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(54) **A CYCLE HELMET AND A CYCLE HELMET SYSTEM**

(57) A cycle helmet (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);
the helmet (1) further comprising a tail portion (18) detachably connected to the shell (2), the tail portion (18) extending 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).

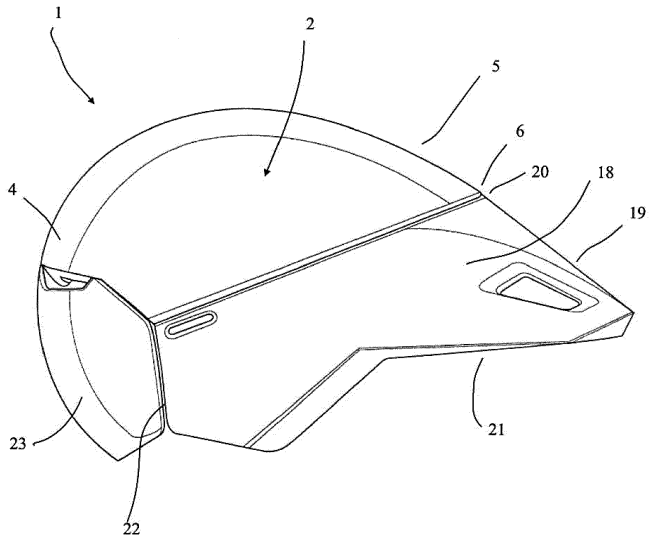

Figure 4

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Description

[0001] The present invention relates to a cycle helmet. More particularly, but not exclusively the present invention relates to a cycle helmet comprising an impact resistant shell and a tail portion detachably connected to the shell, the 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. The present invention also relates to a cycle helmet system. More particularly, but not exclusively, the present invention relates to a cycle helmet system comprising a plurality of such tail portions, each 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] The cycle helmet according to the invention seeks to overcome the problems of the prior art.

[0005] Accordingly, in a first aspect the present invention provides a cycle helmet 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 further comprising a tail portion detachably connected to the shell, the tail portion extending from the rear portion of the shell in a direction substantially parallel to the length axis away from the front portion.

[0006] The tail portion of the cycle helmet according to the invention is detachable. The 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.

[0007] Further, because the 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.

[0008] Preferably the tail portion comprises an upper face, the upper face and the shell together forming a smooth surface.

[0009] Preferably the upper face of the tail portion comprises a leading edge proximate to or abutting the shell.

[0010] Preferably the rear portion comprises a bottom edge, the upper face of the tail portion extending smoothly from the bottom edge of the rear portion.

[0011] Preferably the lateral side portions each comprise a bottom edge, the upper face of the tail portion extending smoothly from the bottom edge of each lateral side portion.

[0012] Preferably the shell further comprises a lateral support skirt extending from each lateral side portion, the tail portion being detachably connected to the lateral support skirts.

[0013] Preferably the tail portion at least partially covers the lateral support skirts.

[0014] Preferably the shell further comprises a rear support skirt extending from the rear portion, the tail portion being detachably connected to the rear support skirt.

[0015] Preferably the tail portion at least partially covers the rear support skirt.

[0016] Preferably the cycle helmet according to the invention further comprises a visor, the visor having first and second visor edges, the upper face of the tail portion extending smoothly from the visor edges.

[0017] Preferably the lateral side portions are symmetrically arranged on either side of the length axis.

[0018] In a further aspect of the invention there is provided 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 further comprising 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.

[0019] 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 according to the invention in side view without the tail portion;

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

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

Figure 4 shows a further embodiment of a cycle helmet 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 according to the invention.

[0020] Shown in figure 1 is a cycle helmet 1 according to the invention without the tail portion. The cycle helmet 1 comprises an impact resistant shell 2 which in use partially covers a portion of a cyclists 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.

[0021] The shell 2 comprises an upper dome 3 which covers the top of the cyclists head. The outer surface of the upper dome 3 is typically smooth so as to promote smooth airflow over the cycle helmet and so reduce drag.

[0022] Extending from the upper dome 3 is a front portion 4 which extends as far as a front portion bottom edge 4a. In use the front portion 4 covers the wearers forehead Also extending from the upper dome 3 in a direction away from the front portion 4 is a rear portion 5. In use the rear portion 5 covers at least part of the rear of the wearers head. The rear portion 5 extends as far as a rear portion bottom edge 6. Extending from the rear portion 5 is a rear support skirt 7. The rear support skirt 7 is arranged such that when the helmet 1 is worn it is below the rear portion 5 and slightly inset from the rear portion 5 ie towards the wearer as shown. The rear support skirt 7 comprises a push fit connector (not shown), the function of which is described below.

