

(19)



(11)

**EP 3 243 399 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:  
**12.09.2018 Bulletin 2018/37**

(51) Int Cl.:  
**A42B 3/04 (2006.01)**

(21) Application number: **17170670.8**

(22) Date of filing: **11.05.2017**

(54) **CYCLE HELMET SYSTEM**

FAHRRADHELMSYSTEM

SYSTÈME DE CASQUE DE CYCLISME

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **13.05.2016 GB 201608493**

(43) Date of publication of application:  
**15.11.2017 Bulletin 2017/46**

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(56) References cited:  
**CH-A5- 671 864 GB-A- 2 175 490**  
**US-A- 4 995 117**

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## Description

**[0001]** The present invention relates to a cycle helmet system. More particularly, but not exclusively the present invention relates to a cycle helmet system comprising an impact resistant shell and a plurality of tail portions detachably connected to the shell, each tail portion extending from a rear portion of the shell away from the shell substantially parallel to the length axis, so increasing the length of the helmet along the length axis, each tail portion adapted to extend substantially parallel to the length axis by a different amount.

**[0002]** Cycle helmets having a tail portion are known. Such cycle helmets are designed for their aerodynamic properties and produce a smooth flow of air over the helmet, so reducing drag. They are typically used in triathlons or in time trials.

**[0003]** Such helmets have a number of drawbacks. In particular, the tail of the helmet is designed to optimise air flow at a higher cycling speed. A helmet designed to optimise air flow at high speeds such as in a road or track race, would offer little advantage in, for example, a hill climb, where speeds are lower. Further, if such helmets are used in more general cycling where the head of the cyclist is not always held in the optimum position the tail portion can act as a sail, increasing rather than decreasing drag.

**[0004]** GB2175490A (*Nolan SpA*) discloses a method for the manufacture of a plurality of models of crash helmets provided with different aesthetic and functional characteristics, comprising the steps of forming a unitary basic helmet body, the shape and dimensions of which are such as to enable the body sufficiently to enclose the head of a wearer for crash protection, and applying to the said unitary helmet body at least one of a plurality of different ancillary reinforcement members which are fixed to and superimposed on the basic helmet body by means of appropriate fixing elements.

**[0005]** US4995117A (*Mirage, James A*) discloses a bicyclist helmet which has an outer shell, an inner buffer liner, forward facing baffle controlled air inlets, side baffle controlled air inlets, rear discharge baffle controlled exhaust air outlets, attaching ear cups, an attaching fairing cone, attachments and baffles are provided to further enhance the helmet's aerodynamic properties, as well as providing a more comfortable helmet when riding in cold or foul weather.

**[0006]** CH671864A5 (*Beat, Engel*) discloses a helmet for high-speed skiers which has instead of the one-piece design a rear profile to improve the aerodynamics which can break off in case of a fall. This profile is made of plastic material and is attached to the helmet by plastic screws.

**[0007]** The cycle helmet system according to the invention seeks to overcome the problems of the prior art with the features described in claim 1.

**[0008]** Accordingly, the present invention provides a cycle helmet system comprising

an impact resistant shell adapted to cover a portion of a wearers head, the shell comprising an upper dome, front and rear portions extending from the upper dome, and first and second lateral side portions extending from the upper dome and between the front and rear portions;

the shell having a length axis extending from the front portion to the rear portion, the lateral side portions being arranged on opposite sides of the length axis;

the helmet system further comprises a plurality of tail portions each adapted to be detachably connected to the shell and to extend from the rear portion of the shell in a direction substantially parallel to the length axis away from the front portion;

each tail portion being adapted to extend away from the shell substantially parallel to the length axis by a different amount.

**[0009]** The tail portions of the cycle helmet according to the invention are detachable. A tail portion can be attached when the cycle helmet is to be used in a triathlon or time trial. It can then be removed for more general cycling or training.

**[0010]** Further, because each tail portion can be removed it can be replaced with different tail portions of different dimensions. If the cycle helmet is to be used at a relatively low speed race such as a cycle club training ride the tail portion can be relatively short. If it is to be used at higher speeds such as in a time trial, then the short tail portion can be replaced with a longer tail portion. The most suitable tail portion for a particular profile of cycle event could therefore be chosen from a variety of different tail portion options, depending on the speed profile of the event.

**[0011]** Preferably each tail portion comprises an upper face, the upper face and the shell together forming a smooth surface.

**[0012]** Preferably the upper face of each tail portion comprises a leading edge proximate to or abutting the shell.

**[0013]** Preferably the rear portion comprises a bottom edge, the upper face of each tail portion extending smoothly from the bottom edge of the rear portion.

**[0014]** Preferably the lateral side portions each comprise a bottom edge, the upper face of each tail portion extending smoothly from the bottom edge of each lateral side portion.

**[0015]** Preferably the shell further comprises a lateral support skirt extending from each lateral side portion, each tail portion being detachably connected to the lateral support skirts.

**[0016]** Preferably each tail portion at least partially covers the lateral support skirts.

**[0017]** Preferably the shell further comprises a rear support skirt extending from the rear portion, each tail

portion being detachably connected to the rear support skirt.

**[0018]** Preferably each tail portion at least partially covers the rear support skirt.

**[0019]** Preferably the cycle helmet according to the invention further comprises a visor, the visor having first and second visor edges, the upper face of each tail portion extending smoothly from the visor edges.

**[0020]** Preferably the lateral side portions are symmetrically arranged on either side of the length axis.

**[0021]** The present invention will now be described by way of example only and not in any limitative sense with reference to the accompanying drawings in which

Figure 1 shows a cycle helmet system according to the invention in side view without a tail portion;

Figure 2 shows the cycle helmet system of figure 1 from above;

Figure 3 shows a further embodiment of a cycle helmet system according to the invention in side view;

Figure 4 shows a further embodiment of a cycle helmet system according to the invention in side view;

Figure 5 shows the embodiment of figure 4 from above;

Figure 6 shows a method of assembly of the cycle helmet of figures 4 and 5; and,

Figure 7 shows a further embodiment of a cycle helmet system according to the invention.

