



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.01.2018 Bulletin 2018/03

(51) Int Cl.:
A42B 3/28 (2006.01)

(21) Application number: **16178832.8**

(22) Date of filing: **11.07.2016**

(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**
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(54) **HELMET VENTILATION**

(57) A sports helmet (100) is disclosed comprising a closable air inlet for ventilation of the wearer's head. The air inlet comprises blinds (102-104) movable between an open and closed position. In the closed position, the

blinds close the air inlet. The blinds are further positioned such that, in the open position, air is guided into the helmet along the blinds.

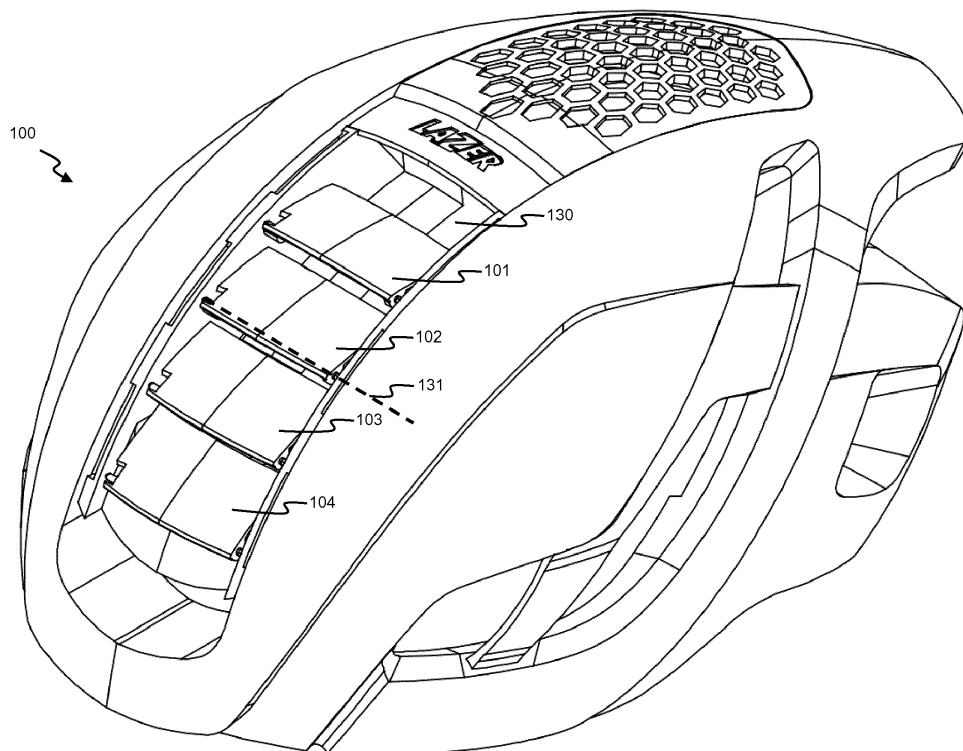


Fig. 4

Description

Field of the Invention

[0001] The present invention relates to the ventilation of helmets, in particular it relates to improving the cooling performance while maintaining the aerodynamics of sport helmets. The main factors contributing to the the cooling performance of a helmet are forced convection and the blocking of heat irradiation, e.g., sun irradiation.

Background of the Invention

[0002] The primary goal of a helmet is to protect the wearer's head on impact. In order to absorb the energy from the impact, the helmet typically contains a shock absorbent material such as expanded polystyrene (EPS). The helmet may further comprise an outer casing. This outer casing may serve different purposes such as for the protection of the absorbent material, for the distribution of impact forces over a wider area, for preventing the helmet to crush of brake in smaller parts, for providing a smooth aerodynamic outer surface and for aesthetic reasons.

[0003] A disadvantage of helmets is that they hinder the cooling of the wearer's head. This may be solved by providing fixed openings in the helmet that allow air to flow onto the wearer's head thereby providing a cooling effect. However, the openings are not always favoured by the wearer, for example when it rains or when aerodynamics prevail over the cooling effect.