[0023] Also extending from the upper dome 3 are first and second lateral side portions 8,9 which each extend as far as a bottom edge 10. The lateral side portions 8,9 also extend between the front and rear portions 4,5. In this embodiment the bottom edge 10 of each lateral side portion 8,9 is arranged so that when the helmet 1 is worn the bottom edges 10 are slightly above the ears of the wearer.

[0024] Extending from each lateral side portion 8,9 of the shell 2 is a lateral support skirt 11. Each lateral support skirt 11 is arranged such that when the helmet is worn the lateral support skirt 11 extends below the bottom edge 10 of its associated lateral side portion 8,9 as shown. Each lateral support skirt 11 is slightly inset from its associated lateral side portion 8,9 ie towards the head of the wearer. Each lateral support skirt 11 comprises a push fit connector 12. This is arranged towards the front of the helmet 1 as shown. Each lateral support skirt 11 further comprises a ventilation aperture 13 as shown allowing air within the helmet 1 to exit to the rear of the helmet 1 in use.

[0025] Each of the lateral side portions 8,9 comprises a front edge 14. These front edges 14 together with the bottom edge 4a of the front portion 4 define a front aperture 15 so that the face of the wearer is not covered when the helmet 1 is worn.

[0026] Figure 2 shows the helmet 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.

[0027] 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.

[0028] Figure 3 shows an alternative embodiment of a cycle helmet 1 according to the invention, again without the 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. The visor 17, front portion 4 and lateral side portions 8,9 together from 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.

[0029] Figure 4 shows a further embodiment of a cycle helmet 1 according to the invention including the 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.

[0030] 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 turbu-

lence in air flowing over the helmet 1.

[0031] 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.

[0032] 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.

[0033] 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 positon with respect to the cyclist to minimise drag.

[0034] 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.

[0035] The tail portion 18 covers the lateral and rear support skirts 7,11, again to reduce drag.

[0036] 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.

[0037] Figure 5 shows the helmet 1 of figure 4 in plan view from above showing the 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.

[0038] 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.

[0039] Figure 6 shows a method of attaching the 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.

[0040] Figure 7 shows, in side view, a further embodiment of a cycle helmet 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.

[0041] The 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.

[0042] Further, the helmet 1 can be 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 potion 18 the greater the degree of inclination. 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 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 further comprising a tail portion detachably connected to the shell, the tail portion extending from the rear portion of the shell in a direction substantially parallel to the length axis away from the front portion.

2. A cycle helmet as claimed in claim 1, wherein the tail portion comprises an upper face, the upper face and the shell together forming a smooth surface.

3. A cycle helmet as claimed in claim 2, wherein the upper face of the tail portion comprises a leading edge proximate to or abutting the shell.

4. A cycle helmet as claimed in either of claims 2 or 3, wherein the rear portion comprises a bottom edge, the upper face of the tail portion extending smoothly from the bottom edge of the rear portion.

5. A cycle helmet as claimed in any one of claims 2 to 4, wherein the lateral side portions each comprise a bottom edge, the upper face of the tail portion extending smoothly from the bottom edge of each lateral side portion.

6. A cycle helmet as claimed in any one of claims 1 to 5, wherein the shell further comprises a lateral support skirt extending from each lateral side portion, the tail portion being detachably connected to the lateral support skirts.

7. A cycle helmet as claimed in claim 6, wherein the tail portion at least partially covers the lateral support skirts.

8. A cycle helmet as claimed in any one of claims 1 to 7, wherein the shell further comprises a rear support skirt extending from the rear portion, the tail portion being detachably connected to the rear support skirt.

9. A cycle helmet as claimed in claim 8 wherein the tail portion at least partially covers the rear support skirt.

10. A cycle helmet as claimed in any one of claims 1 to 9, further comprising a visor, the visor having first and second visor edges, the upper face of the tail portion extending smoothly from the visor edges.

11. A cycle helmet as claimed in any one of claims 1 to 10, wherein the lateral side portions are symmetrically arranged on either side of the length axis.

12. 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 further comprising 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.

