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(54) **TRAUMA PROTECTING ANTI BALLISTIC HELMET**

TRAUMA-SCHÜTZENDER KUGELSICHERER HELM

CASQUE PARE-BALLES PROTEGEANT DES TRAUMATISMES

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## Description

### FIELD OF THE DISCLOSURE

**[0001]** The present invention generally relates to helmets. Particularly, the present invention relates to trauma resistant anti ballistic helmets.

### BACKGROUND

**[0002]** Helmet is a protective gear worn on a head portion of a user to protect it from injuries. Helmet may be used for various purposes such as recreational activities, sports, two-wheelers occupant, construction, mining, police and military applications. The Police, military and other law enforcement agencies personnel wear the helmet to protect their head from hand held firearms/Hand-guns, high velocity fragments, projectiles and the like. It is important that the helmet should cater to the needs for which it is used.

**[0003]** Helmets used for Police, military and other law enforcement agencies should protect their head from trauma (Back face deformation (BFD)) that can be caused by various elements such as hand held firearms/Hand Guns, high velocity fragments, projectiles, stones, blow and the likes. Trauma (BFD) is an important consideration while designing ballistic protection articles. More the amount of trauma (BFD) more is the chances of users getting injured. Generally, a trauma (BFD) head injury is more fatal than trauma to other parts of the body.

**[0004]** Presently, helmets that are used for head protection (particularly, for Police, military and other law enforcement agencies) are made of different types of ballistic fabrics such as Kevlar fibers or from Ultra high molecular weight polyethylene/Polyolefene fibers. Further, shells of helmets are molded under pressure and temperature till it cures and adopts the shape of mold. Thereafter further operations such as cutting to required shape, fitment of harness assembly and applying protective paint in the required shade is carried out.

**[0005]** Although the currently existing helmets are useful for security forces, paramilitary forces and other law enforcement agencies, the currently existing helmets have various limitations. For example, the currently existing helmets are comparatively less effective in providing trauma resistance to the operative front portion, the operative rear portion and the periphery of the helmet. Further, the currently existing helmets are comparatively less effective in providing trauma resistance to head portion of a user from snipers, enemy fire and other harmful projectile. US2006/248623 describes armour for a helmet including a soft-armour attachment and a hard-armour attachment. US3958276 describes a bullet-proof body-protecting wall structure comprising a thin resilient pressure molded, outer skin of resin impregnated layers of flexible woven fabric with inner and outer surfaces. US2014/0123360 discloses a protective helmet having a shell formed from a cushioning material, a cushioning

spacer layer coupled to the shell and only partially covering an inner surface of the shell.

**[0006]** Accordingly, based on the foregoing, there exists a need for a helmet that provides comparatively more protection to an operative front portion, an operative rear portion and/or a periphery of the helmet. Further, there is need of a helmet that is comparatively more effective in providing trauma resistance to a head portion of a user from snipers, enemy fire, projectiles, stones and the like.

### OBJECTS OF THE CLOSURE

**[0007]** Some of the objects of the present invention are as follows:

5 An object of the present invention is to provide a trauma resistant anti ballistic helmet that provides comparatively more protection to an operative front portion, an operative rear portion and/or at least some portion of periphery of the helmet.

20 **[0008]** Further an object of the present invention is to provide a trauma resistant anti ballistic helmet that is comparatively more effective in providing trauma resistance to a head portion of a user from snipers, enemy fire, projectiles, stones and the like.

25 **[0009]** Another object of the present invention is to provide a trauma resistant anti ballistic helmet that is cost effective.

30 **[0010]** Another object of the present invention is to provide a trauma resistant anti ballistic helmet that is simple in structure.

**[0011]** Also, an object of the present invention is to provide a trauma resistant anti ballistic helmet that has comparatively low back face deformation value.

### 35 SUMMARY

**[0012]** In view of the foregoing disadvantages inherent in the prior art, the general purpose of the present invention is to provide a trauma resistant anti ballistic helmet configured to include all the advantages of the prior art, and to overcome the drawbacks inherent therein.

**[0013]** The present invention solves the problem stated above by providing a trauma resistant anti-ballistic helmet according to claim 1 and comprising:

45 a shell composed of a plurality of helmet pre-forms;

characterized in that,

50 a pair of first back face deformation shields (BFDS) is disposed on an operative front portion and an operative rear portion of an operative inner surface of said shell along a major axis of said helmet;

55 an anti-ballistic sheet is disposed over said pair of first BFDS covering at least a portion said shell; and

a pair of second back face deformation shields

(BFDS) is disposed over said anti-ballistic sheet on the operative front portion and the operative rear portion and disposed over said pair of first back face deformation shields (BFDS).

**[0014]** The at least one first back face deformation shield (BFDS) may be disposed on an entire periphery of the shell.

**[0015]** -

**[0016]** -

**[0017]** -

**[0018]** In one embodiment of the present invention, the at least one first back face deformation shield (BFDS) may be composed of at least one of a light alloy metal, a non metallic material, a non-metal laminate, a laminated fabric, an anti ballistic fabric, a woven fabric, a needle punched fleece and a UD fabric.

**[0019]** The at least one first back face deformation shield (BFDS) may be of a shape selected from the group consisting of a rectangle, an oval, a square, a trapezoid, an ellipse, a circle, a hexagon and a triangle.

**[0020]** Further, the at least one first back face deformation shield (BFDS) is disposed on at least one of the operative front portion, the operative rear portion, and at least a portion of a periphery of the shell by at least one of fusion, weld, adhesion, weaving, and molding.

**[0021]** Typically, the anti-ballistic sheet is composed of at least one of an anti-ballistic woven fabric sheet, an anti-ballistic needle punched fleece, a UD fabric sheet, an aramid pinwheel, a plurality of BFDS layers and non-ballistic material.

**[0022]** In one embodiment, the ballistic sheet is disposed over the at least one first BFDS covering at least a portion of an operative inner surface of the shell.

**[0023]** In one embodiment, the ballistic sheet is configured in a shape of a flower.

**[0024]** In one embodiment, the at least one second back face deformation shield (BFDS) is disposed on entire periphery of the shell.

**[0025]** In one embodiment, the at least one second back face deformation shield (BFDS) is disposed on any portion of the shell.

**[0026]** The at least one second back face deformation shield (BFDS) may be disposed over said at least one first back face deformation shield (BFDS).

**[0027]** The at least one second back face deformation shield (BFDS) may be disposed adjacent to the at least one first back face deformation shield (BFDS).

**[0028]** In one embodiment, edges of the second back face deformation shield (BFDS) are provided with high density cushioning material either as coating or edging.

**[0029]** The at least one second back face deformation shield (BFDS) is composed of at least one of a light alloy metal, a non metallic material, a non-metal laminate, a laminated fabric and a ballistic woven fabric, a non-ballistic woven fabric, a needle punched fleece and a UD fabric.

**[0030]** The at least one second back face deformation

shield (BFDS) is of a shape selected from the group of a rectangle, an oval, a square, a trapezoid, an ellipse, a circle, a hexagon and a triangle.

**[0031]** -

**[0032]** These together with other aspects of the present invention, along with the various features of novelty that characterize the present invention, are pointed out with particularity in the claims annexed hereto and form a part of this present invention. For a better understanding of the present invention, its operating advantages, and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated exemplary embodiments of the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0033]** The advantages and features of the present invention will become better understood with reference to the following detailed description and claims taken in conjunction with the accompanying drawings, wherein like elements are identified with like symbols, and in which:

Figure 1 illustrates a front perspective view of a trauma resistant Anti ballistic helmet (T R A B H), according to an embodiment of the present invention;

Figure 2 illustrates a bottom view of a shell of the trauma resistant Anti ballistic helmet (T R A B H) of Figure 1 depicting a major axis of the shell, according to an embodiment of the present invention;

Figure 3 illustrates a front view of a first set of Back Face Deformation Shield (BFDS), according to an embodiment of the present invention;

Figure 4 illustrates a front view of a second set of Back Face Deformation Shield (BFDS), according to an embodiment of the present invention;

Figure 5 illustrates a front view of an anti ballistic sheet, according to an embodiment of the present invention;

Figure 6 illustrates a bottom view depicting positioning of the first set of Back Face Deformation Shield (BFDS) on an operative front portion and an operative rear portion of the shell of Figure 2, according to an embodiment of the present invention;

Figure 7 illustrates a bottom view depicting positioning of an anti ballistic sheet over the first set of the BFDS covering entire inner portion of the shell of the helmet, according to an embodiment of the present invention;

Figure 8 illustrates a bottom view depicting positioning of the second set of Back Face Deformation

Shield (BFDS) on the operative front portion and the operative rear portion of the shell of the helmet along the major axis of the helmet and disposed over the first set of Back Face Deformation Shield (BFDS), according to an embodiment of the present invention;

Figure 9 illustrates a bottom view of the shell of the helmet including the first set of Back Face Deformation Shield (BFDS), the anti ballistic sheet and the second set of Back Face Deformation Shield (BFDS), according to an embodiment of the present invention;

Figure 10 illustrates a bottom view depicting positioning of the first set of Back Face Deformation Shield (BFDS) on an operative front portion and an operative rear portion of a portion of a periphery of the shell of Figure 2, according to an embodiment of the present invention;

Figure 11 illustrates a bottom view depicting positioning of an anti ballistic sheet over the first set of the BFDS covering a portion of a periphery of the shell of the helmet, according to an embodiment of the present invention;

Figure 12 illustrates a bottom view depicting positioning of the second set of Back Face Deformation Shield (BFDS) on the operative front portion and the operative rear portion of the portion of the periphery of the shell of the helmet and disposed exactly over the first set of Back Face Deformation Shield (BFDS), according to an embodiment of the present invention;

Figure 13 illustrates a bottom view of the shell of the helmet including the first set of Back Face Deformation Shield (BFDS), the anti ballistic sheet and the second set of Back Face Deformation Shield (BFDS), according to an embodiment of the present invention; and

Figure 14 illustrates a bottom perspective view of the trauma resistant anti ballistic helmet, according to an embodiment of the present invention;

**[0034]** Like reference numerals refer to like parts throughout the description of several views of the drawings.

#### DETAILED DESCRIPTION OF THE DRAWINGS

**[0035]** The exemplary embodiments described herein detail for illustrative purposes are subject to many variations in structure and design. It should be emphasized, however, that the present invention is not limited to a particular trauma resistant Anti Ballistic helmet, as shown

and described. It is understood that various omissions and substitutions of equivalents are contemplated as circumstances may suggest or render expedient, but these are intended to cover the application or implementation without departing from the spirit or scope of the claims of the present invention.