[0004] This can be overcome by closable air inlets having an open and closed position. In the open position, air can flow into the helmet and provide the ventilation and, in the closed position, air flows over the helmet's outer surface. One way to achieve such a closable air inlet is by a cover element that is embedded between the outer casing of the helmet and the absorbent material. In a closed position, the cover element then covers an air inlet opening in the absorbent material. To open the ventilation, the cover element is then slid underneath the outer cover thereby exposing the air inlet. Alternatively, the cover element is slid along the outside of the outside casing.

[0005] While providing ventilation, the above solution still has some drawbacks. A first drawback is that the wearer's head may be exposed to sun radiation in the open position when the air inlet is on the topside of the helmet. This exposure partly cancels out the ventilation effect. A second drawback is that the airflow is often sub-optimal because the air is not optimally guided upon entering the air inlet. These two drawbacks are also present in helmets with fixed air inlets. A third drawback is that extra space must be foreseen in, on top or under the outer cover to embed the cover element when it is in the open position. This further increases the thickness of the helmet or results in an uneven outer surface which affects the aerodynamics of the helmet.

Summary of the Invention

[0006] It is an object of the invention to overcome the above drawbacks and provide a closable air inlet for a helmet which is more aerodynamic at the outside, does not add thickness to the helmet, prevents sun irradiation onto the wearer's head and provides an aerodynamic airflow into the helmet.

[0007] This object is achieved by a sports helmet comprising a closable air inlet for ventilation of the wearer's head; wherein the air inlet comprises:

- blinds movable between an open and closed position,
- wherein, in the closed position, the blinds close the air inlet,
- wherein the blinds are positioned such that, in the open position, air is guided into the helmet along the blinds.

[0008] Ventilation and thus forced convection of the wearer's head is thus provided by blinds. Blinds are thin plate like structures or lamellas that essentially only comprise two main surfaces, a top and bottom surface. When referring to the surface of a blind within this disclosure, it is a reference to this bottom or top surface. In both open and closed position the surfaces of the blinds are substantially parallel to each other. In a closed position, the surfaces further form a single surface or plane. In an open position, each blind defines a plane separate from the other blinds such that an air gap is defined in between consecutive blinds through which the air can flow into the helmet.

[0009] By the surface of the blinds sunlight will be blocked. The more the sunlight radiates a blind's surface perpendicularly, the more efficient the sunlight is blocked. As the strongest radiation is mostly received on top of the helmet and as the blinds will be most effective for ventilation when parallel to the horizon, an optimal ventilation and irradiation blocking is achieved by a helmet according to the invention. By the same principle, the blinds will also protect the wearer better from rain.

[0010] Furthermore, the blinds will guide the incoming air flow along their surface. Therefore, by positioning the blinds appropriately, an optimal air flow inside the helmets is achieved. Moreover, by adjusting the position of the blinds, the direction of the air flow may be further adjusted according to the air flow conditions.

[0011] As the blinds do not need to be slid away from the air inlet, no extra space must be foreseen, either inside or outside the outside cover. Therefore an even outside surface without bumps or of major irregularities can be achieved resulting in an aerodynamic air flow along the helmet, especially when the blinds are closed. It is thus an advantage that improved aerodynamics are obtained compared with existing solutions.

[0012] Advantageously, in the open position, the blinds are positioned such that air is guided into the helmet

along the wearer's head. This way, the least air resistance and maximum cooling is achieved.

[0013] According to an embodiment the helmet comprises an outside surface along which the air is guided when the blinds are in the closed position; and wherein, in the open position, the blinds are in a tilted position with respect to the outside surface of the helmet.

[0014] By the tilted position, the air flowing along the outside surface of the helmet will be directed into the helmet.