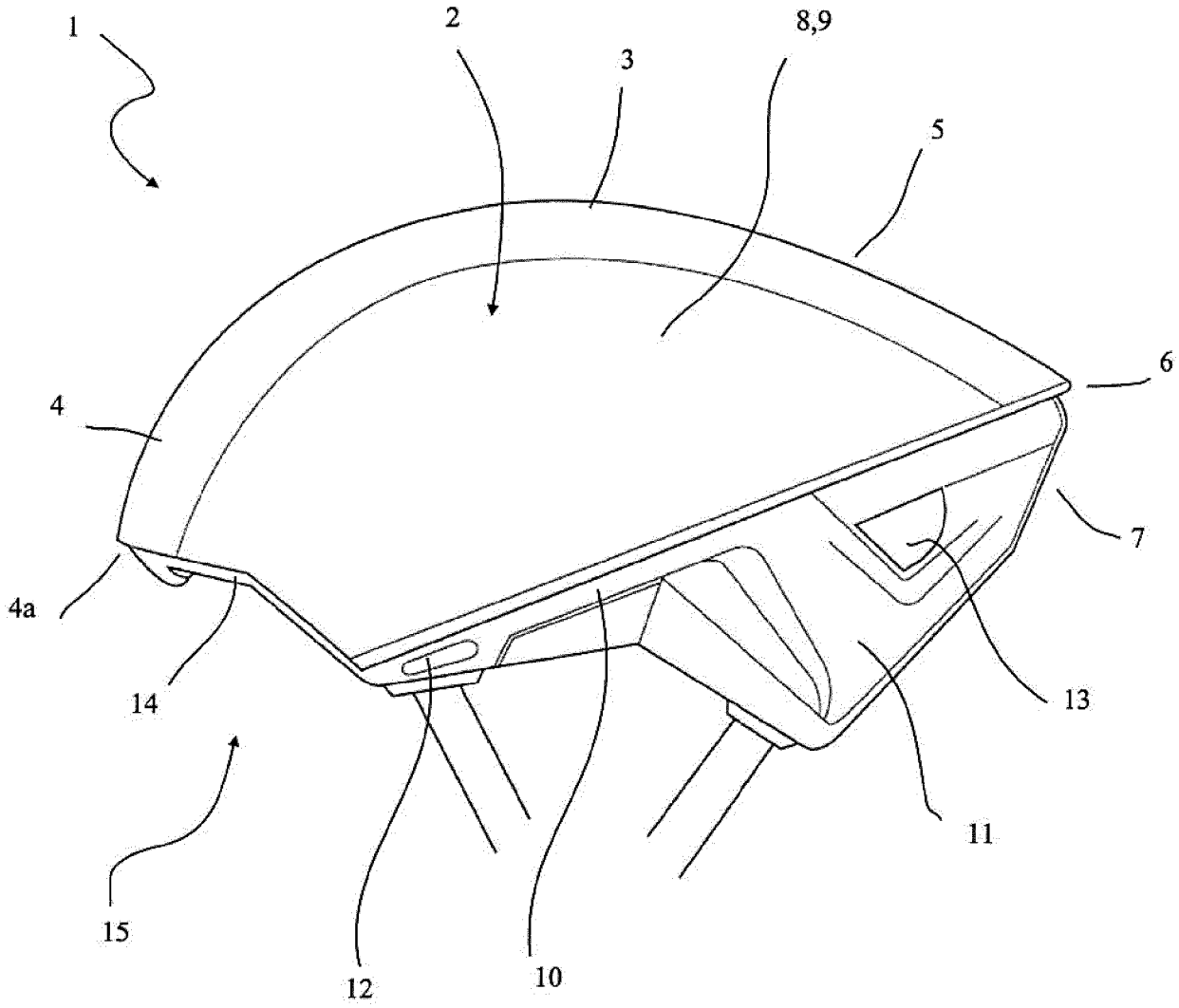

Figure 1

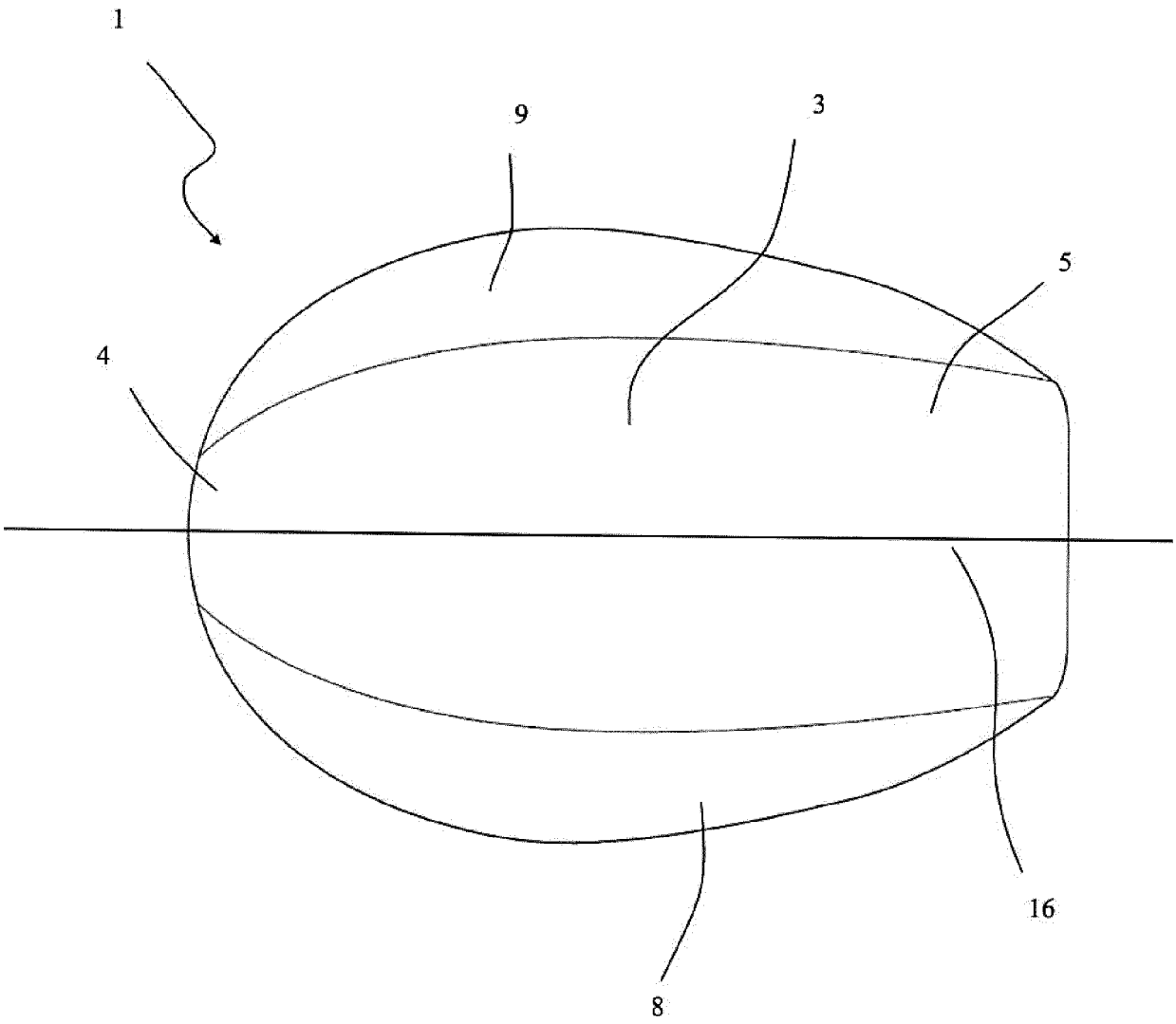

Figure 2

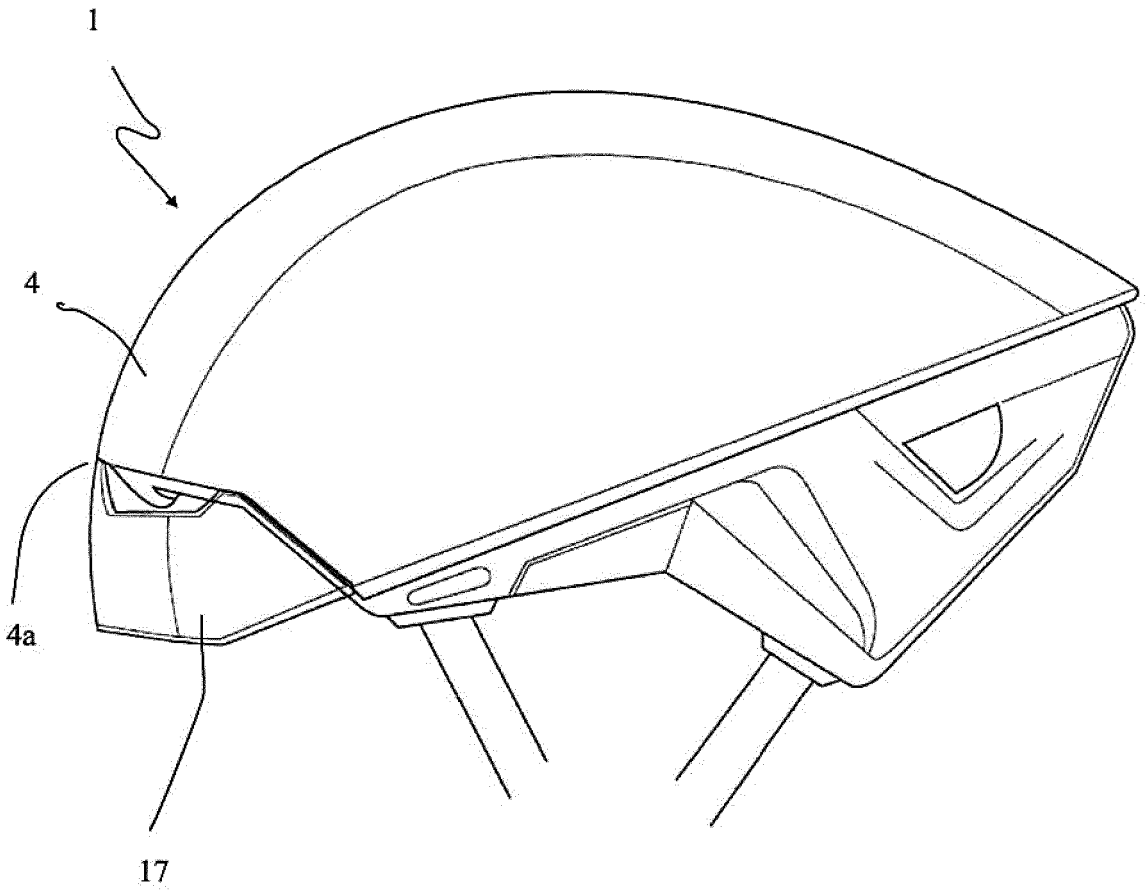

Figure 3

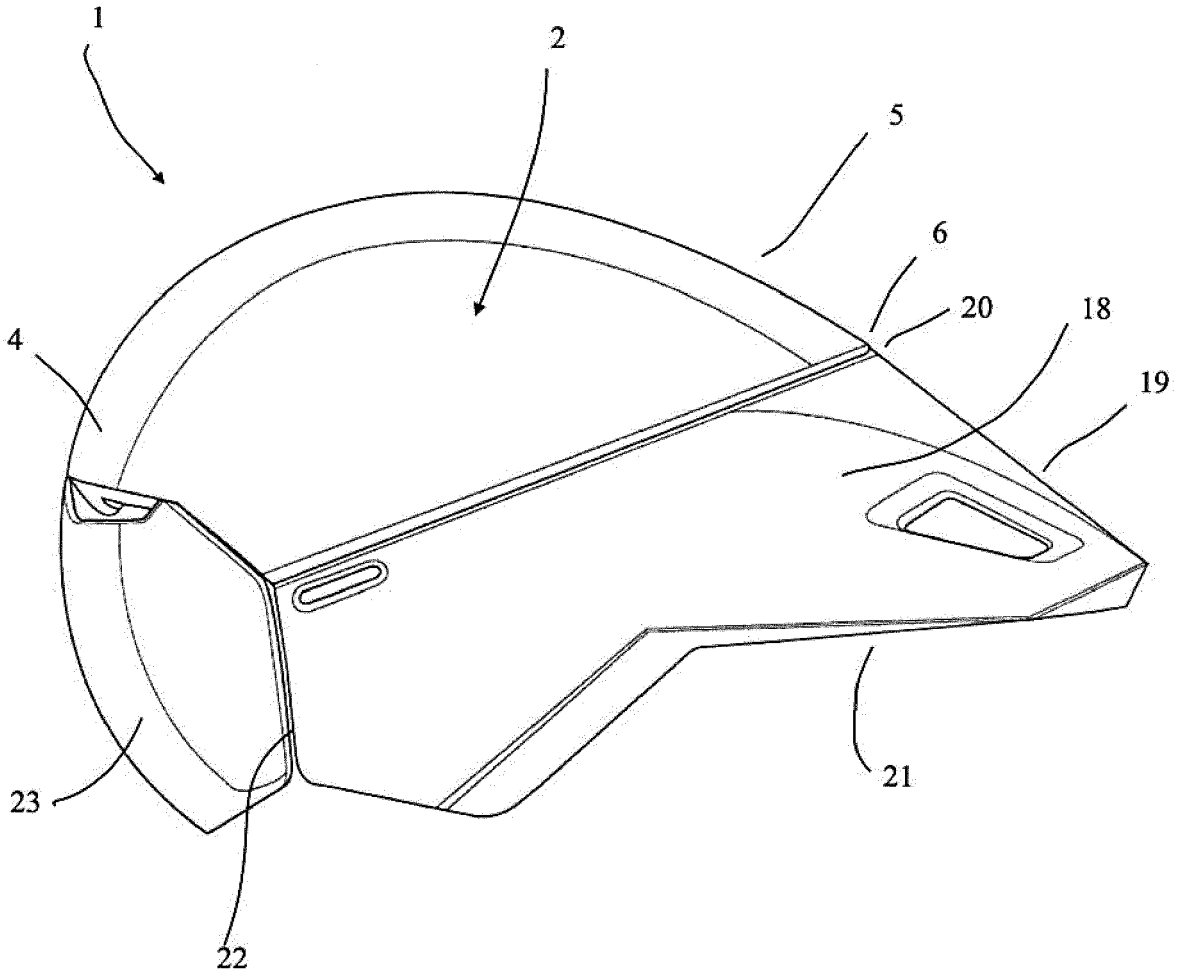

Figure 4