**[0022]** Shown in figure 1 is a cycle helmet system 1 according to the invention without a tail portion. The cycle helmet system 1 comprises an impact resistant shell 2 which in use partially covers a portion of a cyclist's head. The shell is typically a plastics material such as polycarbonate or alternatively a fibreglass or carbon fibre. Inside the shell (not shown) is typically an impact absorbing liner layer such as an expanded polystyrene or expanded polypropylene.

**[0023]** Figure 2 shows the helmet system 1 of figure 1 from above in plan view, showing the upper dome 3 and the front, rear and lateral side portions 4,5,8,9 extending therefrom. All of these portions extend smoothly from the upper dome 3 to produce a smooth flow over the shell 2.

**[0024]** Also shown in figure 2 is the length axis 16 of the helmet 1. The length axis 16 extends from the front portion 4 to the rear portion 5. The lateral side portions 8,9 are arranged on either side of the length axis 16. In this embodiment the lateral side portions 8,9 are arranged symmetrically on either side of the length axis 16 as shown.

**[0025]** Figure 3 shows an alternative embodiment of a cycle helmet system 1 according to the invention, again

without a tail portion. In this embodiment a detachable shallow visor 17 extends from the bottom edge 4a of the front portion 4 and the front edges 14 of the lateral side portions 8,9. The visor 17 protects the eyes of the cyclist.

5 The visor 17, front portion 4 and lateral side portions 8,9 together form a smooth surface which improves the air flow over the helmet 1 which in turn reduces drag. The shallow visor 17 is dimensioned to enable a wearer to wear sunglasses beneath the visor 17.

10 **[0026]** Figure 4 shows a further embodiment of a cycle helmet 1 according to the invention including a tail portion 18. The tail portion 18 is detachably connected to the shell 2. The tail portion 18 extends from the rear portion 5 of the shell 2 in a direction substantially parallel to the length axis 16 and away from the front portion 4. The tail portion 18 is connected to the push fit connectors 12 of the lateral support skirt 11 and the further connector on the rear support skirt 7 so holding the tail portion 18 in fixed relation to the shell 2.

20 **[0027]** The tail portion 18 comprises an upper face 19. The upper face 19 is adapted such that when the tail portion 18 is connected to the shell 2 the upper face 19 and the shell 2 together form a smooth surface as shown over which air can flow. The smooth surface has no discontinuity as one passes from the shell 2 to the upper face 19 of the tail portion 18 which would cause turbulence in air flowing over the helmet 1.

25 **[0028]** The upper face 19 of the tail portion 18 comprises a leading edge 20, which, when the tail portion 18 is fixed in place, abuts or is proximate to the shell 2. In the case where there is a gap between the leading edge 20 and the shell 2 the gap is sufficiently narrow so as not to alter the air flow over the helmet 1. In this embodiment the upper face 19 of the tail portion 18 extends smoothly from the bottom edge 6 of the rear portion 5. It also extends smoothly from the bottom edges 10 of the lateral side portions 8,9.

30 The upper face 19 of the tail portion 18 proximate to the leading edge 20 and the shell portion 2 proximate to the leading edge 20 are substantially co-planar, typically to within a few degrees, preferably within ten degrees, more preferably within five degrees, more preferably to within 2 degrees.

35 The tail portion 18 further comprises a lower face 21. The lower face 21 is shaped to abut the back of a cyclist when being worn so holding the helmet 1 in the correct position with respect to the cyclist to minimise drag.

40 The tail portion 18 further comprises front edges 22. The front edges 22 are arranged adjacent to the edges of the visor 23 as shown to produce a smooth surface extending from the visor 23 to the tail portion 18. Again, this reduces drag.

45 The tail portion 18 covers the lateral and rear support skirts 7,11, again to reduce drag.

50 This embodiment further comprises a deep visor as shown. The deep visor improves aerodynamic performance to a greater degree than the shallow visor of figure 3.

**[0029]** Figure 5 shows the helmet system 1 of figure 4

in plan view from above showing a tail portion 18 extending away from the rear portion 5 of the shell 2 along the length axis 16. Preferably the helmet 1 is symmetrical about the length axis 16 as shown.

**[0030]** As can be seen in this figure a portion of the upper face 19 of the tail portion 18 proximate to the leading edge 20 of the tail portion 18 is substantially planar. A corresponding portion of the rear portion 5 proximate to the bottom edge 6 is also substantially planar. These two planar portions are co-planar so that together the upper face 19 of the tail portion 18 and the shell 2 form a smooth surface. The smooth surface prevents turbulence from forming as air flows from the shell 2 to the tail portion 18.

Figure 6 shows a method of attaching a tail portion 18 to the shell 2. The tail portion 18 is arranged to the rear of the shell 2 substantially parallel to the length axis 16 with the leading edge 20 of the tail portion 18 facing towards the shell 2. The tail portion 18 is then slid parallel to the bottom edges 10 of the lateral side portions 8,9 towards the front portion 4 of the helmet 1 until the tail portion 18 engages with the connectors 12 of the lateral and rear support skirts 7,11. In this embodiment the top of the tail portion comprises tongues 24 which slide along grooves in the bottom edges 10 of the of the lateral side portions 8,9 which guides the tail portion 18 into position. Figure 7 shows, in side view, a further embodiment of a cycle helmet system 1 according to the invention. In this embodiment the leading edge 20 of the tail portion 18 abuts the shell 2 proximate to the upper dome 3. The upper face 19 of the tail portion 18 and the shell 2 again form a smooth continuous surface. In this embodiment the rear portion 5 extends beneath the tail portion (or in other words the tail portion 18 covers the rear portion 5). The tail portion 18 connects to a connector (not shown) extending from the rear portion 5 of the shell 2 in addition to the connectors 12 of the lateral skirt 11. The tail portion 18 covers this connector so that it does not interfere with the air flow over the helmet 1. Again, the tail portion 18 extends from the rear portion 5 substantially parallel to the length axis 16.

**[0031]** A tail portion 18 can be attached and detached from the shell portion 2. The tail portion 18 is attached when the cyclist wishes to use the helmet 1 in a high speed event such as a triathlon or time trial. After the event the tail portion 18 can be removed and the helmet 1 used as a normal helmet.