**[0036]** The terms "first," "second," and the like, herein do not denote any order, quantity, or importance, but rather are used to distinguish one element from another, and the terms "a" and "an" herein do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced item.

**[0037]** The present invention provides a trauma resistant Anti Ballistic helmet for protecting a head portion of a user from injuries. Generally, during testing procedure of a helmet, it was found that an operative front portion and an operative rear portion of the helmet are comparatively more prone to trauma than any other portion of the helmet. Accordingly, the trauma resistant helmet of the present disclosure provides comparatively improved protection to the operative front portion, the operative rear portion, at least a portion of the periphery and/or any portion of the helmet. In one embodiment, the trauma resistant Anti Ballistic helmet of the present disclosure is comparatively more effective in providing trauma resistance of about 13 mm, to a head portion of a user from snipers, enemy fire, fire from a hand held arm or a hand gun, projectiles, stones and other harmful projectiles.

**[0038]** Referring to Figures 1 to 14, a trauma resistant Anti Ballistic helmet 100 is illustrated. The trauma resistant helmet 100 includes a shell 102, a first set of Back Face Deformation Shield (BFDS) 104 (illustrated in Figures 3, 6, 10 and 11), a ballistic sheet 106 (illustrated in Figures 5, 7, 8, 9, 11 and 12,) and a second set of Back Face Deformation Shield (BFDS) 108 (illustrated in Figures 4, 8, 9, 12 and 13).

**[0039]** The shell 102 of the helmet 100 is composed of a plurality of helmet pre-forms. Each of the plurality of helmet pre-forms may be configured to have a variety of shapes based: on the user requirement. The plurality of helmet pre-forms may be composed from various materials known for making fragment resistant/ trauma resistant/ bullet proof helmets. In one embodiment of the present invention, the plurality of helmet pre-forms may be composed of a composite fabric material. In another embodiment of the present invention, the plurality of helmet pre-forms may be composed of an Aramid or a para-Aramid fabric. In another embodiment of the present invention, the plurality of helmet pre-forms may be composed of an ultra high molecular weight polyethylene fabric. Further, in one embodiment, the shell 102 is composed by molding together a plurality of layers of different type of ballistic fabric pre-forms/prepreg (resin coated fabric). Further, in one embodiment, coating is generally configured in different proportion on the ballistic fabric/prepreg which helps in providing desired shape to the plurality of layers to form the shell 102. In one embodiment, the shell 102 may be further processed by cutting

its periphery to give the required shape like ACH/PASGT and the like. The shell 102 has a major axis 110 (illustrated in Figures 2, 6 and 10).

**[0040]** The first set of Back Face Deformation Shield (BFDS) 104a and 104b is disposed on an operative inner surface 112 (illustrated in Figures 2 and 6) of the operative front portion 114 (illustrated in Figures 2, 6 and 8) and the operative rear portion 116 (illustrated in Figures 2, 6 and 8) respectively of the shell 102 of the helmet 100 along the major axis 110 of the helmet 100. The first BFDS sheet 104a and a second BFDS sheet 104b is a piece of Back Face Deformation Shield dimensioned to be suited for protecting particular front portion and rear portion of the helmet 100. The "particular portion" is the area of the operative front portion 114 and the operative rear portion 116 of the helmet 100 which is found comparatively less trauma resistant than other parts of the helmet 100. In one embodiment, the "particular portion" includes at least a portion along the major axis 110 of the helmet 100. Although, in the present embodiment, the first set of the Back Face Deformation Shield (BFDS) includes a pair of the Back Face Deformation Shield (BFDS) 104a and 104b, the present invention is not limited to the plurality of Back Face Deformation Shield (BFDS). In another embodiment, at least one first Back Face Deformation Shield (BFDS), such as 104a and 104b, is disposed on one of the operative front portion 114 and the operative rear portion 116 of the shell 102 based on the user requirement. Also, in yet another embodiment, at least one first Back Face Deformation Shield (BFDS), such as 104a and 104b, is disposed on an operative outer surface of one of the operative front portion 114 and the operative rear portion 116 of the shell 102 based on the user requirement. Referring to Figures 10 to 13, in another embodiment, the first set of Back Face Deformation Shield (BFDS) 104a and 104b is disposed on a portion of a periphery 142 of the shell 102 of the helmet 100. In yet another embodiment, a plurality of first Back Face Deformation Shields (BFDS), such as 104a and 104b is disposed on entire periphery of the shell 102 of the helmet 100. In yet another embodiment, at least one first Back Face Deformation Shields (BFDS), such as 104a and 104b is disposed on any other portion of the shell 102 of the helmet 100. Accordingly, the present invention is not limited to any particular position or location of the shell 102 where the first Back Face Deformation Shields (BFDS) is disposed.

**[0041]** Accordingly, the first set of the Back face deformation shield (BFDS) 104a and 104b is made of a suitable size and thickness. Further, the first set of the Back face deformation shield (BFDS) 104a and 104b may be of any light alloy metal plates, any other suitable non metallic material, laminated fabric, anti ballistic fabric, a woven fabric, a needle punched fleece, a UD fabric, any other fabric or any other suitable compound. Further, in another embodiment of the present invention, the first set of the Back face deformation shield (BFDS) 104 may be of any combination of material such as light alloy met-

al, non-metal laminate, laminated fabric, and the like. However, the present invention is not limited to any particular material used for composing the first set of the Back face deformation shield (BFDS) 104a and 104b. The shape of the first BFDS may be rectangular, oval, square, trapezoidal, elliptical, circular, hexagonal, triangular and the like. However, the present invention is not limited to any particular shape of the first set of BFDS 104a and 104b. In one embodiment of the present disclosure, the first set of the BFDS 104a and 104b is affixed on the operative front portion 114 and the operative rear portion 116 of the helmet 100 along the major axis 110. In one embodiment, the set of BFDS 104a and 104b is affixed on the inner surface 112 on the operative front portion 114 and the operative rear portion 116 of the shell 102 by application of suitable adhesive. However, in other embodiments, the set of BFDS 104a and 104b is affixed on the inner surface 112 on the operative front portion 114 and the operative rear portion 116 of the shell 102 by means of at least one of fusion, weld, adhesion, weaving, molding and the like. However, the present invention is not limited to, any particular method or any particular device used for disposing the first set of BFDS 104a and 104b on the front 114 and the rear 116 inner surface 112 of the shell 102.

**[0042]** Further, the anti ballistic sheet 106 is disposed over the first set of the BFDS 104a and 104b or at least one of the BFDS 104a and 104b, covering at least a portion of the shell 102. In one embodiment, the anti ballistic sheet 106 is an aramid pinwheel. More specifically, in one embodiment, the ballistic fabric sheet 106 is disposed over the first set of the BFDS 104a and 104b covering entire operative inner surface 112 of the shell 102 of the helmet 100. Alternatively, in another embodiment, the ballistic fabric sheet 106 is disposed over the first set of the BFDS 104a and 104b covering entire operative outer surface of the shell 102 of the helmet 100. In one embodiment, the ballistic fabric sheet 106 is at least one of aramid fabric, an anti-ballistic woven fabric sheet, an anti-ballistic needle punched fleece, a UD fabric sheet, an aramid pinwheel, a plurality BFDS layers, a non-ballistic material and the like. However, the present invention is not limited to any particular material used for composing the ballistic fabric sheet 106. In one embodiment, the ballistic fabric sheet 106 is cut in the shape of flower. However, the present invention is not limited to any particular shape of the ballistic fabric sheet 106. In one embodiment, the ballistic fabric sheet 106 is disposed on the shell 102 over the first set of the BFDS 104a and 104b by means of various mechanisms and systems, such as but not limited to adhesive, fusion, weld, weaving, molding and the like. However, the present invention is not limited to any particular method or device used for disposing the ballistic fabric sheet 106 on the shell 102 over the first set of the BFDS 104a and 104b. Further, in one embodiment, resin is used to cover the first set of BFDS 104a and 104b.

**[0043]** The second set of Back Face Deformation

Shield (BFDS) 108a, 108b is disposed respectively on the operative front portion 114 and the operative rear portion 116 of the shell 102 over the ballistic fabric sheet 106 and aligned/ disposed respectively over the first set of Back Face Deformation Shield (BFDS) 104a and 104b. More specifically, the second set of Back Face Deformation Shield (BFDS) 108a, 108b is disposed respectively on the operative front portion 114 and the operative rear portion 116 over the ballistic fabric sheet 106 along the major axis 110 and aligned/ disposed respectively over the first set of Back Face Deformation Shield (BFDS) 104a and 104b. In one embodiment, the edges of each of the second set of the BFDS 108a and 108b are disposed with high density cushioning material as a coating or an edging.

**[0044]** Referring to Figures 10 to 13, in yet another embodiment, the second set of Back Face Deformation Shield (BFDS) 108a and 108b is disposed on the ballistic fabric sheet 106 on a portion of the periphery 142 of the shell 102 of the helmet 100. In yet another embodiment, a plurality of second Back Face Deformation Shields (BFDS), such as 108a and 108b is disposed on the ballistic fabric sheet 106 on entire periphery of the shell 102 of the helmet 100.

**[0045]** In another embodiment of the present disclosure, the second set of Back Face Deformation Shield (BFDS) 108a, 108b is disposed on the ballistic fabric sheet 106 adjacent to the first set of Back Face Deformation Shield (BFDS) 104a and 104b. In yet another embodiment, at least one second Back Face Deformation Shields (BFDS), such as 108a and 108b is disposed on any other portion of the shell 102 of the helmet 100. Accordingly, the present invention is not limited to any particular position or location of the shell 102 where the second Back Face Deformation Shields (BFDS) is disposed.