[0015] More advantageously, the blinds are rotatable around a rotation axis between the closed and tilted position; and wherein the rotation axis of each blind is parallel to a tangent of the blind and perpendicular to a direction of the air flow over the blind when the blind is in the closed position.

[0016] The tilting of the blinds is thus achieved by a rotation of each blind around a rotation axis which is parallel to the surface of the blind. Furthermore, the blind is positioned such that the air gap intercepts the air flow in the most optimal position. This has the advantage that the least resistance is achieved when guiding the airflow inside the helmet.

[0017] According to a further embodiment, the helmet comprises a front and back portion thereby defining a front and back portion of the blinds; and wherein the blind is rotatable around the front portion such that the blind is tilted inward the helmet when in the open position.

[0018] The front portion of the helmet thus corresponds to the front of the helmet, i.e., the portion running towards the face of the wearer. Because the rotation axis is positioned towards the front side of the blind, the blind will mainly rotate inwards into the helmet when moving into the open position. This has the advantage that the blind thus not stick out of the helmet's outer surface when in the open position. Moreover, the blinds will not exhibit a large momentum towards the open position when they are closed. This prevents that the blinds would accidentally open by a strong air flow during use.

[0019] In the open position, the blinds may further be in a translated position with respect to the outside surface of the helmet.

[0020] According to an embodiment, the closable air inlet comprises an engaging means movable from a first position to a second position such that the blinds are moved between the open and closed position when the engaging means is moved between the first and second position.

[0021] This allows an easy operation by the wearer as only a single movement is required to get the blinds in the open position.

[0022] According to a further embodiment, the blinds are pivotally mounted in the engaging means; and wherein the blinds are moved from the closed position to the translated position when moving the engaging means from the first to second position; and wherein the helmet further comprises a guiding means arranged such that the blinds move from the closed position to the tilted po-

sition by interaction with the guiding means when the engaging means moves from the first to second position.

[0023] This way, a combined rotation of all the blinds is achieved by a single translation. Furthermore, by the guiding means in the helmet, the blinds can be further secured apart from the fixation points of the rotation axis thereby assuring that the blinds can withstand the forces exhibited by the air flow.

[0024] The air inlet may further comprise a cover covering the blinds and comprising openings to guide the air to the blinds.

[0025] By the cover, the air may be filtered upon entering, for example to prevent that insects fly into the helmet through the blinds. Moreover, the cover may have a pattern different from the blinds allowing further personalization of the helmet. The cover also strengthens the overall structure of the helmet thereby making the helmet better resistant to impact. To this respect, the cover preferably comprises an impact absorbing structure.

[0026] The engaging means may further be connected to the cover such that the engaging means is moved from the first to second position when the cover is moved along the helmet's outer surface. The engaging means thus serves a dual purpose, i.e., as a cover for the blinds and for moving the blinds. This has the advantage that no further space on the outside cover of the helmet must be sacrificed to embed the engaging means resulting in a slick and visually attractive design.

[0027] According to an embodiment, the helmet further comprises an actuation means comprising an actuator for moving the blinds from the first to second position in an automated way. This way, the wearer does not have to move the blinds manually because the actuator will move the blinds between the open and closed position.

[0028] The actuation means may further comprise a temperature sensor. The actuator is then driven by the temperature sensor, i.e., when the temperature exceeds a certain threshold temperature as measured by the sensor, then the actuation means moves the blinds to the open position by the actuator. The other way around, when the temperature drops below a certain second threshold temperature as measured by the sensor, then the actuation means moves the blinds to the closed position. This way, the blinds are operated in a fully automated way without the need for any manual interaction from the wearer.

[0029] According to an embodiment, the actuator comprises a material which changes shape by a change in temperature arranged such that the blinds move between the open and closed position depending on the temperature of the material. This has the advantage that the automated movement of the blinds can be achieved without any motorized means and thus without any energy storage such as a battery.