**[0032]** The helmet 1 is supplied with a range of tail portions 18 of different shapes, each one optimised to reduce drag at different speeds. A cyclist can swap between these tail portions 18 depending on the type of event the helmet 1 is to be used in. In each case the tail portion 18 will extend substantially parallel to the length axis 16. Each one however extends along the length axis 16 by a different amount. Because of this difference in length the upper face 19 of each tail portion 18 is inclined vertically to the length axis 16 by a different amount. The shorter the tail portion 18 the greater the degree of incli-

nation. Shorter tail portions 18 are more suitable for low speed events. Longer tail portions 18 are more suitable for high speed events.

## Claims

1. A cycle helmet system (1) comprising an impact resistant shell (2) adapted to cover a portion of a wearers head, the shell (2) comprising an upper dome (3), front and rear portions (4, 5) extending from the upper dome (3), and first and second lateral side portions (8, 9) extending from the upper dome (3) and between the front and rear portions (4, 5); the shell (2) having a length axis (16) extending from the front portion (4) to the rear portion (5), the lateral side portions (8, 9) being arranged on opposite sides of the length axis (16);  
**characterised in that** the helmet system (1) further comprises a plurality of tail portions (18) each adapted to be detachably connected to the shell (2) and to extend from the rear portion (5) of the shell (2) in a direction substantially parallel to the length axis (16) away from the front portion (4);  
each tail portion (18) being adapted to extend away from the shell (2) substantially parallel to the length axis (16) by a different amount.
2. A cycle helmet system (1) as claimed in claim 1, wherein each tail portion (18) comprises an upper face (19), the upper face (19) and the shell (2) together forming a smooth surface.
3. A cycle helmet system (1) as claimed in claim 2, wherein the upper face (19) of each tail portion (18) comprises a leading edge (20) proximate to or abutting the shell (2).
4. A cycle helmet system (1) as claimed in either of claims 2 or 3, wherein the rear portion (5) comprises a bottom edge (6), the upper face (19) of each tail portion (18) extending smoothly from the bottom edge (6) of the rear portion (5).
5. A cycle helmet system (1) as claimed in any one of claims 2 to 4, wherein the lateral side portions (8, 9) each comprise a bottom edge (10), the upper face (19) of each tail portion (18) extending smoothly from the bottom edge (10) of each lateral side portion (8, 9).
6. A cycle helmet system (1) as claimed in any one of claims 1 to 5, wherein the shell (2) further comprises a lateral support skirt (11) extending from each lateral side portion (8, 9), each tail portion (18) being detachably connected to the lateral support skirts

- (11).
7. A cycle helmet system (1) as claimed in claim 6, wherein each tail portion (18) at least partially covers the lateral support skirts (11).
8. A cycle helmet system (1) as claimed in any one of claims 1 to 7, wherein the shell (2) further comprises a rear support skirt (7) extending from the rear portion (5), each tail portion (18) being detachably connected to the rear support skirt (7).
9. A cycle helmet system (1) as claimed in claim 8 wherein each tail portion (18) at least partially covers the rear support skirt (7).
10. A cycle helmet system (1) as claimed in any one of claims 1 to 9, further comprising a visor (17), the visor (17) having first and second visor edges, the upper face (19) of each tail portion (18) extending smoothly from the visor edges.
11. A cycle helmet system (1) as claimed in any one of claims 1 to 10, wherein the lateral side portions (8, 9) are symmetrically arranged on either side of the length axis (16).

#### Patentansprüche

1. Fahrradhelm-System (1), umfassend eine stofffeste Schale (2), die einen Teil des Kopfes einer Trägers bedeckt, wobei die Schale (2) eine obere Dompattie (3), vordere und hintere Abschnitte (4, 5), die sich von der oberen Dompattie (3) weg erstrecken, und erste und zweite seitliche Seitenabschnitte (8, 9), die sich von der oberen Dompattie (3) weg und zwischen den vorderen und hinteren Abschnitten (4,5) erstrecken, aufweist; wobei die Schale (2) eine Längsachse (16) aufweist, die sich vom vorderen Abschnitt (4) zum hinteren Abschnitt (5) erstreckt, wobei die seitlichen Abschnitte (8, 9) auf gegenüberliegenden Seiten der Längsachse (16) angeordnet sind;  
**dadurch gekennzeichnet, dass** das Helmsystem (1) ferner eine Mehrzahl von Endteilen (18) umfasst, von welchen jedes ausgebildet ist, um mit der Schale (2) lösbar verbindbar zu sein und sich vom hinteren Abschnitt (5) der Schale (2) in eine Richtung, die im Wesentlichen parallel zur Längsachse (16) und weg vom vorderen Abschnitt (4) verläuft, erstreckt.
2. Fahrradhelm-System (1) nach Anspruch 1, wobei jedes der Endteile (18) eine obere Seite (19) umfasst, wobei die obere Seite (19) und die Schale (2) zusammen eine gleichmässige Oberfläche bilden.