**[0046]** In one embodiment, the shape of the second set of BFDS 108a and 108b may be rectangular, oval, square, trapezoidal, circular, elliptical, hexagonal, triangular and the like. However, the present invention is not limited to any particular shape of the second set BFDS 108a and 108b. In other embodiments, the second set of Back Face Deformation Shield (BFDS) 108a and 108b is disposed (affixed) over the ballistic fabric sheet 106 by ensuring that positioning is fully aligned/ adjacent respectively with the first set of BFDS 104a and 104b already affixed/placed below the ballistic fabric sheet 106. In some embodiments, the second set of Back Face Deformation Shield (BFDS) 108a and 108b is disposed respectively over the location that is fully aligned/ adjacent with the first set of the back face deformation shield (BFDS) 104a and 104b and above the ballistic fabric sheet 106. Further, in one embodiment, the second set of the Back face deformation shield (BFDS) 108a and 108b may be of any light alloy metal plates, any other suitable non metallic material, laminated fabric, ballistic fabric, a ballistic woven fabric, a needle punched fleece, a UD fabric, any other fabric or any other suitable compound. However, the present invention is not limited to

any particular material used for composing the second set of the Back face deformation shield (BFDS) 108a and 108b.

**[0047]** Although, in the present embodiment, the second set of the Back Face Deformation Shield (BFDS) includes a pair of second set of the Back Face Deformation Shield (BFDS) 108a and 108b, the present invention is not limited to the plurality of second Back Face Deformation Shield (BFDS). In another embodiment, at least one second Back Face Deformation Shield (BFDS), such as 108a and 108b, is disposed on one of the operative front portion 114, the operative rear portion 116, at least a portion of the periphery 142 and/or any other portion of the shell 102 based on the user requirement. Also, in yet another embodiment, at least one second Back Face Deformation Shield (BFDS), such as 108a and 108b, is disposed on an operative outer surface of one of the operative front portion 114, the operative rear portion 116, at least a portion of the periphery 142 and/or any other portion of the shell 102 based on the user requirement. In one embodiment, the trauma resistant anti-ballistic helmet of the present disclosure has a back face deformation value within 13.

**[0048]** Further, referring to Figure 14, the helmet 100 further includes a chin cup 120, a rear cushion pad 122, a snap button 124, a side cushion pad 126, a ladder lock 128, a rubber edging 130, a crown pad 132, a front cushion pad 134, a quick release button 136, a chinstrap 138 and a protective inner liner 140. All these components are provided on the helmet 100 by means of various methods and systems known in the art.

**[0049]** Various embodiments of the present invention offer following advantages. The trauma resistant Anti Ballistic helmet, as described herein, provides comparatively more protection to the operative front portion, the operative rear portion, at least some portion of the periphery or any other portion of the helmet. Further, the trauma resistant helmet is comparatively more effective in providing trauma resistance to a head portion of a user from snipers, enemy fire and other harmful projectiles. Furthermore, the trauma resistant helmet is cost effective. Still further, the trauma resistant helmet is simple in structure. Additionally, the trauma resistant anti-ballistic helmet of the present disclosure has comparatively low back face deformation value.

**[0050]** The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the present invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. The embodiments were chosen and described in order to best explain the principles of the present invention and its practical application, and to thereby enable others skilled in the art to best utilize the present invention and various embodiments with various modifications as are suited to the particular use contemplated. It is understood that various omissions and substitutions

of equivalents are contemplated as circumstances may suggest or render expedient, but such omissions and substitutions are intended to cover the application or implementation without departing from the scope of the present invention that is only limited by the appended claims.

## Claims

1. A trauma resistant anti-ballistic helmet (100) comprising:

a shell (102) composed of a plurality of helmet pre-forms;

**characterized in that,**

a pair of first back face deformation shields (BFDS) (104a; 104b) is disposed on an operative front portion (114) and an operative rear portion (116) of an operative inner surface (112) of said shell (102) along a major axis of said helmet (100);

an anti-ballistic sheet (106) is disposed over said pair of first BFDS (104a; 104b) covering at least a portion said shell (102); and

a pair of second back face deformation shields (BFDS) (108a; 108b) is disposed over said anti-ballistic sheet (106) on the operative front portion (114) and the operative rear portion (116) and disposed over said pair of first back face deformation shields (BFDS).

2. The trauma resistant anti-ballistic helmet (100) as claimed in claim 1, wherein said pair of first back face deformation shields (BFDS) (104a; 104b) and said pair of second back face deformation shields (BFDS) (108a; 108b) are composed of at least of a light alloy metal, a non-metallic material, a non-metal laminate, a laminated fabric, an anti-ballistic fabric, a woven fabric, a needle punched fleece and a UD fabric, of a shape selected from the group consisting of a rectangle, an oval, a square, a trapezoid, an ellipse, a circle, a hexagon, and a triangle.

3. The trauma resistant anti-ballistic helmet (100) as claimed in claim 1 or claim 2, wherein said pair of first back face deformation shields (BFDS) (104a; 104b) and said pair of second back face deformation shields (BFDS) (108a; 108b) are disposed on the operative front portion (114) and the operative rear portion (116) of said shell (102) by at least one of fusion, weld, adhesion, weaving and molding.

4. The trauma resistant anti-ballistic helmet (100) as claimed in any preceding claim, wherein said anti-ballistic sheet (106) is composed of at least one of an anti-ballistic woven fabric sheet, an anti-ballistic needle punched fleece, a UD fabric sheet, an aramid

pin wheel, a plurality of BFDS layers and a non-ballistic material.

5. The trauma resistant anti-ballistic helmet (100) as claimed in any preceding claim, wherein said anti-ballistic sheet (106) is disposed over said pair of first back face deformation shields (BFDS) (104a; 104b), configured at least in one of a shape of a square, a rectangle, an ellipse, a circle, and a triangle.

6. The trauma resistant anti-ballistic helmet (100) as claimed in any preceding claim, wherein said anti-ballistic sheet (106) is configured in a shape of a flower.

7. The trauma resistant anti-ballistic helmet (100) as claimed in any preceding claim, wherein in edges of said pair of second back face deformation shields (BFDS) (108a; 108b) are disposed with high density cushioning material as at least one of a coating and an edging.

8. The trauma resistant anti-ballistic helmet (100) as claimed in any preceding claim, wherein said pair of second back face deformation shields (BFDS) (108a; 108b) is composed of at least one of light alloy metal, a non-metallic material, a laminated fabric, a non-metal laminate, a ballistic woven fabric, needle punched fleece, a UD fabric.

9. The trauma resistant anti-ballistic helmet (100) as claimed in any preceding claim, wherein said pair of second back face deformation shields (BFDS) (108a; 108b) is of a shape selected from the group consisting of a rectangle, an oval, a square, a trapezoid, an ellipse, a circle, a hexagon, and a triangle.

## Patentansprüche

1. Verletzungsverhindernder anti-ballistischer Schutzhelm (100), umfassend:

eine Schale (102), die aus mehreren Helmvorformen aufgebaut ist;

**dadurch gekennzeichnet, dass**

ein Paar von ersten Rückseitenverformungsschirmen (BFDS) (104a; 104b) auf einem in Wirkung befindlichen vorderen Teil (114) und einem in Wirkung befindlichen hinteren Teil (116) einer in Wirkung befindlichen Innenfläche (112) der Schale (102) entlang einer Hauptachse des Schutzhelms (100) angeordnet ist;

eine anti-ballistische Lage (106) über dem Paar von ersten BFDS (104a; 104b) angeordnet ist, die mindestens einen Teil der

- Schale (102) abdeckt; und ein Paar von zweiten Rückseitenverformungsschirmen (BFDS) (108a; 108b) über der anti-ballistischen Lage (106) auf dem in Wirkung befindlichen vorderen Teil (114) und dem in Wirkung befindlichen hinteren Teil (116) angeordnet ist und über dem Paar von ersten Rückseitenverformungsschirmen (BFDS) angeordnet ist.
2. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach Anspruch 1, wobei das Paar von ersten Rückseitenverformungsschirmen (BFDS) (104a; 104b) und das Paar von zweiten Rückseitenverformungsschirmen (BFDS) (108a; 108b) aus zumindest einem Leichtlegierungsmetall, einem nicht-metallischen Material, einem nicht-metallinen Laminat, einem laminierten Gewebe, einem anti-ballistischen Gewebe, einem gewebten Gewebe, einem Nadelvlies und einem UD-Gewebe zusammengesetzt ist, die eine Form aufweisen, die aus der Gruppe ausgewählt ist, die aus einem Rechteck, einem Oval, einem Quadrat, einem Trapez, einer Ellipse, einem Kreis, einem Sechseck und einem Dreieck besteht.
  3. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach Anspruch 1 oder Anspruch 2, wobei das Paar von ersten Rückseitenverformungsschirmen (BFDS) (104a; 104b) und das Paar von zweiten Rückseitenverformungsschirmen (BFDS) (108a; 108b) auf dem in Wirkung befindlichen vorderen Teil (114) und dem in Wirkung befindlichen hinteren Teil (116) der Schale (102) durch zumindest eines der Verfahren aus Schmelzen, Schweißen, Kleben, Weben und Formen angeordnet sind.
  4. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach einem der vorangehenden Ansprüche, wobei die anti-ballistische Lage (106) aus mindestens einer anti-ballistischen gewebten Gewebelage, einem anti-ballistischen Nadelvlies, einer UD-Gewebelage, einem Aramid-Stiftrid, mehreren BFDS-Schichten und einem nicht-ballistischen Material zusammengesetzt ist.
  5. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach einem der vorangehenden Ansprüche, wobei die anti-ballistische Lage (106) über dem Paar von ersten Rückseitenverformungsschirmen (BFDS) (104a; 104b) angeordnet ist, die mindestens in einer der Formen eines Quadrats, eines Rechtecks, einer Ellipse, eines Kreises und eines Dreiecks konfiguriert sind.
  6. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach einem der vorangehenden Ansprüche, wobei die anti-ballistische Lage (106) in Form einer Blume konfiguriert ist.
  7. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach einem der vorangehenden Ansprüche, wobei in den Rändern des Paares von zweiten Rückseitenverformungsschirmen (BFDS) (108a; 108b) hochdichtes Polstermaterial als mindestens eine Beschichtung und/oder eine Einfassung angeordnet ist.
  8. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach einem der vorangehenden Ansprüche, wobei das Paar von zweiten Rückseitenverformungsschirmen (BFDS) (108a; 108b) aus mindestens einem aus Leichtlegierungsmetall, einem nicht-metallischen Material, einem laminierten Gewebe, einem nicht-metallinen Laminat, einem ballistischen Gewebe, Nadelvlies und einem UD-Gewebe zusammengesetzt ist.
  9. Verletzungsverhindernder anti-ballistischer Schutzhelm (100) nach einem der vorangehenden Ansprüche, wobei das Paar von zweiten Rückseitenverformungsschirmen (BFDS) (108a; 108b) von einer aus der Gruppe ausgewählten Form ist, die aus einem Rechteck, einem Oval, einem Quadrat, einem Trapez, einer Ellipse, einem Kreis, einem Sechseck und einem Dreieck besteht.
- ### Revendications
1. Casque antibalistique résistant au traumatisme (100) comprenant :
    - une coque (102) composée d'une pluralité de préformes de casque ;
    - caractérisé en ce que :**
      - une paire de premières protections de déformation de face arrière (BFDS) (104a ; 104b) est disposée sur une partie avant opérationnelle (114) et une partie arrière opérationnelle (116) d'une surface interne opérationnelle (112) de ladite coque (102) le long d'un axe majeur dudit casque (100) ;
      - une feuille antibalistique (106) est disposée sur ladite paire de premières BFDS (104a ; 104b) recouvrant au moins une partie de ladite coque (102) ; et
      - une paire de secondes protections de déformation de face arrière (BFDS) (108a ; 108b) est disposée sur ladite feuille antibalistique (106) sur la partie avant opérationnelle (114) et la partie arrière opérationnelle (116) et disposée sur ladite paire de premières protections de déformation de face arrière (BFDS).
  2. Casque antibalistique résistant au traumatisme