[0030] According to a further embodiment the actuation means further comprises a sensor for measuring the tilting of the helmet; and the helmet further comprises a processing unit arranged to configure a position of the

blinds in the open position and thereby the air flow into the helmet based on the measured tilting.

[0031] This has the advantage that the air flow into the helmet may be made constant such that a constant cooling effect and constant aerodynamic effect is achieved.

Brief Description of the Drawings

[0032]

Fig. 1A illustrates a side view of a helmet comprising a closable air inlet according to an embodiment of the invention when the air inlet is closed; and

Fig. 1B illustrates a side view of a helmet comprising a closable air inlet according to an embodiment of the invention when the air inlet is open; and

Fig. 2A illustrates a detailed view of an engaging means for opening and closing the air inlet of the helmet according to Fig. 1A and Fig. 1B when the air inlet is in the closed position; and

Fig. 2B illustrates a detailed view of an engaging means for opening and closing the air inlet of the helmet according to Fig. 1A and Fig. 1B when the air inlet is in the open position; and

Fig. 3A illustrates the air flow along the helmet of Fig. 1A when the air inlet is in the closed position; and

Fig. 3B illustrates the air flow along and into the helmet of Fig. 1B when the air inlet is in the closed position; and

Fig. 4 illustrates a three dimensional view of the helmet according to Fig. 1B when the air inlet is in the open position; and

Fig. 5 illustrates a three dimensional view of the helmet according to Fig. 1B when the air inlet is in the open position with a cover mounted on top of the air inlet; and

Fig. 6 illustrates an actuation means for opening and closing an air inlet of a helmet according to an embodiment of the invention.

Detailed Description of Embodiment(s)

[0033] Fig. 1 to Fig. 5 illustrate different views and details of a helmet 100 comprising a closable air inlet 120 according to an embodiment of the invention. The helmet 100 comprises a front portion and rear or back portion thereby defining a front direction 115 and rear direction 116 with respect to the helmet 100. The face of a wearer of the helmet is facing the front direction and the back of the head of the wearer is facing the rear direction. The

helmet 100 comprises a closable air inlet 120 in the front portion of the helmet. The air inlet 120 can be arranged in a closed position and an open position. In the closed position an air flow 301 will flow along the outer surface 303 of the helmet and no air is entering the helmet through the air inlet 120. In an open position an air flow 302 will flow into the air inlet 120 and flow along the wearer's head thereby providing a cooling effect. The airflow 302 exits the helmet 100 through holes in the rear portion of the helmet 100.

[0034] The air inlet comprises blinds 101 to 104 movable between a closed position as illustrated by Fig. 1A, 2A and 3A and an open position as illustrated by Fig. 1B, 2B, 3B, 4 and 5. When the blinds are in the open position, the air inlet 120 is in the open position, when the blinds are in the closed position, the air inlet 120 is in the closed position.

[0035] Blinds 101 to 104 are attached to an engaging means 130. The blinds are rotatable around a rotation axis, for example axis 131 for blind 102, within the engaging means 130, i.e., blinds 101-104 are pivotally mounted in the engaging means 130. In the closed position, the blinds 101-104 form a single flat surface preventing the air from entering the air inlet. In the open position, the blinds 101-104 are tilted 111 with respect to the open position around their respective rotation axis. Engaging means 130 is mountable in helmet 100. Engaging means 130 is movable between a first and second position by a translation along the outer surface of the helmet. In the first position as shown in Fig. 1A, the blinds are closed. In order to open the blinds, the engaging means 130 is slid along direction 110 to the back of the helmet. By the translation 110, the blinds are tilted inwards the helmet by a slope element 119 serving as guiding element for the blinds. Blinds 101-104 interact with slope element 119 and thus follow the slope of slope element 119 during the translation 110 of the engaging means 130.