3. Fahrradhelm-System (19 nach Anspruch 2, wobei die obere Seite (19) dieses Endteils (18) eine Vorderkante (20) nahe der Schale (2) oder an dieser anliegend aufweist.
4. Fahrradhelm-System(1) nach einem der Ansprüche 2 oder 3, wobei der hintere Abschnitt (5) eine untere Kante (6) aufweist, wobei die obere Seite (19) jedes der Endteile (18) gleichmässig zur unteren Kante (6) des hinteren Abschnitts (5) verläuft.
5. Fahrradhelm-System (1) nach einem der Ansprüche 2 bis 4, wobei jeder der seitlichen Seitenabschnitte (8, 9) eine Unterkante (10) aufweist, wobei die obere Seite (19) des Endteils (18) gleichmässig zur Unterkante (10) jedes der seitlichen Seitenabschnitte (8, 9) verläuft.
6. Fahrradhelm-System (1) nach einem der Ansprüche 1 bis 5, wobei die Schale (2) ferner eine seitliche Trägerschürze (11) aufweist, die sich von jedem der seitlichen Seitenabschnitte (8, 9) erstreckt, wobei jedes der Endteile (18) lösbar mit den seitlichen Trägerschürzen (11) verbunden ist.
7. Fahrradhelm-System (1) nach Anspruch 6, wobei jedes der Endteile (18) die seitlichen Trägerschürzen (11) mindestens teilweise abdeckt.
8. Fahrradhelm-System (1) nach einem der Ansprüche 1 bis 7, wobei die Schale (2) ferner eine hintere Trägerschürze (7) umfasst, die sich vom hinteren Abschnitt (5) erstreckt, wobei jedes der Endteile (18) lösbar mit der hinteren Trägerschürze (7) verbunden ist.
9. Fahrradhelm-System (1) nach Anspruch 8, wobei jedes der Endteile (18) die hintere Trägerschürze (7) mindestens teilweise abdeckt.
10. Fahrradhelm-System (1) nach einem der Ansprüche 1 bis 9, ferner umfassend ein Visier (17), wobei das Visier (17) erste und zweite Visierkante aufweist, wobei die obere Seite (19) jedes der Endteile (18) gleichmässig zu den Visierkanten verläuft.
11. Fahrradhelm-System nach einem der Ansprüche 1 bis 10, wobei die seitlichen Seitenabschnitte (8, 9) symmetrisch zu jeder Seite der Längsachse (16) angeordnet sind.

#### Revendications

1. Système de casque de vélo (1) comprenant :
- une coque résistante aux chocs (2) adaptée à recouvrir une partie de la tête d'un porteur, la

- coque (2) comprenant un dôme supérieur (3), des parties avant et arrière (4, 5) s'étendant depuis le dôme supérieur (3), et des première et deuxième parties de côté latéral (8, 9) s'étendant depuis le dôme supérieur (3) et entre les parties avant et arrière (4, 5) ;  
la coque présentant un axe longitudinal (16) s'étendant depuis la partie avant (4) vers la partie arrière (5), les parties de côté latéral (8, 9) étant disposées en opposition de part et d'autre de l'axe longitudinal ;  
**caractérisé en ce que :**
- le système de casque (1) comprend en outre une pluralité de parties de queue (18), chacune étant adaptée à être connectée de manière amovible à la coque (2) et à s'étendre depuis la partie arrière (5) de la coque (2) selon une direction sensiblement parallèle à l'axe longitudinal (16) et à l'opposée de la partie avant (4) ;  
chaque partie de queue (18) étant adaptée à s'étendre depuis la coque (2) selon une direction sensiblement parallèle à l'axe longitudinal (16) et selon des distances différentes.
2. Système de casque de vélo (1) selon la revendication 1, selon lequel chaque partie de queue (18) comprend une face supérieure (19), la face supérieure et la coque formant ensemble une surface lisse.
  3. Système de casque de vélo (1) selon la revendication 2, selon lequel la face supérieure (19) de chaque partie de queue (18) comprend un bord d'attaque (20) à proximité de, ou en butée avec, la coque (2).
  4. Système de casque de vélo (1) selon l'une quelconque des revendications 2 ou 3, selon lequel la partie arrière (5) comprend un bord inférieur (6), la face supérieure (19) de chaque partie de queue (18) s'étendant de manière lissée depuis le bord inférieur (6) de la partie arrière (5).
  5. Système de casque de vélo (1) selon l'une quelconque des revendications 2 à 4, selon lequel les parties de côté latéral (8, 9) comprennent chacune un bord inférieur (10), la face supérieure (19) de chaque partie de queue (18) s'étendant de manière lissée depuis le bord inférieur (10) de chaque partie de côté latéral (8, 9).
  6. Système de casque de vélo (1) selon l'une quelconque des revendications 1 à 5, selon lequel la coque (2) comprend en outre une jupe de support latérale (11) s'étendant depuis chaque partie de côté latéral (8, 9), chaque partie de queue (18) étant connectée de manière amovible aux jupes de support latérales (11).
  7. Système de casque de vélo (1) selon la revendication 6, selon lequel chaque partie de queue (18) recouvre au moins partiellement les jupes de support latérales (11).
  8. Système de casque de vélo (1) selon l'une quelconque des revendications 1 à 7, selon lequel la coque (2) comprend en outre une jupe de support arrière (7) s'étendant depuis la partie arrière (5), chaque partie de queue (18) étant connectée de manière amovible à la jupe de support arrière (7).
  9. Système de casque de vélo (1) selon la revendication 8, selon lequel chaque partie de queue (18) recouvre au moins partiellement la jupe de support arrière (7).
  10. Système de casque de vélo (1) selon l'une quelconque des revendications 1 à 9, comprenant en outre un viseur (17), le viseur (17) présentant des premier et deuxième bords de viseur, la face supérieure (19) de chaque partie de queue (18) s'étendant de manière lissée depuis les bords de viseur.
  11. Système de casque de vélo (1) selon l'une quelconque des revendications 1 à 10, selon lequel les parties de côté latéral (8, 9) sont disposées de manière symétrique de part et d'autre de l'axe longitudinal (16).