- (100) selon la revendication 1, dans lequel ladite paire de premières protections de déformation de face arrière (BFDS) (104a ; 104b) et ladite paire de secondes protections de déformation de face arrière (BFDS) (108a ; 108b) sont composées d'au moins l'un parmi un métal à base d'alliage léger, un matériau non métallique, un stratifié non métallique, un tissu stratifié, un tissu antibalistique, un tissu tissé, un molleton aiguilleté et un tissu UD, d'une forme sélectionnée dans le groupe comprenant un rectangle, un ovale, un carré, un trapèze, une ellipse, un cercle, un hexagone et un triangle.
3. Casque antibalistique résistant au traumatisme (100) selon la revendication 1 ou la revendication 2, dans lequel ladite paire de premières protections de déformation de face arrière (BFDS) (104a ; 104b) et ladite paire de secondes protections de déformation de face arrière (BFDS) (108a ; 108b) sont disposées sur la partie avant opérationnelle (114) et la partie arrière opérationnelle (116) de ladite coque (102) par le biais d'au moins l'un parmi la fusion, le soudage, l'adhésion, le tissage et le moulage.
4. Casque antibalistique résistant au traumatisme (100) selon l'une quelconque des revendications précédentes, dans lequel ladite feuille antibalistique (106) est composée d'au moins l'un parmi une feuille de tissu tissé antibalistique, un molleton aiguilleté antibalistique, une feuille de tissu UD, une roue de broche d'aramide, une pluralité de couches de BFDS et un matériau non balistique.
5. Casque antibalistique résistant au traumatisme (100) selon l'une quelconque des revendications précédentes, dans lequel ladite feuille antibalistique (106) est disposée sur ladite paire de premières protections de déformation de face arrière (BFDS) (104a ; 104b), configurées dans au moins une forme parmi un carré, un rectangle, une ellipse, un cercle et un triangle.
6. Casque antibalistique résistant au traumatisme (100) selon l'une quelconque des revendications précédentes, dans lequel ladite feuille antibalistique (106) est configurée en une forme de fleur.
7. Casque antibalistique résistant au traumatisme (100) selon l'une quelconque des revendications précédentes, dans lequel les bords de ladite paire de secondes protections de déformation de face arrière (BFDS) (108a ; 108b) sont disposés avec un matériau d'amortissement haute densité comme au moins l'un parmi un revêtement et une bordure.
8. Casque antibalistique résistant au traumatisme (100) selon l'une quelconque des revendications précédentes, dans lequel ladite paire de secondes protections de déformation de face arrière (BFDS) (108a ; 108b) est composée d'au moins l'un parmi un métal à base d'alliage léger, un matériau non métallique, un tissu stratifié, un stratifié non métallique, un tissu tissé balistique, un molleton aiguilleté, un tissu UD.
9. Casque antibalistique résistant au traumatisme (100) selon l'une quelconque des revendications précédentes, dans lequel ladite paire de secondes protections de déformation de face arrière (BFDS) (108a ; 108b) est d'une forme sélectionnée dans le groupe comprenant un rectangle, un ovale, un carré, un trapèze, une ellipse, un cercle, un hexagone et un triangle.

