas (111) (112) (211) (212) have been provided for including Velcro or other fast connection systems, in order to fasten the neck protector (001) to the user's clothing (jacket, riding suit, sweater, etc.). See figure 8.

**[0040]** These union areas can also be used to incorporate a possible system of straps for attaching the neck protector (001) to the user's thorax, if it is not attached directly to the clothing.

**[0041]** Attaching the neck protector (001) to the user's clothing, as described above, thanks to the kinematics of the opening system, allows users to place and remove the neck protector (001) together with a jacket or the like, the two items remaining connected at all times.

**[0042]** With the neck protector (001) in its closed position (see figure 8), the front shields (251) (252) can be separated in the front area by a distance such that it is possible to raise and lower the zipper of a jacket, riding suit or any other clothing item worn under the neck protector (001). This arrangement also allows an increased ventilation.

**[0043]** The collar that the protector defines around the neck can be closed to provide the necessary stability in two different ways:

a) If the neck protector (001) is fastened to the user's clothing (jacket, riding suit, etc.) as indicated above (Velcro unions or the like), the same zipper or closing system of the clothing item can be used as a closing element for the protector;

b) By a union system included in the front part of the front shields (251) (252) which, in its open position, does not interfere in the space that may exist between them; This system can be used, in addition, even if the neck protector (001) is connected to the clothing and the latter's closure system (zipper, etc.) is used.

**[0044]** Said union system between the front shields (251) (252) is shown in figure 10 and comprises:

- A slide (416) that moves in a box (412) attached to one of the two front shields (252) or (251). This mechanism has an elastic mechanism, such as a spring, that exerts a force that tends to retract the slide (416) into the box (412);
- A clasp (405) that moves on a support (401) integrally joined to the other anterior shield (251) or (252), which retains the slide (416) when it is moved far enough to reach the clasp (405). This clasp (405) also has an elastic mechanism, such as a spring, that exerts a force that tends to keep it in a closed position.

**[0045]** The movements needed to lock and release this union device are simple and have a single direction.

**[0046]** To adapt the neck protector (001) to different sizes, on either side of it is mounted a guide-slide system, shown in figures 2 and 3 and in detail in figure 6, with the corresponding locking mechanism comprised of:

- A locking screw (313) (314), housed in the lateral guides (317) (318) joined to the front shields (251) (252), with its linear motion along its axis restricted and fitted with stops to limit its range of rotation.
- A locking nut (315) (316), also housed in the lateral guides (317) (318) and threaded on the locking screw (313) (314), which has its rotation motion restricted but can move linearly;
- A stem (309) (310) that slides through the lateral guides (317) (318) and has several orifices in which the locking nut (315) (316) can be inserted. It can also comprise one or more stops at its end, to prevent it from moving out of the lateral guide (317) (318) when the locking nut (315) (316) is out of the orifices of the stem (309) (310).

**[0047]** Figures 1 and 2 show the ease of removal of the neck protector object of the invention. It can be seen that the special configuration of the protector allows it to follow the motion of the clothing item easily, as if it were part of its collar. It is interesting to note that, even if the collar and the clothing item are not connected, it is possible to open and reach the interior of the clothing item by pulling somewhat on the collar without removing it.

**[0048]** A more detailed explanation is not considered necessary of some mechanical solutions which, in general, will be known to persons skilled in the art.

**[0049]** The figures accompanying the preceding description of a preferred embodiment represent various elements, such as recesses and variations in the thickness of the deformable coatings, which are considered not to require a detailed explanation as they are widely known in the prior art.

**[0050]** Also obvious to a person skilled in the art are a number of variants and modifications that allow adapting

the design to the available production means, while respecting the essence of the invention.

## 5 Claims

1. Neck protector (001), **characterised in that** it comprises:

- a rear shield (100) that rests on the shoulders and the upper part of the back;
- two front shields (251) (252) that rest on the upper front part of the user's torso, one on either side of the neck;
- means for articulating the front shields (251) (252) with the rear shield (100), their rotation axes facing towards the top, towards the back and towards the centre, so that their intersection point (Oi) is above and behind them.

2. Neck protector (001) according to claim 1, **characterised in that** the articulation means comprise hinges (301) (302).

3. Neck protector (001) according to claim 1, **characterised in that** the articulation means comprise deformable elements.