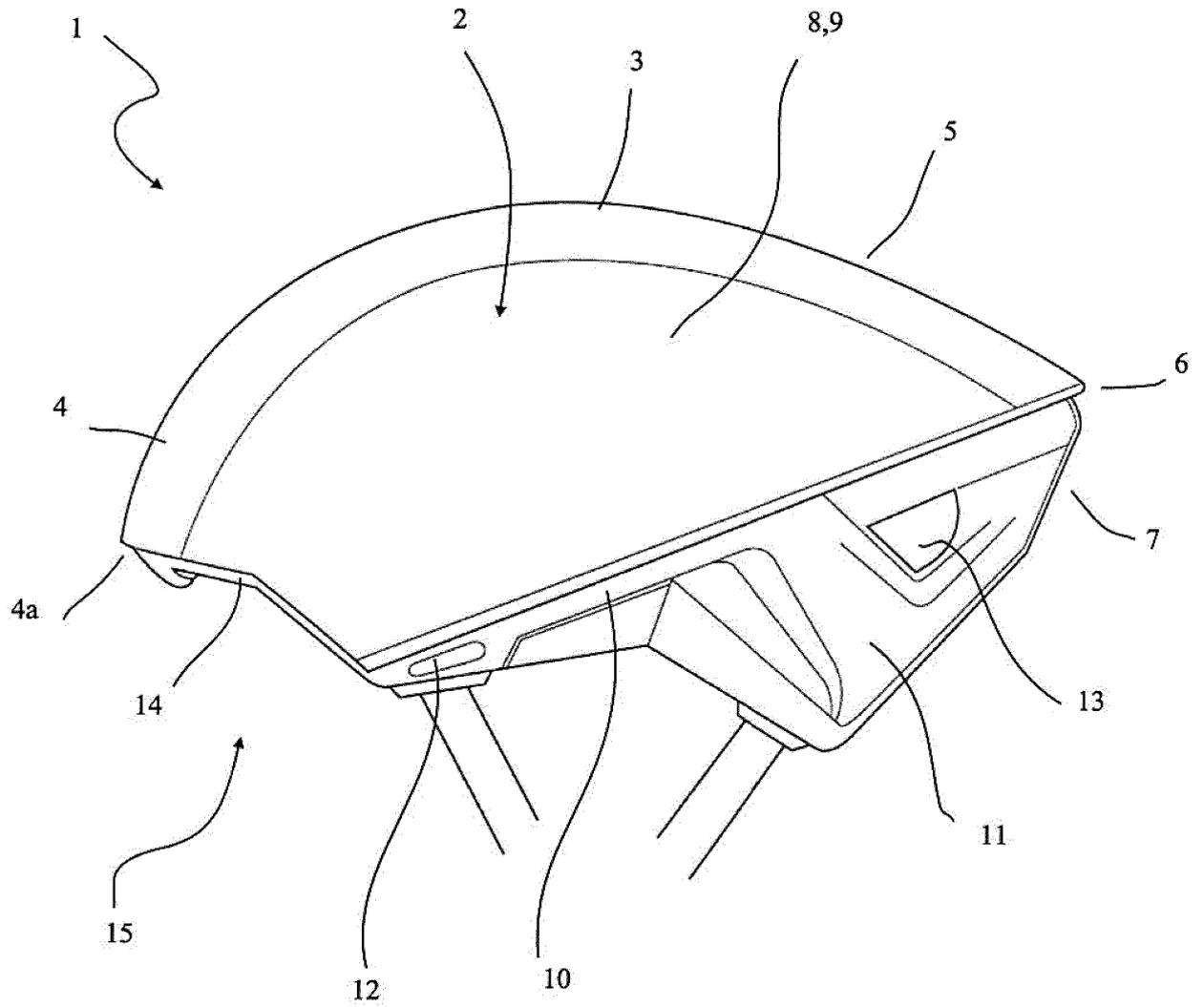


Figure 1

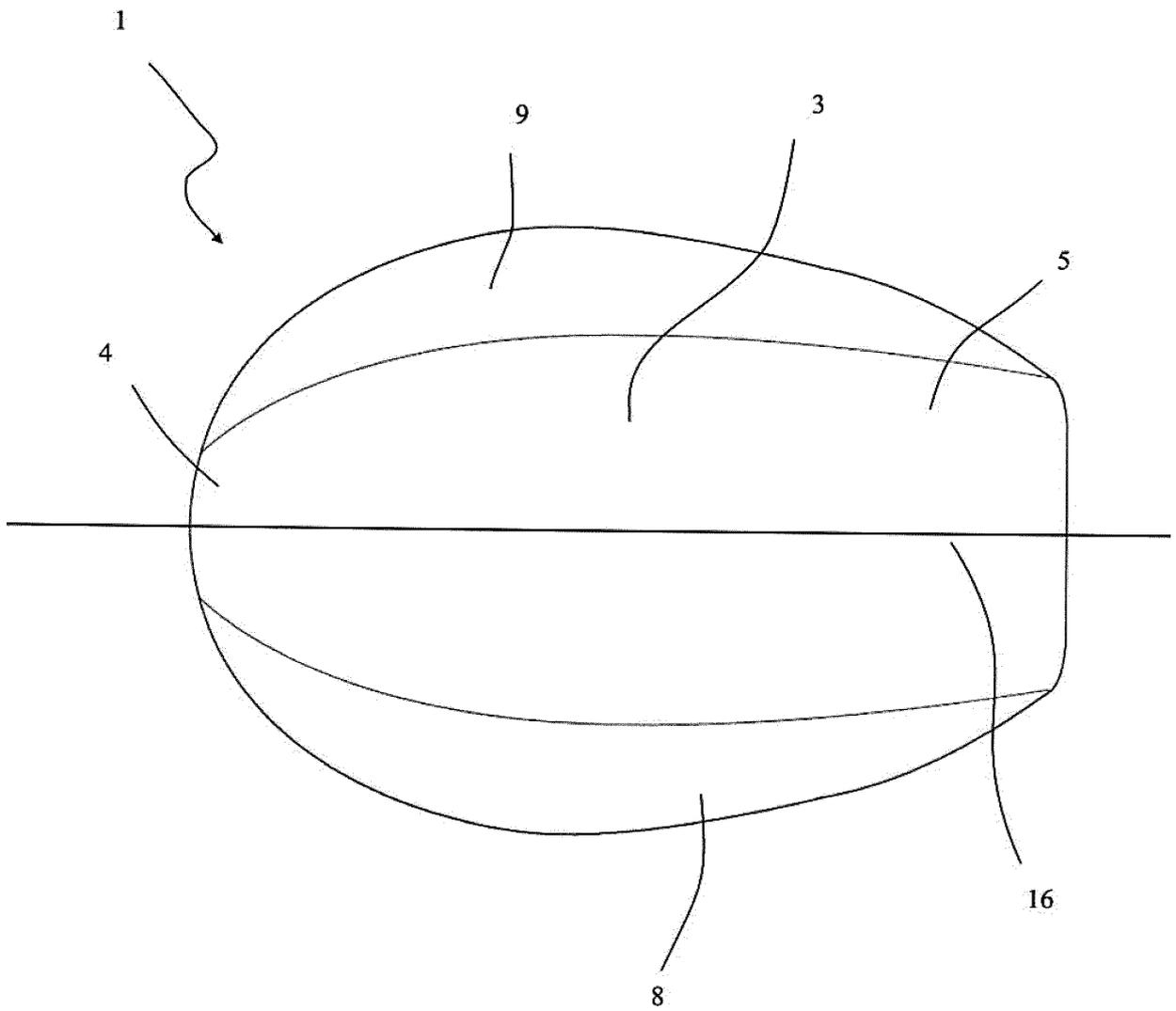