[0036] The rotation axis of blinds 101-104 providing the tilting is preferably parallel to the blind itself and located in the front portion 117 of the blind. The front portion 117 of the blind is the portion which is located towards the front 115 of the helmet 100. The back portion 118 of the blind is then the portion which is located towards the back 116 of the helmet 100. This is illustrated in Fig. 1B where line 113 illustrates the plane of the blind when closed and line 114 illustrates the plane of the blind when in the open position. The angle 112 between plane 113 and 114 then illustrates the tilting angle of the blind with respect to the outer surface 303 of the helmet 100. This way, the blind will make the tilting movement into the helmet. Moreover, the blind is in a stable position as incoming air will not exhibit a large rotation momentum on the blind.

[0037] When the blinds are in the open position the air flow 302 is guided into the helmet 100 by the blinds, i.e., into the air gaps created by the opened blinds. The blinds themselves guide the air flow 302 into the helmet. More

preferably, in the open position, the blinds are positioned such that the air flow 302 is guided along the head of the wearer.

[0038] Preferably, a cover 502 covers blinds 101 to 104. Cover 502 is further attached to the engaging means 130 such that the translation 119 to the open position or the translation 501 to the closed position may be performed by moving the cover along the outer surface 303 of the helmet in respective direction 119 or 501. Holes are provided in cover 502 such that the air flow 302 can pass through the cover when the air inlet is open. Cover 502 provides a reinforcement of the helmet 100 at the air inlet 120. Cover 502 may comprise an impact absorbent structure such that the wearer's head is also protected around the air inlet. Cover 502 and the impact resistant structure may be chosen such that the helmet 100 withstands a kerbstone impact as specified in standard EN1078. The impact absorbance may for example be provided by a honeycomb structure made of Polycarbonate.

[0039] Fig. 6 further illustrates an actuation means 600 for moving the blinds 101-104 between the open and closed position. Actuation means 600 comprises an actuator 604 for performing the movement of the blinds in an automated way. Actuator 604 may for example correspond to a motor for turning the blinds 101-104. Actuator 604 may also correspond to a linear actuator for moving the engaging means 130 or cover 502 between the first and second position.

[0040] According to a further embodiment, actuation means 600 comprises a control unit 603 for controlling the actuator 604. Actuation means 600 may then further comprise a temperature sensor 601 providing a measure of the temperature outside or inside the helmet to the control unit 603. Control unit 603 is then further configured to move the blinds to the open position when the temperature exceeds a first threshold temperature. Control unit 603 may be further configured to move the blinds to the closed position when the temperature drops below a second threshold temperature.

[0041] Actuation means 600 may further comprise a tilting sensor 602 for measuring the tilting position of the helmet. The tilting position is the angle corresponding to the tilting of the head of the wearer with respect to a horizontal reference plane such as for example a plane perpendicular to the direction of the gravity. By the tilting of the head and thus the helmet 100, the airflow 302 entering the helmet will vary. In order to make the airflow into the air inlet more stable, the control unit 603 will vary the position of the blinds depending on the tilting of the helmet measured by the tilting sensor.

[0042] According to another embodiment, actuator 604 comprises a material which deforms by a changing temperature. This deformation is then used to control the position of the blinds 101-104 from completely opened to completely closed. This way an automated opening of the blinds is achieved without a need for energy storage such as a battery.

[0043] Although the present invention has been illustrated by reference to specific embodiments, it will be apparent to those skilled in the art that the invention is not limited to the details of the foregoing illustrative embodiments, and that the present invention may be embodied with various changes and modifications without departing from the scope thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein. In other words, it is contemplated to cover any and all modifications, variations or equivalents that fall within the scope of the basic underlying principles and whose essential attributes are claimed in this patent application. It will furthermore be understood by the reader of this patent application that the words "comprising" or "comprise" do not exclude other elements or steps, that the words "a" or "an" do not exclude a plurality, and that a single element, such as a computer system, a processor, or another integrated unit may fulfil the functions of several means recited in the claims. Any reference signs in the claims shall not be construed as limiting the respective claims concerned. The terms "first", "second", "third", "a", "b", "c", and the like, when used in the description or in the claims are introduced to distinguish between similar elements or steps and are not necessarily describing a sequential or chronological order. Similarly, the terms "top", "bottom", "over", "under", and the like are introduced for descriptive purposes and not necessarily to denote relative positions. It is to be understood that the terms so used are interchangeable under appropriate circumstances and embodiments of the invention are capable of operating according to the present invention in other sequences, or in orientations different from the one(s) described or illustrated above.