4. Neck protector (001) according to claim 3, **characterised in that** the deformable elements comprise flexible sheets.

5. Neck protector (001) according to claim 1, **characterised in that** the shields (100) (251) (252) comprise a rigid frame (101) (201) (202) and a deformable coating (102) (203) (204).

6. Neck protector (001) according to claim 5, **characterised in that** the deformable coating (102) (203) (204) comprises a viscoelastic foam sensitive to the deformation speed.

7. Neck protector (001) according to claim 6, **characterised in that** it comprises an upper protection (121) that covers the rear frame (101).

8. Neck protector (001) according to claim 6, **characterised in that** it comprises a lower protection (122) that covers the rear frame (101).

9. Neck protector (001) according to claim 1, **characterised in that** it comprises, in the surface of contact with the body of both the rear shield (100) and the front shields (251) (252), several areas of union (111) (112) (211) (212) to the user's clothing.

10. Neck protector (001) according to claim 1, **characterised in that** the two front shields (251) (252), in

the closed position, present a separation in their front area.

11. Neck protector (001) according to claim 1, **characterised in that** it comprises means for joining the two front shields (251) (252) 5
12. Neck protector (001) according to claim 11, **characterised in that** the means for joining the two front shields (251) (252) comprise: 10
  - a slide (416) that moves in a box (412) attached to one of the two front shields (252) or (251);
  - a clasp (405) that moves on a support (401) integrally joined to the other anterior shield (251) or (252), which retains the slide (416) when it is moved far enough to reach the clasp (405). 15
13. Neck protector (001) according to claim 12, **characterised in that** the slide (416) incorporates an elastic element that exerts a force that tends to retract the slide (416), after releasing the clasp (405), towards the box (412) that contains, such that it does not interfere with the separation between the front shields (252) (251). 20 25
14. Neck protector (001) according to claim 12, **characterised in that** the clasp (405) incorporates an elastic element that exerts a force that tends to keep the clasp (405) in the closed position. 30
15. Neck protector (001) according to claim 1, **characterised in that** it comprises fast connection means between the front shields (251) (252) and the rear shield (100). 35
16. Neck protector (001) according to claim 15, **characterised in that** the fast connection means comprise:
  - two housings (311)(312) disposed on the rear shield (100); 40
  - corresponding forks integrally joined to the hinges (301) (302), which when inserted in the housings (311) (312) are anchored to them. 45
17. Neck protector (001) according to claim 1, **characterised in that** it comprises means for adjustment to various sizes.
18. Neck protector (001) according to claim 17, wherein the means for adjustment to various sizes are implemented as guides-slides **characterised by** comprising: 50
  - a locking screw (313) (314), housed in lateral guides (317) (318) integrally joined to the front shields (251) (252), having its linear motion along its axis restricted and being fitted with 55

stops to limit its range of rotation;

- a locking nut (315) (316), also housed in the lateral guides (317) (318) and threaded on the locking screw (313) (314), having its rotation motion restricted but being able to move linearly;
- A stem (309) (310) that slides through the lateral guides (317) (318) and has several orifices in which the locking nut (315) (316) can be inserted.

19. Neck protector (001) according to claim 18, **characterised in that** the stem (309) (310) has at least one stop at its end, such that it prevents it from moving out of the lateral guides (317) (318) when the locking nut (315) (316) is out of the orifices of the stem (309) (310).