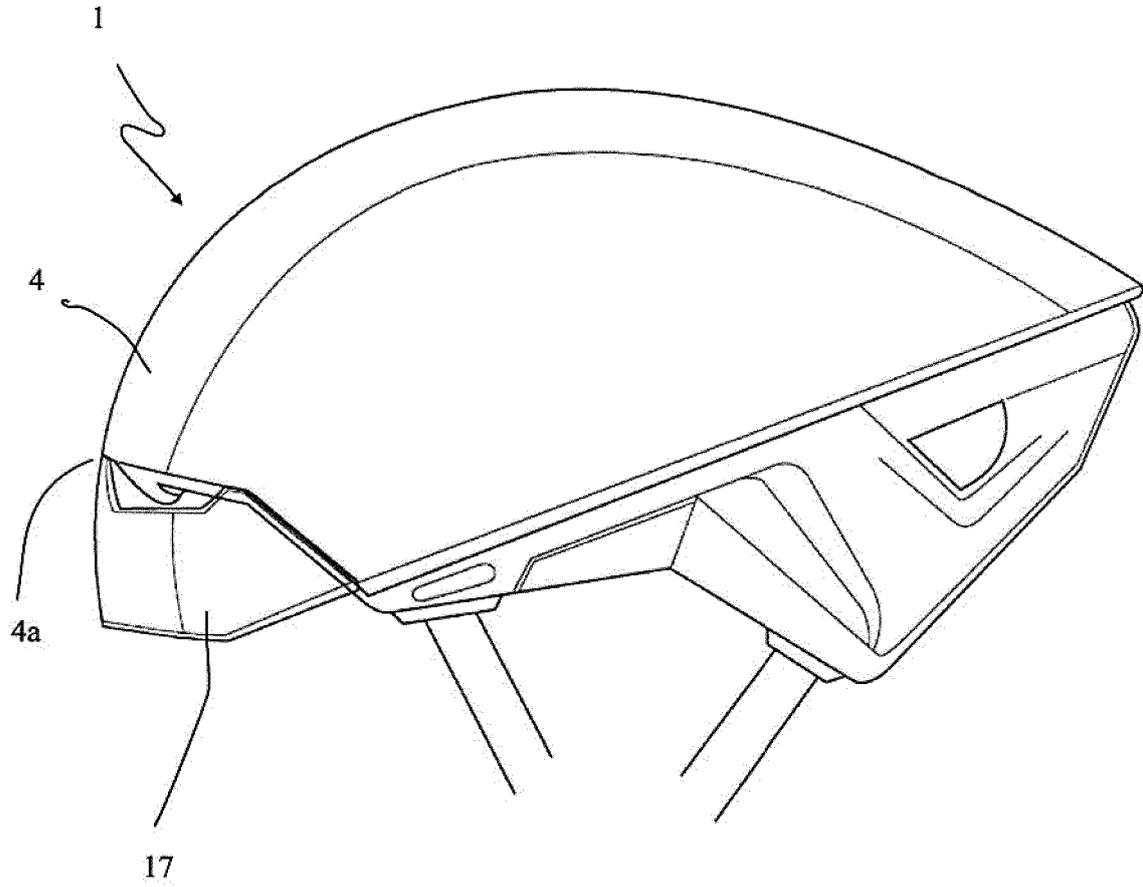
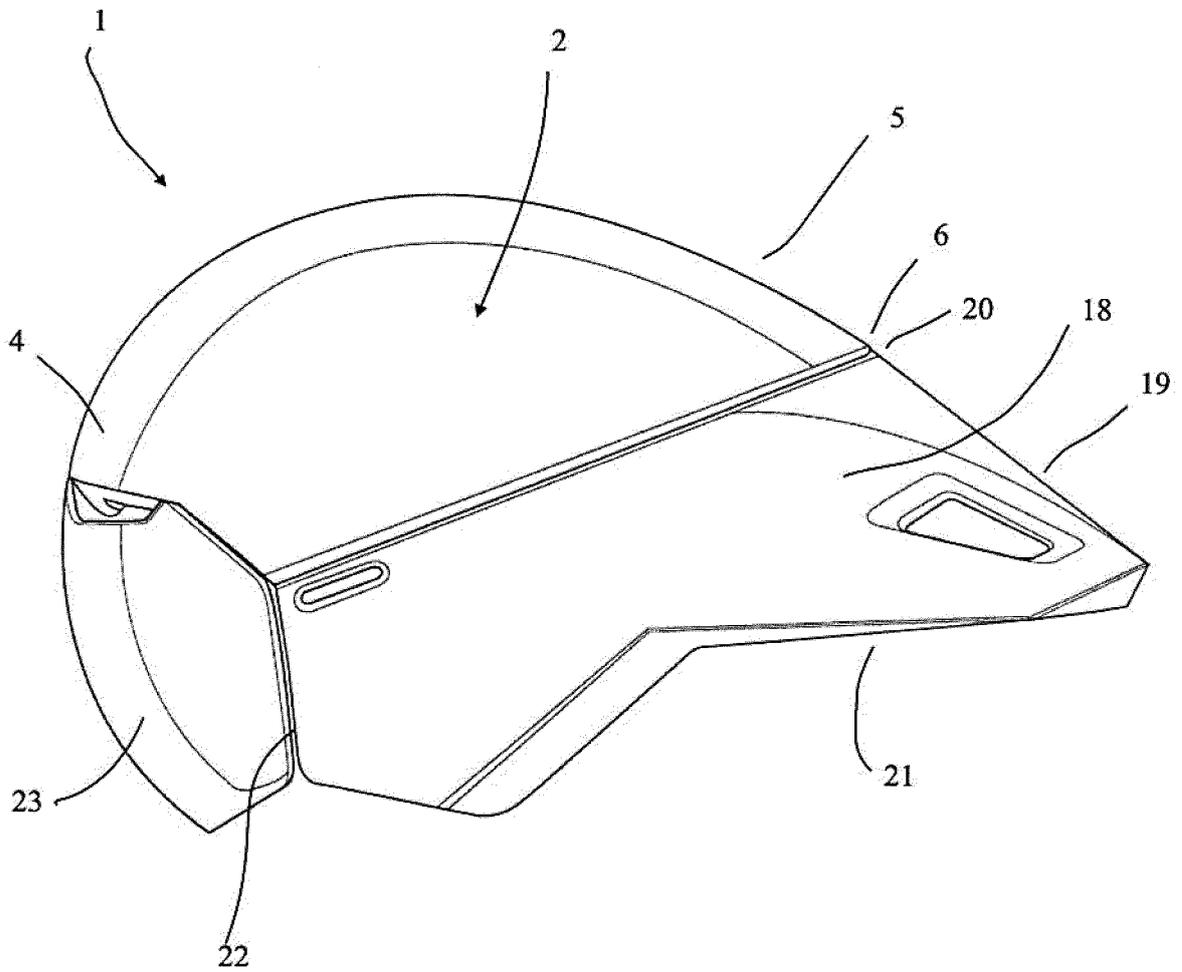