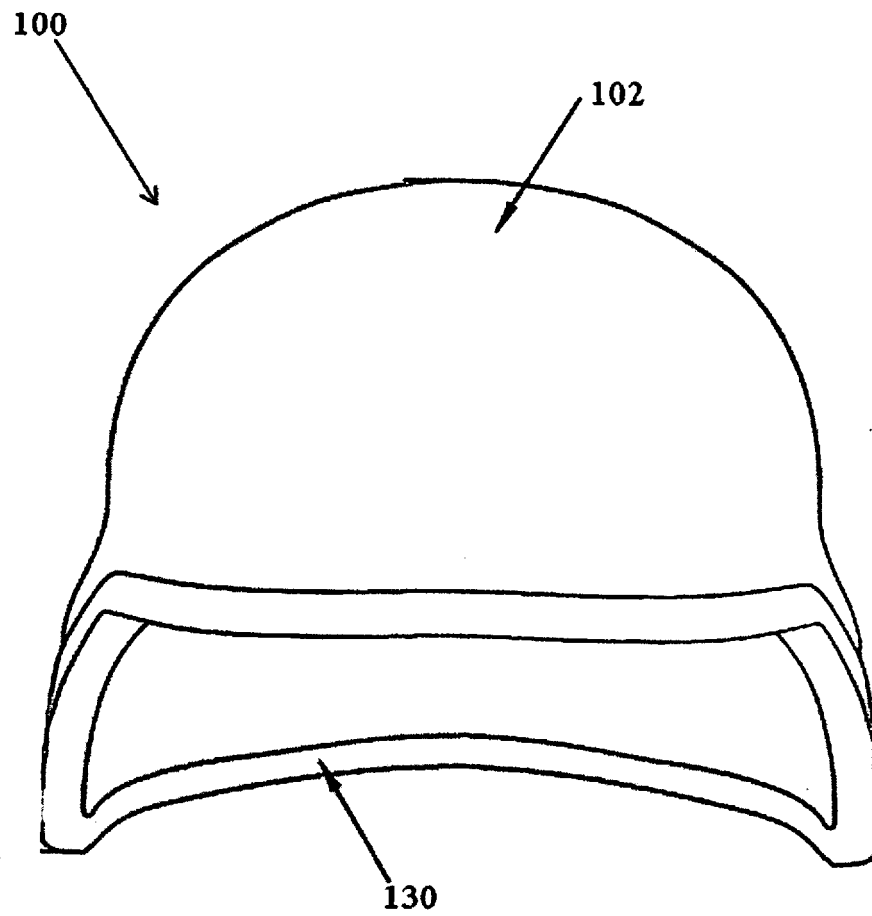


Figure 1

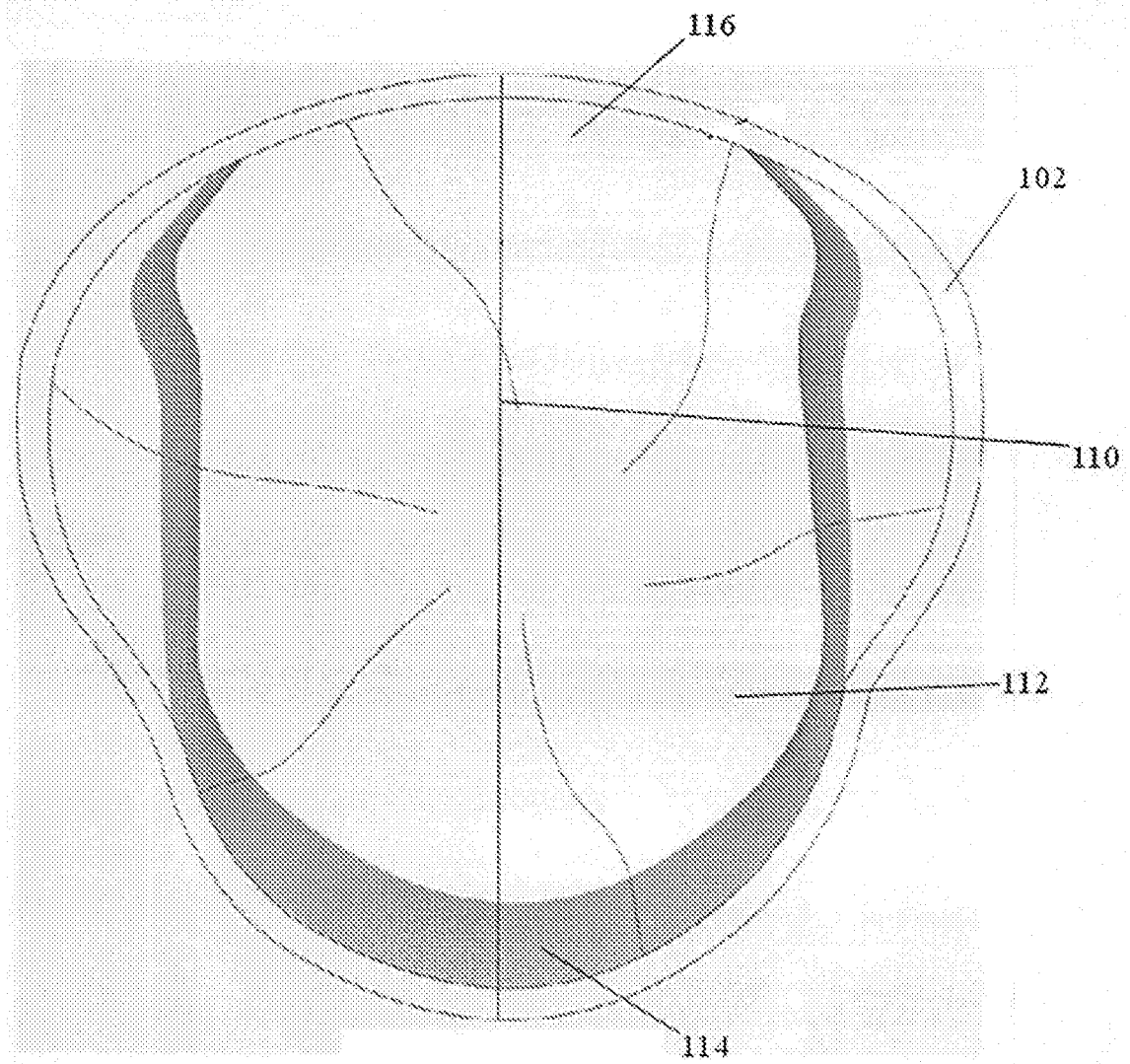


Figure 2

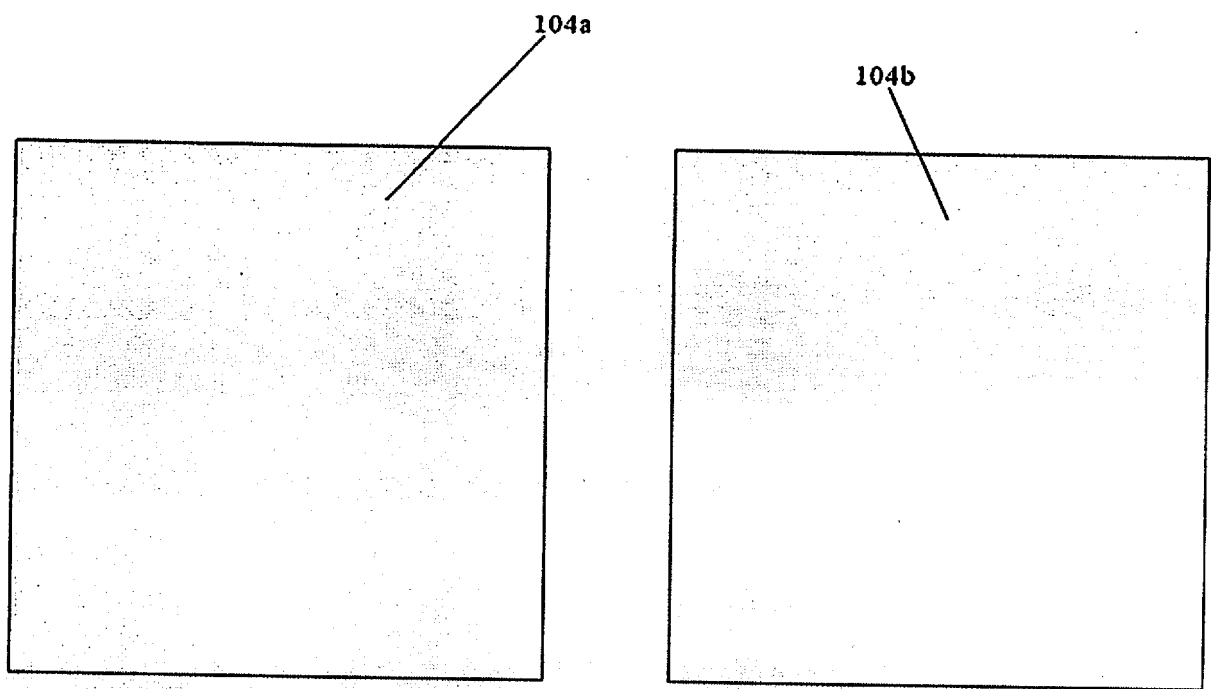