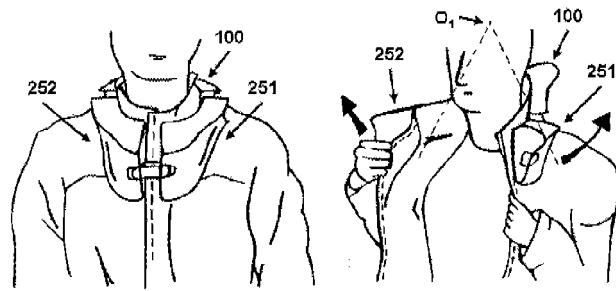


FIG. 1

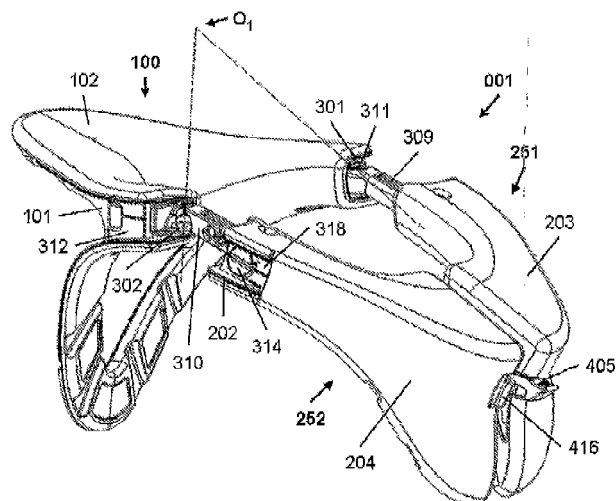


FIG. 2



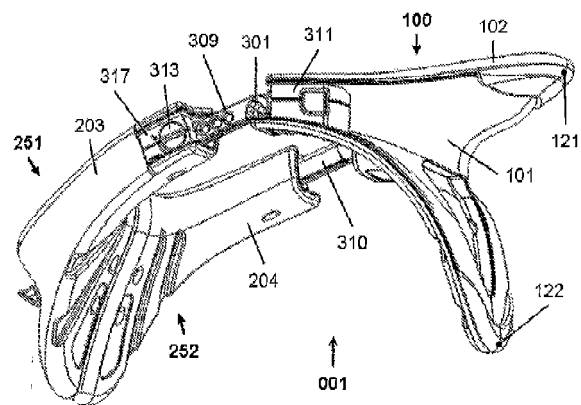


FIG. 3

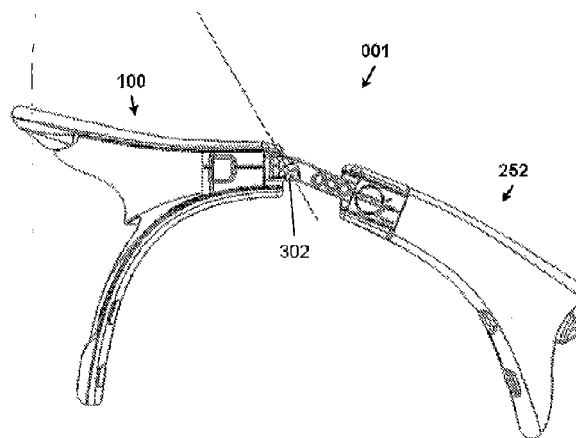


FIG. 4

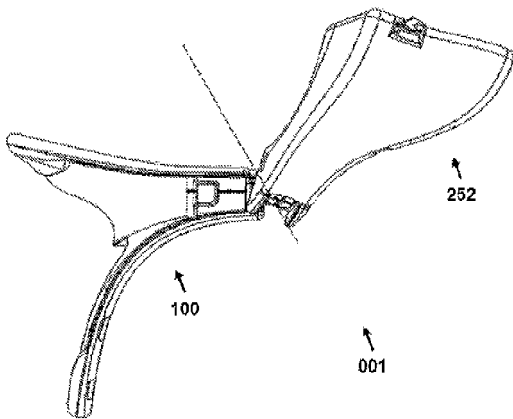


FIG. 5

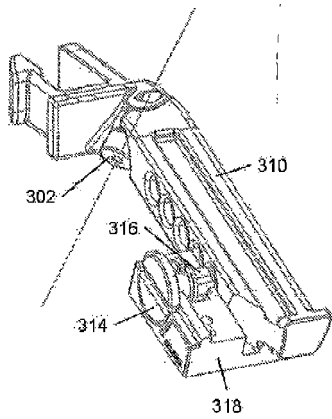


FIG. 6

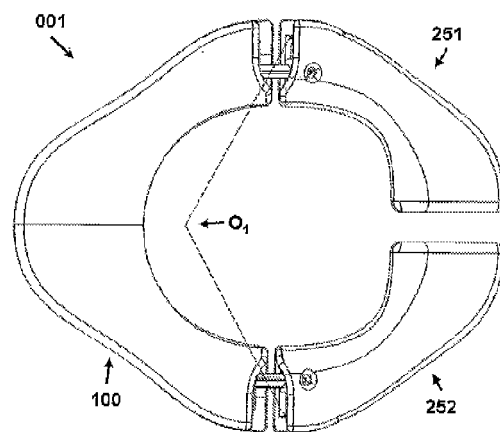


FIG. 7

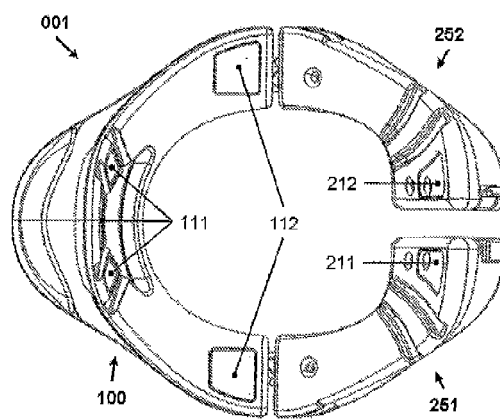


FIG. 8

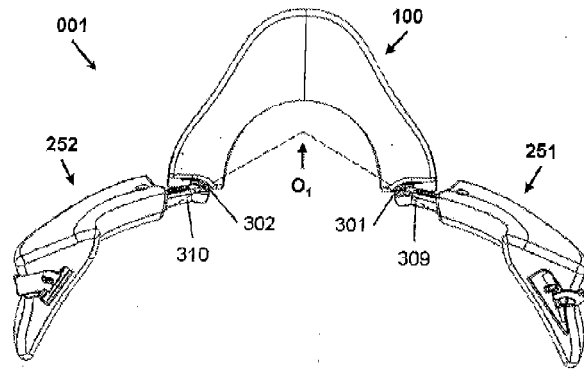


FIG. 9

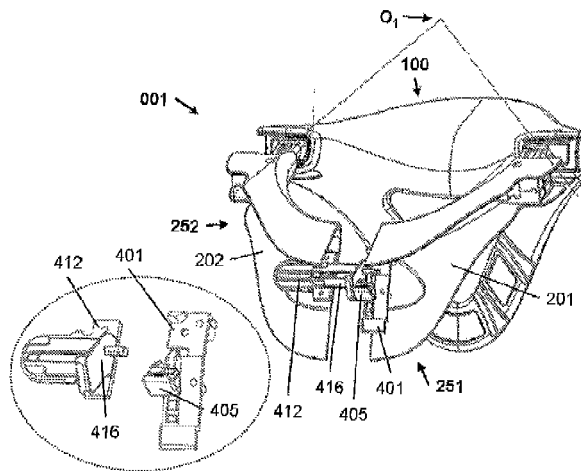


FIG. 10

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2010/070455

## A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet

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)

A41D, A42B

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)

INVENES, EPODOC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                          | Relevant to claim No. |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A         | WO 2008105010 A1 (ALPINESTARS RES SRL ; MAZZAROLO GIOVANNI) 04.09.2008, page 1, line 27 - page 7, line 33; figures 1,4                      | 1,2,5-8,10-19         |
| A         | WO 2005051251 A2 (LEATT CHRISTOPHER JAMES) 09.06.2005, pages 1, paragraph 4 - page 12, paragraph 2; figures 2,6                             | 1,2,5,6,15,16         |
| A         | WO 2008050303 A2 (LEATT CHRISTOPHER JAMES ; HOPKINS MARK ERIC ; NELSON GRANT) 02.05.2008, page 2, line 16 - page 6, line 10; figure 1,      | 1,2,5-8,15,16         |
| A         | WO 2009010936 A2 (LEATT CORP ; LEATT CHRISTOPHER JAMES ; HOPKINS MARK ERIC ; ) 22.01.2009, page 1, line 26 - page 14, line 13; figures 1-3. | 1,2,5-8,10,15,16      |
| A         | US 5404590 A (MONICA et al.) 11.04.1995, description; figures.                                                                              | 1,3,4,9               |

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

\* Special categories of cited documents:

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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 documents, such combination being obvious to a person skilled in the art

"&amp;"

document member of the same patent family

Date of the actual completion of the international search

20.October.2010 (20.10.2010)

Date of mailing of the international search report

(21/10/2010)

Name and mailing address of the ISA/  
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International application No.

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CLASSIFICATION OF SUBJECT MATTER

*A41D 13/05* (2006.01)

*A42B 3/04* (2006.01)

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