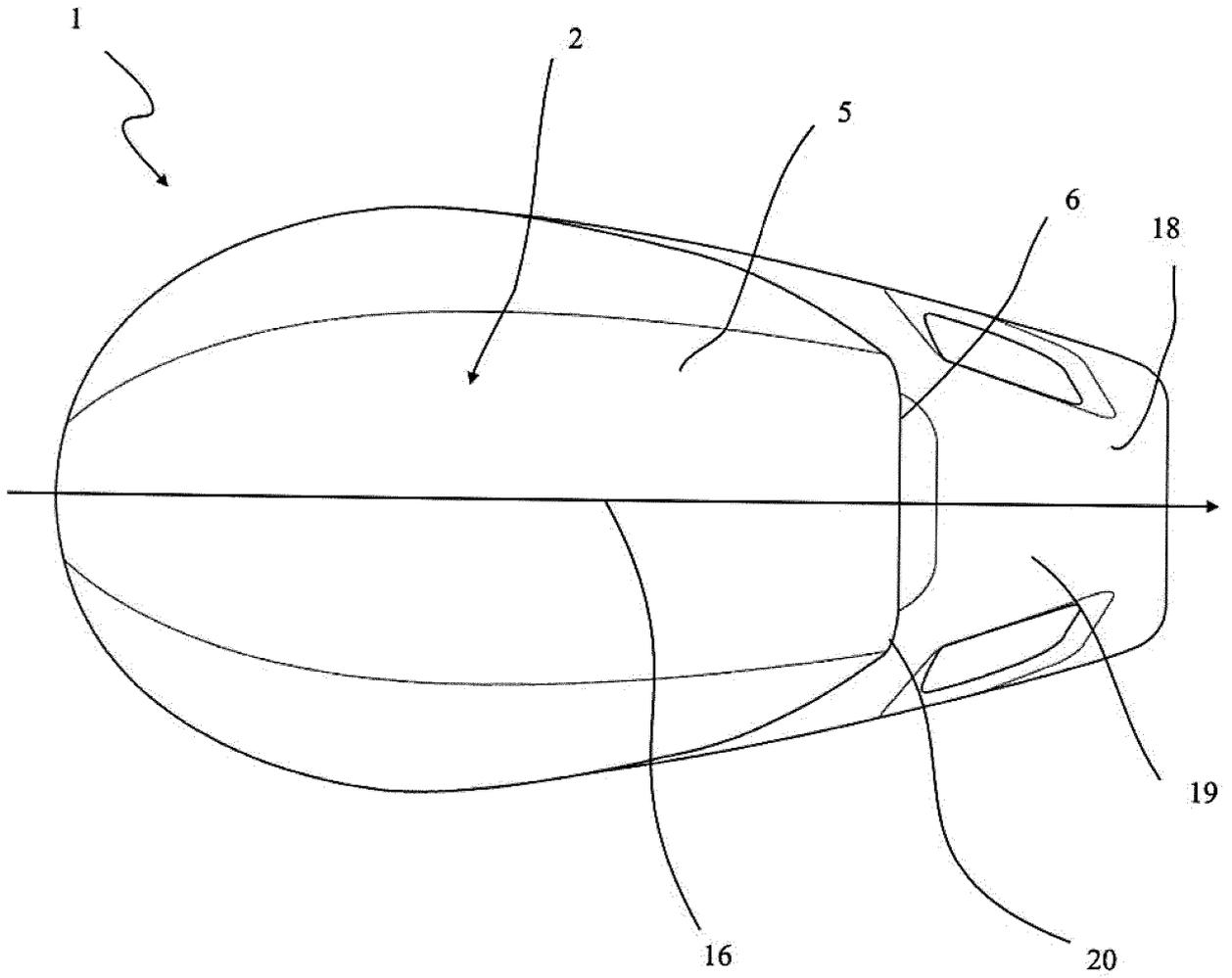
Figure 2



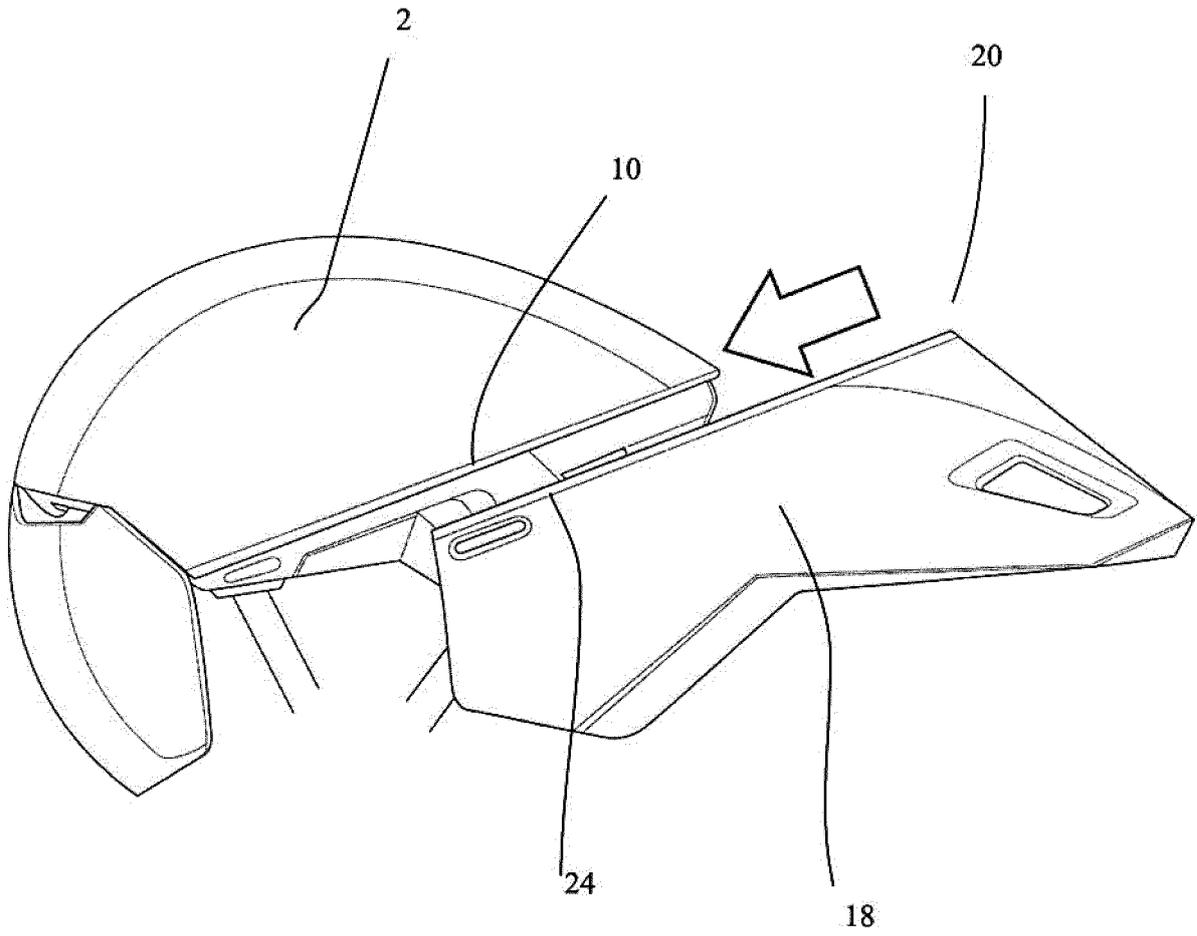
*Figure 3*



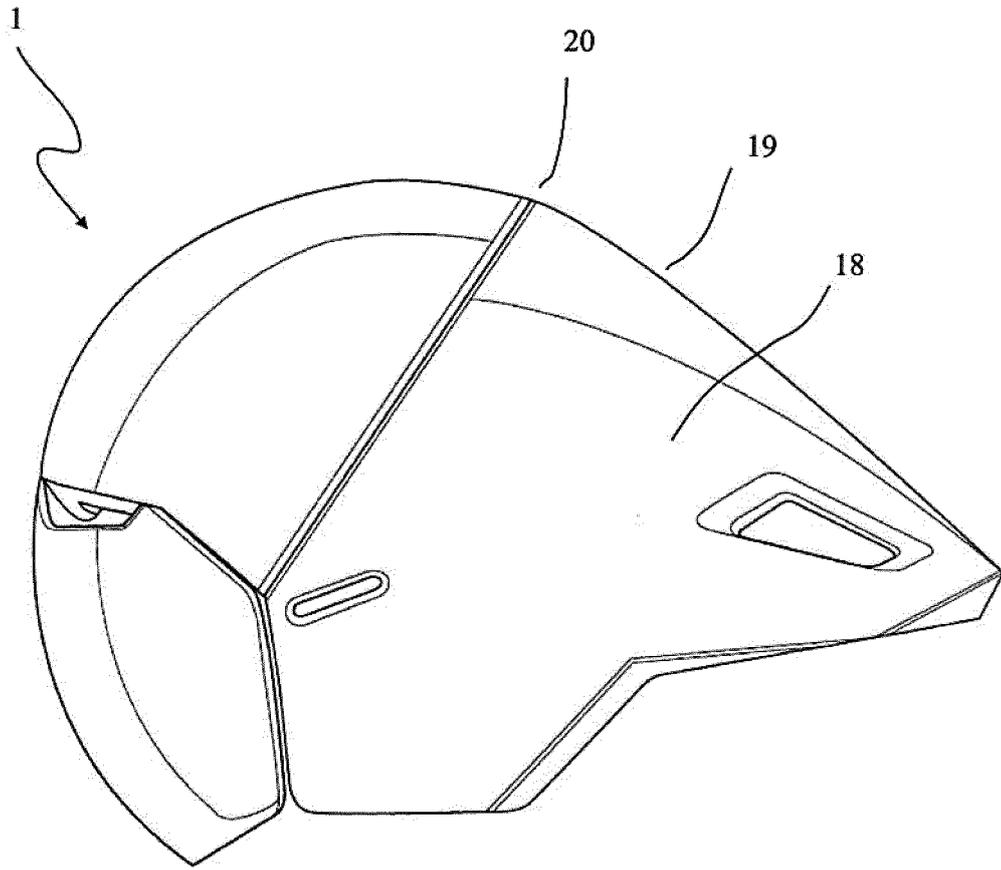
*Figure 4*



*Figure 5*



*Figure 6*



*Figure 7*

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- GB 2175490 A [0004]
- US 4995117 A [0005]
- CH 671864 A5 [0006]