Figure 3

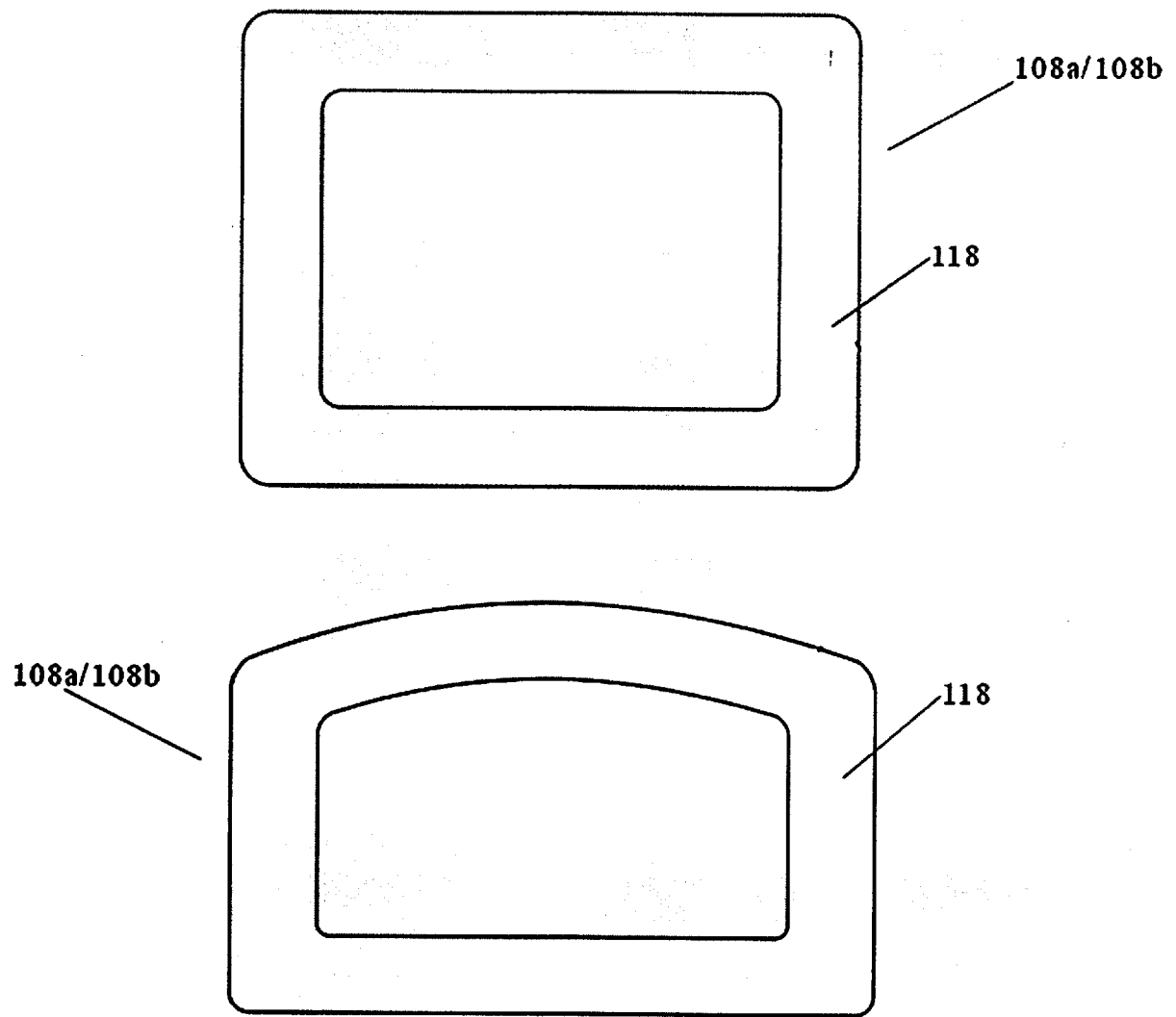


Figure 4

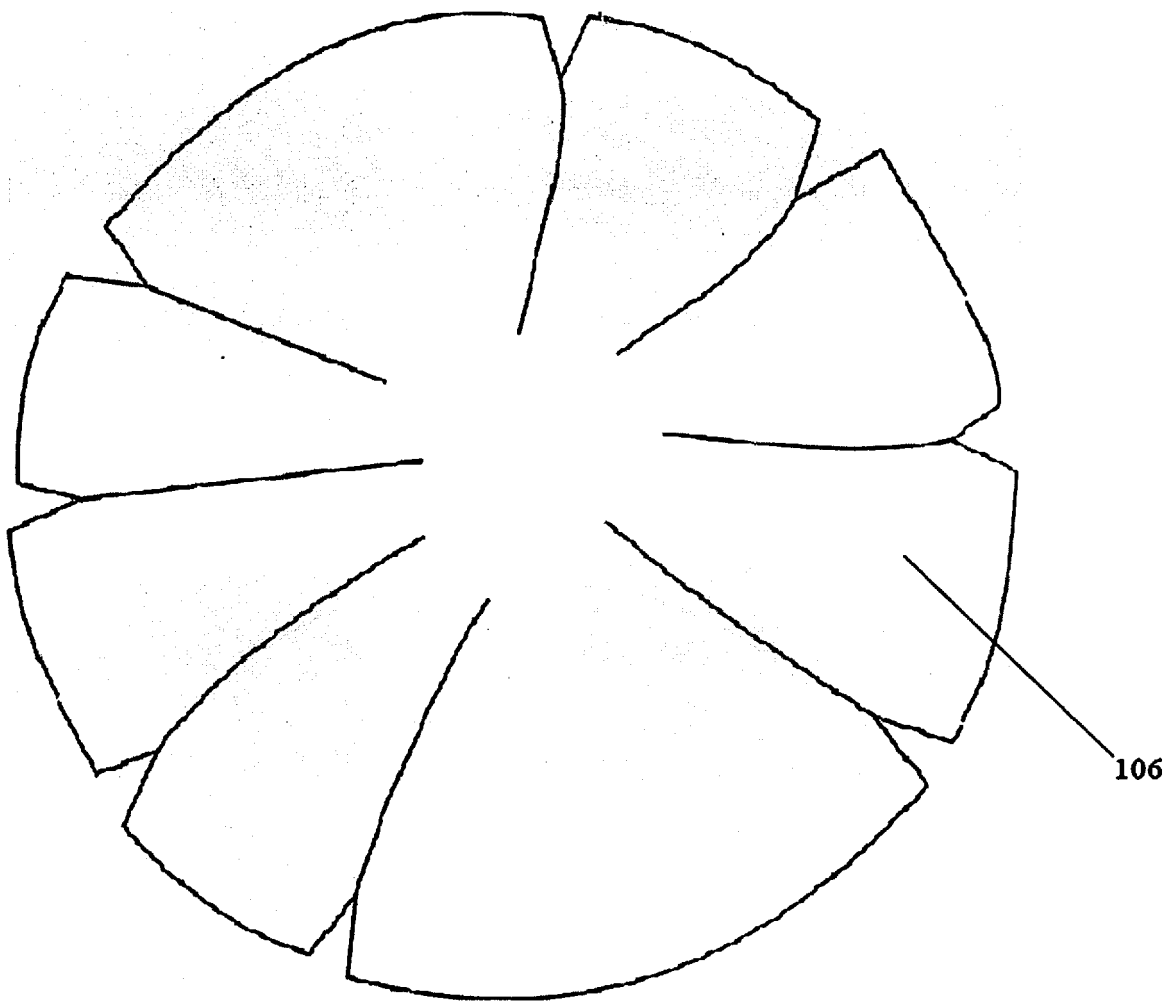
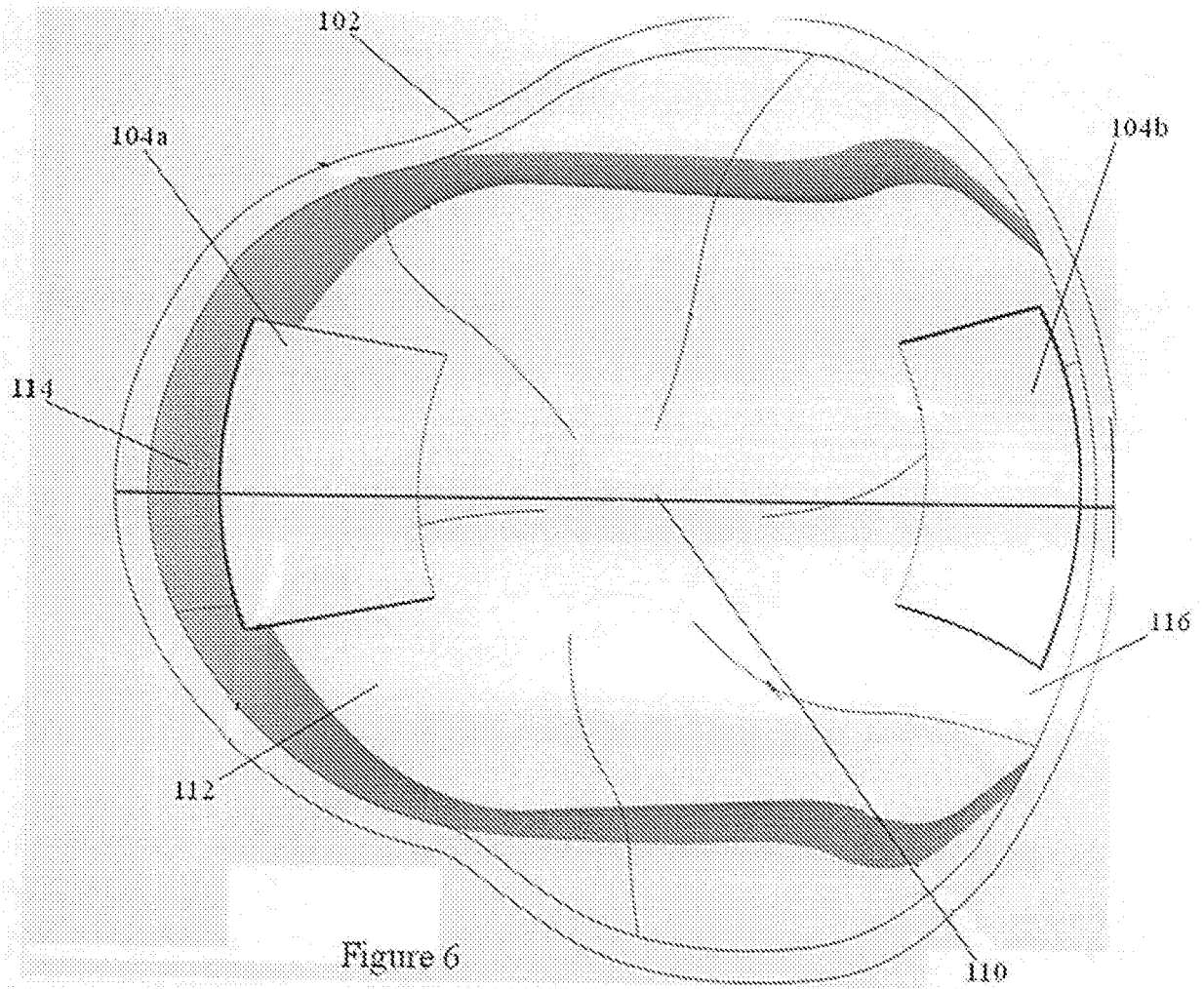