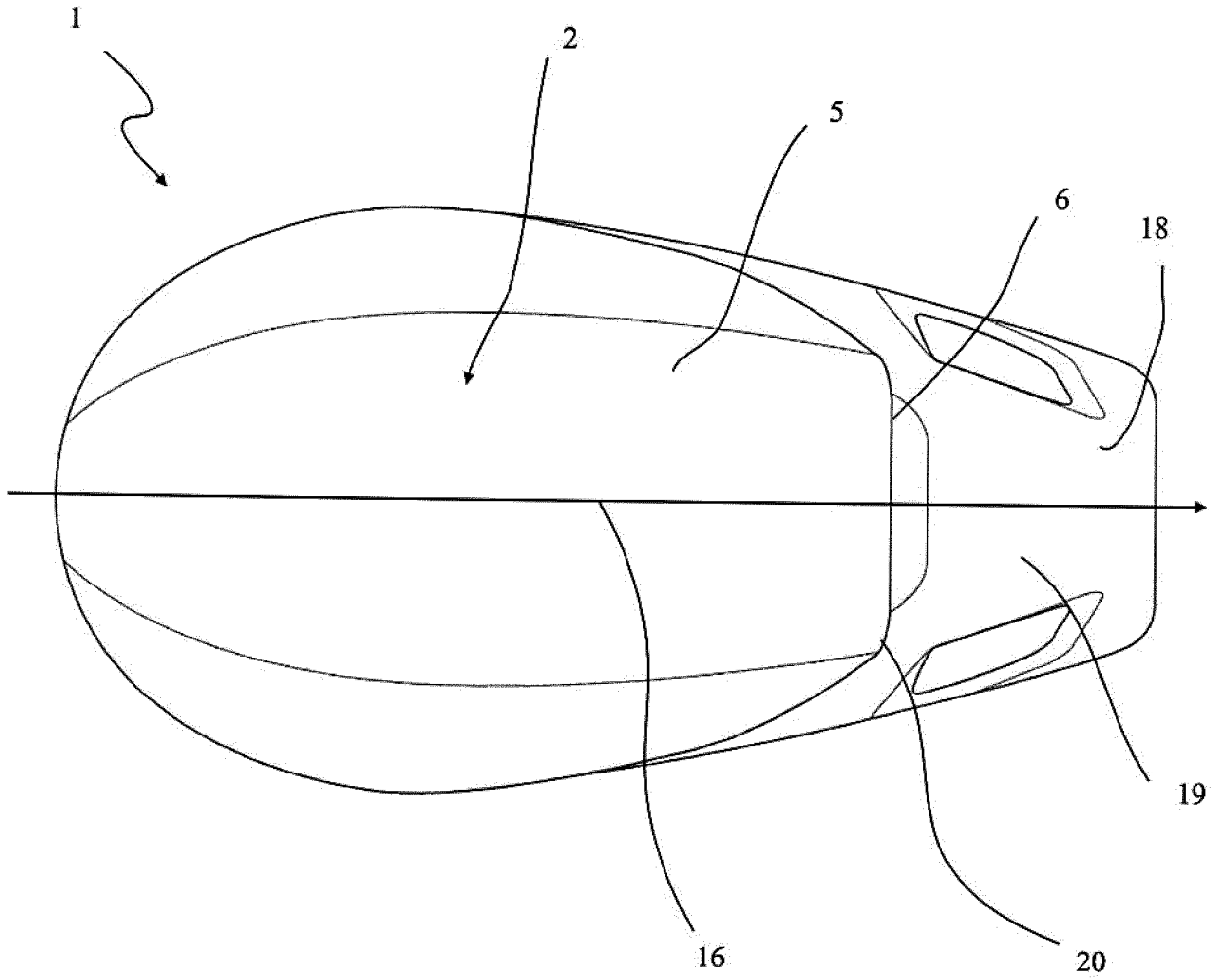

Figure 5

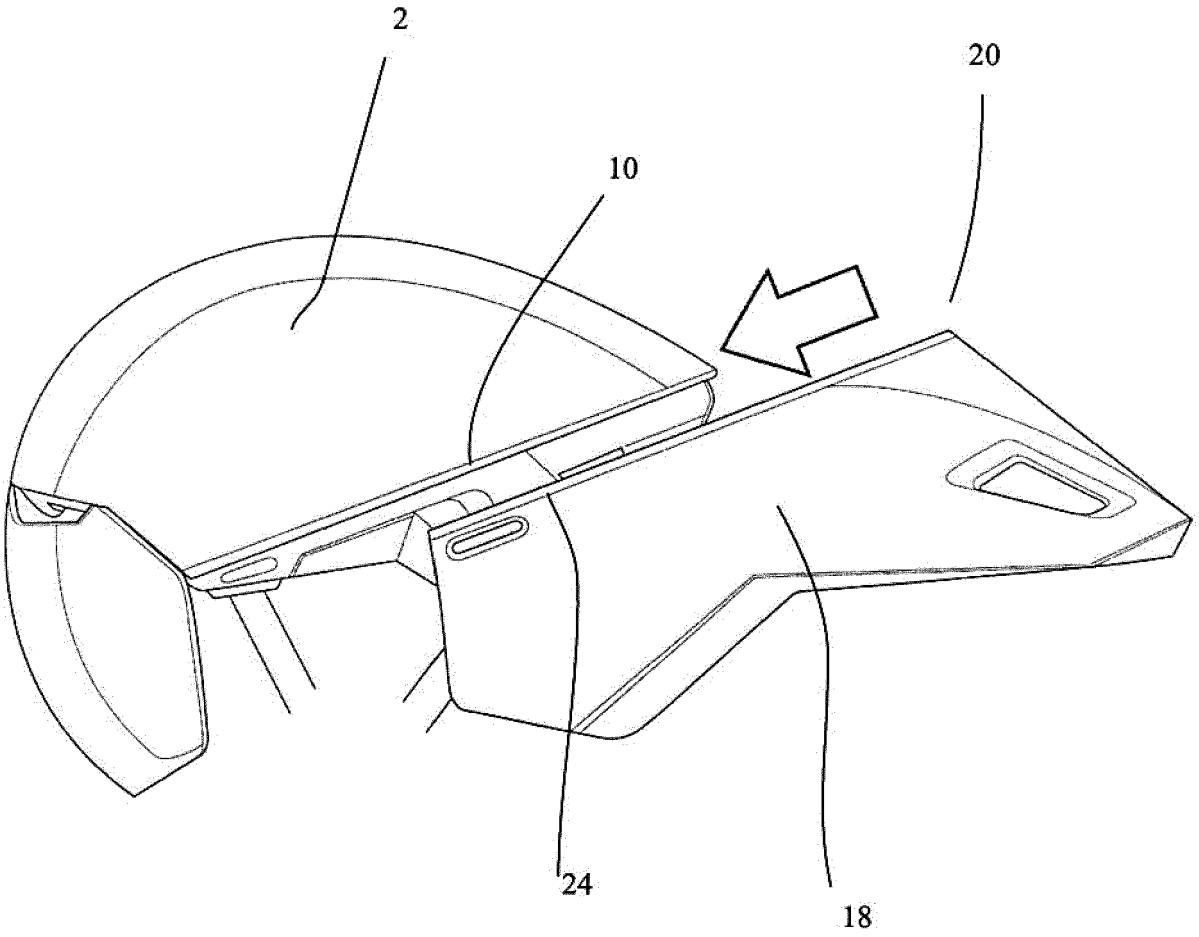

Figure 6

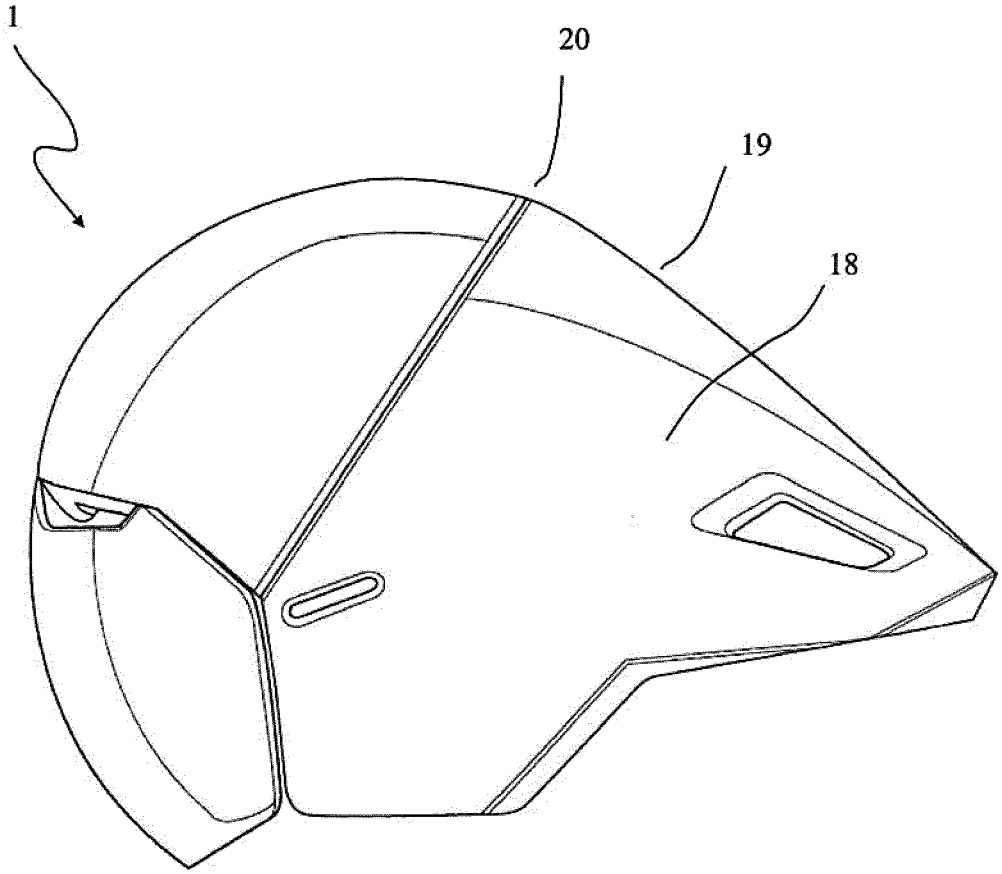

Figure 7

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 0670

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 175 490 A (NOLAN SPA) 3 December 1986 (1986-12-03) * figures 1,2,4 *	1-11 12	INV. A42B3/04
X	US 4 995 117 A (MIRAGE JAMES A [US]) 26 February 1991 (1991-02-26) * figure 9 *	1,11	
X	CH 671 864 A5 (BEAT ENGEL) 13 October 1989 (1989-10-13) * claim 1 * * figure 1 *	1-3,11	

TECHNICAL FIELDS SEARCHED (IPC)

A42B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	5 October 2017	Guisan, Thierry

CATEGORY OF CITED DOCUMENTS

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05-10-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2175490 A	03-12-1986	DE 3617745 A1	27-11-1986
		FR 2582197 A1	28-11-1986
		GB 2175490 A	03-12-1986
		IT 1209637 B	30-08-1989
US 4995117 A	26-02-1991	NONE	
CH 671864 A5	13-10-1989	NONE	

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