Figure 5



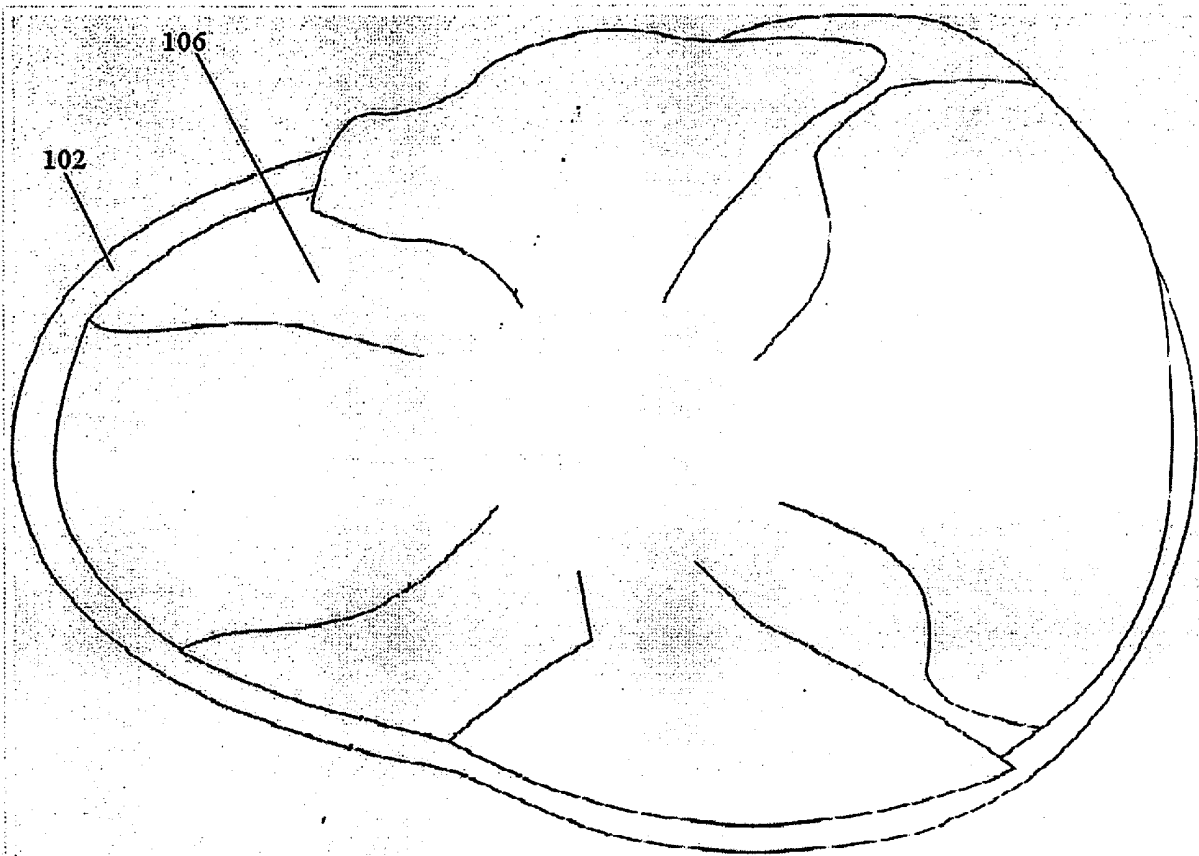


Figure 7



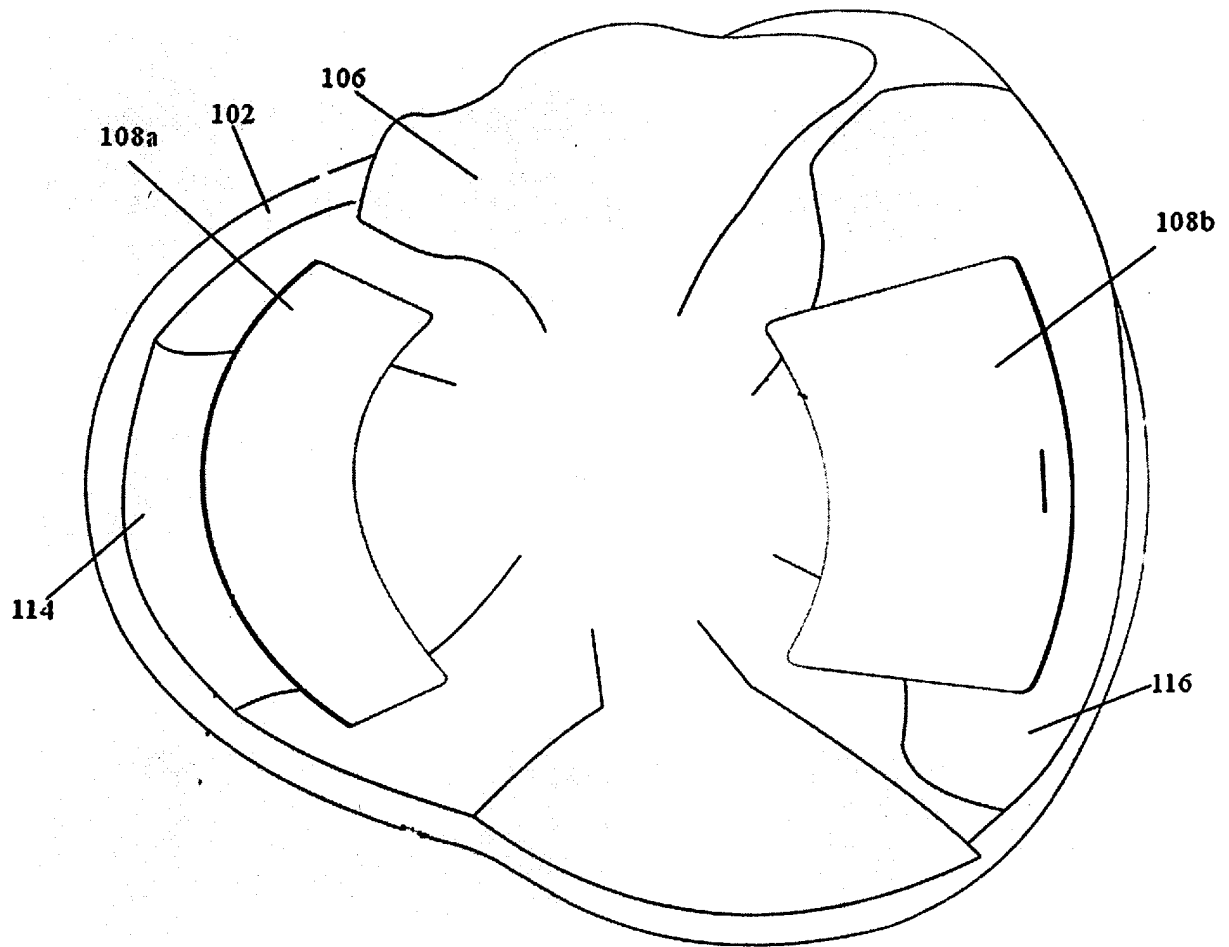


Figure 8

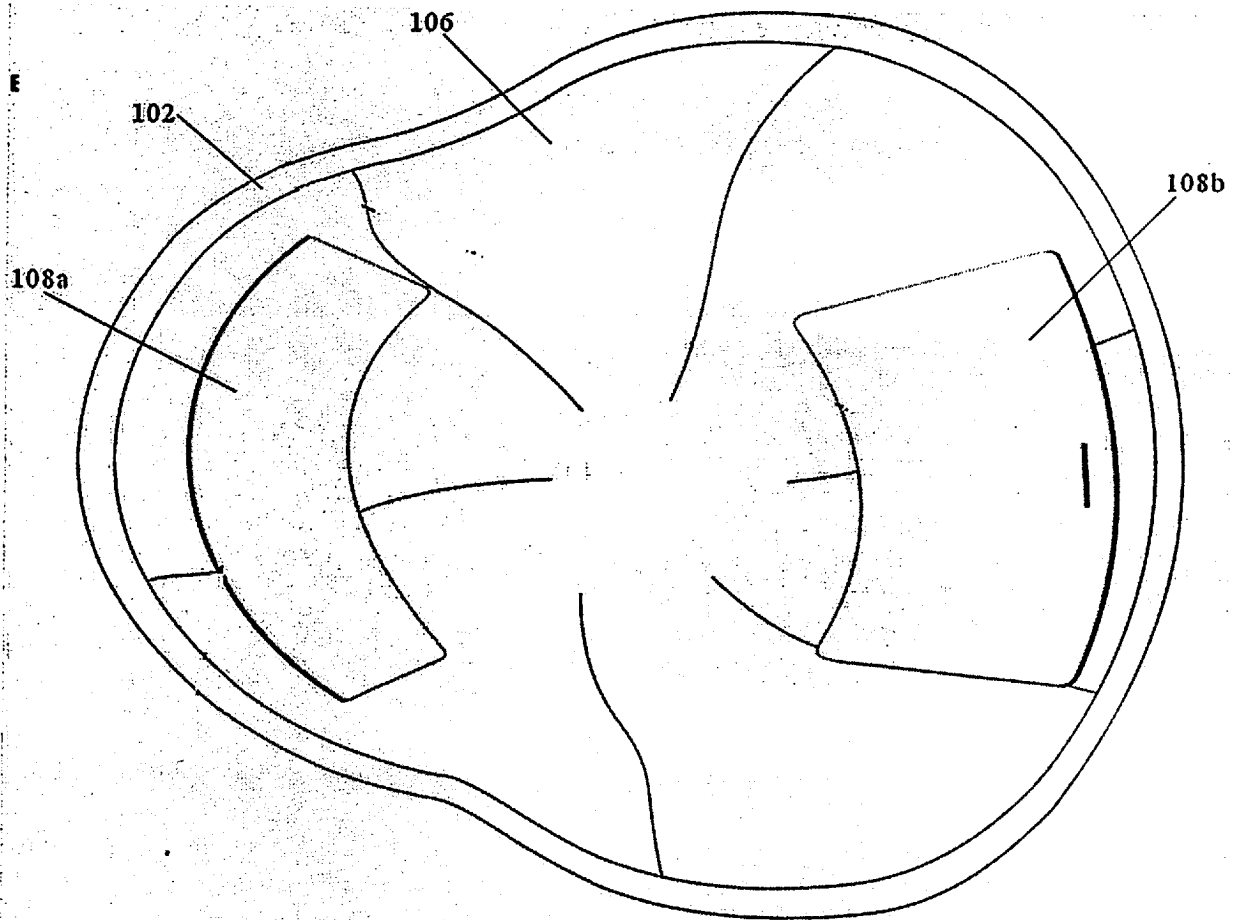
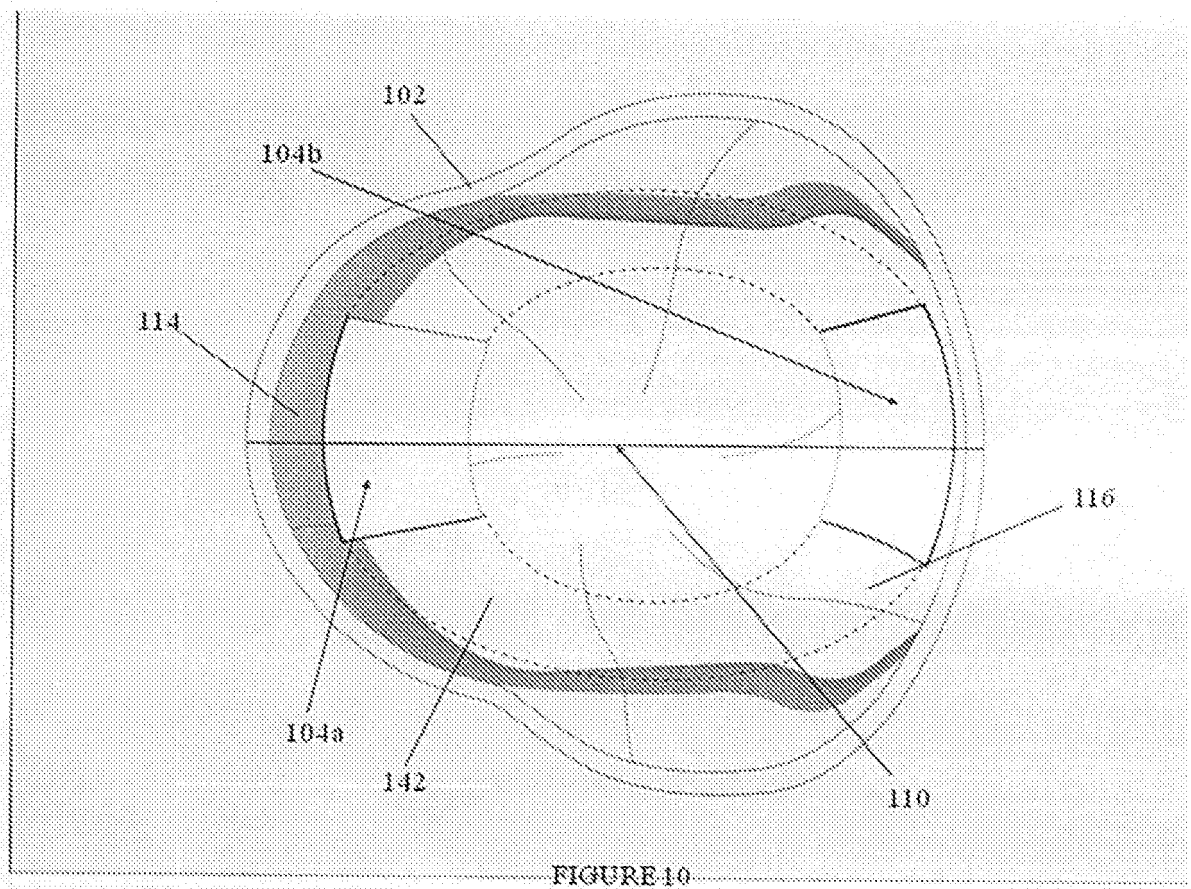


Figure 9



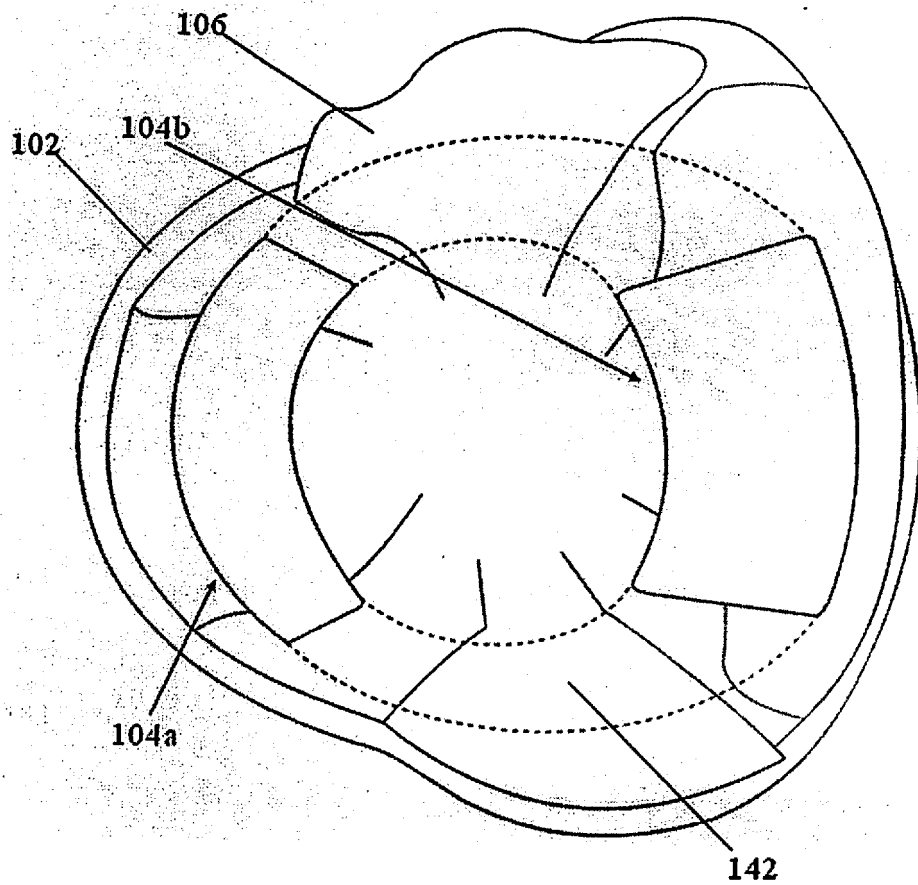


FIGURE 11

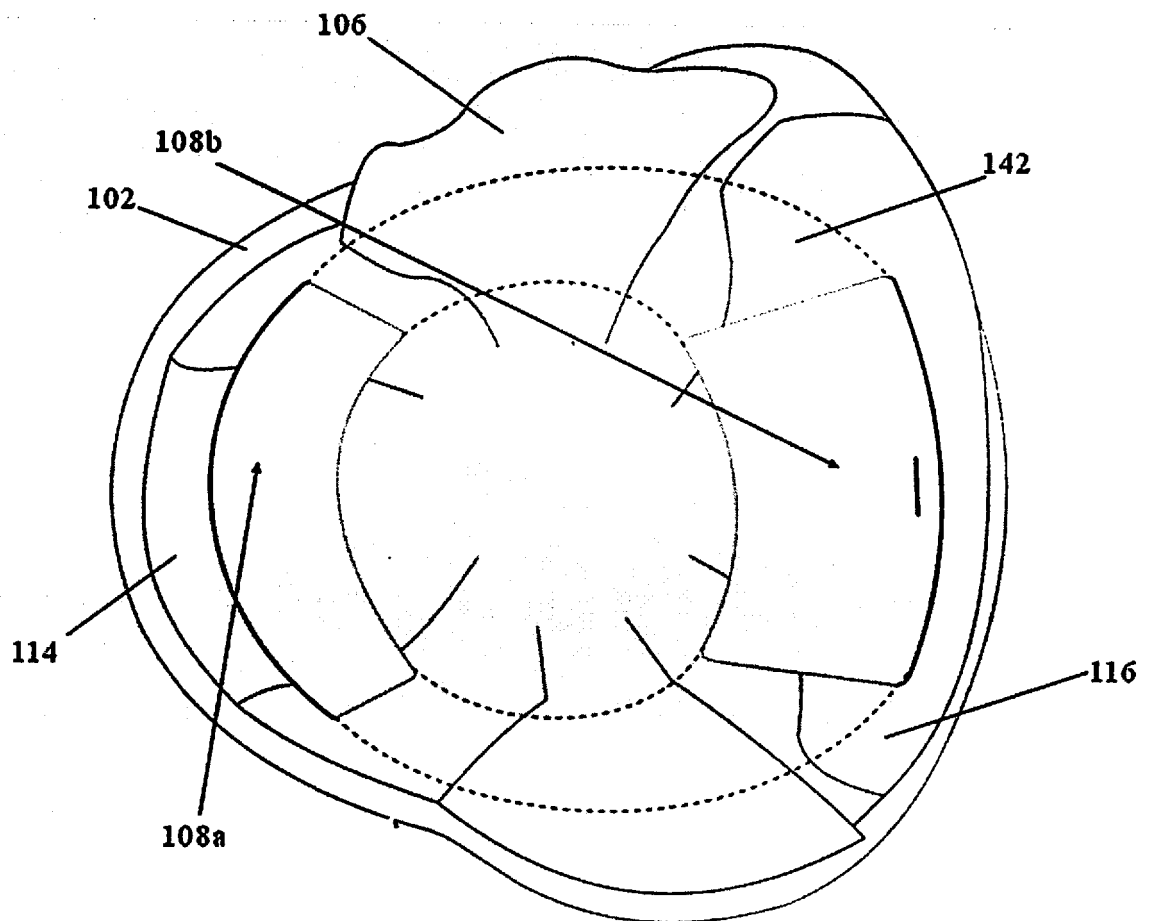


FIGURE 12

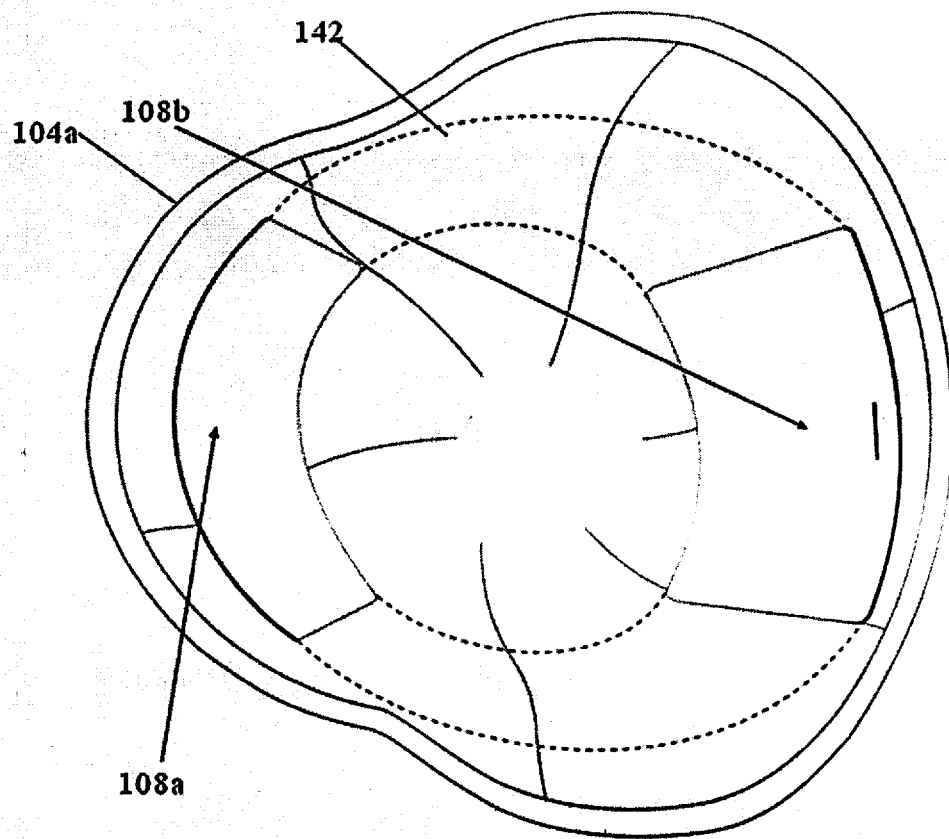


FIGURE 13

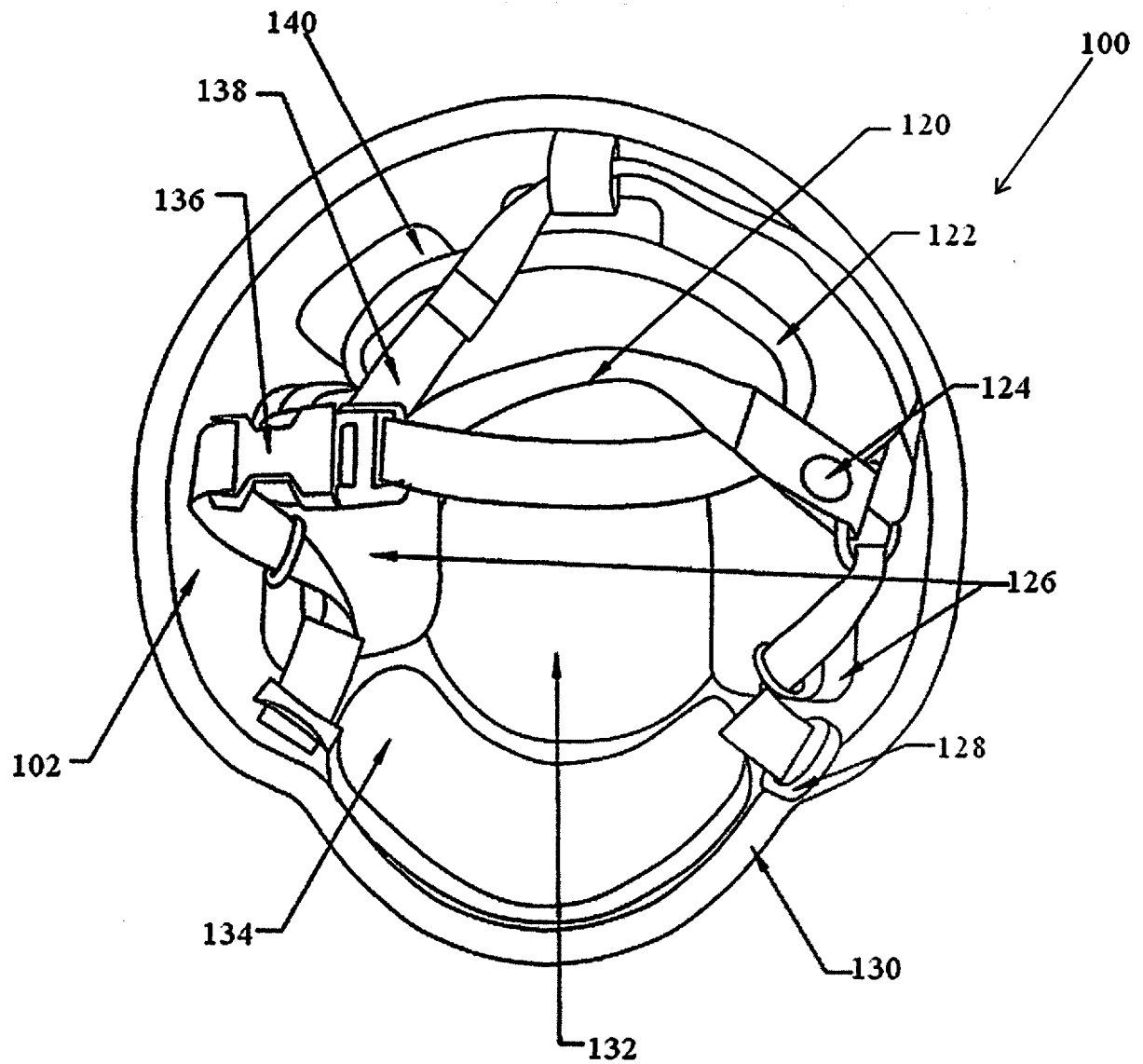


Figure 14

**REFERENCES CITED IN THE DESCRIPTION**

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