Claims

1. A sports helmet (100) comprising a closable air inlet (120) for ventilation of the wearer's head; wherein the air inlet comprises:
 - blinds (102-104) movable between an open and closed position; and
 - wherein, in the closed position, the blinds close the air inlet;
 - wherein the blinds are positioned such that, in the open position, air (302) is guided into the helmet along the blinds.
2. Sports helmet (100) according to claim 1 wherein, in the open position, the blinds are positioned such that air (302) is guided into the helmet along the wearer's head.

3. Sports helmet (100) according to claim 1 or 2 wherein the helmet comprises an outside surface (303) along which the air (301) is guided when the blinds (102-104) are in the closed position; and wherein, in the open position, the blinds are in a tilted position (112) with respect to the outside surface (303) of the helmet.
4. Sports helmet (100) according to any one of the preceding claims wherein the blinds are rotatable (111) around a rotation axis between the closed and tilted position; and wherein the rotation axis of each blind (101) is parallel to a tangent of the blind and perpendicular to a direction (113) of the air flow (301) over the blind (101) when the blind is in the closed position.
5. Sports helmet (100) according to claim 3 or 4 wherein the helmet comprises a front (115) and back (116) portion thereby defining a front (117) and back (118) portion of the blinds; and wherein the blind is rotatable around the front portion (117) such that the blind is tilted inward the helmet when in the open position.
6. Sports helmet (100) according to any one of claims 3 to 5 wherein, in the open position, the blinds are in a translated (110) position with respect to the outside surface (303) of the helmet.
7. Sports helmet (100) according to any one of the preceding claims wherein the closable air inlet comprises an engaging means (130) movable from a first position to a second position arranged such that the blinds are moved between the open and closed position when the engaging means is moved between the first and second position.
8. Sports helmet (100) according to claim 6 and 7; and wherein the blinds (101-104) are pivotally mounted in the engaging means; and wherein the blinds are moved from the closed position to the translated position when moving (110) the engaging means from the first to second position; and wherein the helmet further comprises a guiding means (119) arranged such that the blinds move from the closed position to the tilted position by interaction with the guiding means when the engaging means moves from the first to second position.
9. Sports helmet (100) according to any one of the preceding claims wherein the air inlet comprises a cover (502) covering the blinds and comprising openings to guide the air to the blinds.
10. Sports helmet (100) according to claim 9 as long as dependent on claim 7 or 8 wherein the engaging means is connected to the cover (502) and arranged such that the engaging means is moved from the first to second position when the cover is moved along the helmet's outer surface.
11. Sports helmet (100) according to claim 9 or 10 wherein the cover comprises an impact absorbing structure.
12. Sports helmet (100) according to any one of the preceding claims further comprising an actuation means (600) comprising an actuator (604) for moving the blinds from the first to second position in an automated way.
13. Sports helmet (100) according to claim 12 wherein the actuation means (600) comprises a temperature sensor (603).
14. Sports helmet (100) according to claim 12 or 13 wherein the actuator (604) comprises a material which changes shape by a change in temperature arranged such that the blinds move between the open and closed position depending on the temperature of the material.
15. Sports helmet (100) according to any one of claims 12 to 14 wherein the actuation means comprises a sensor (602) for measuring the tilting of the helmet; and wherein the helmet further comprises a processing unit (603) arranged to configure a position of the blinds and thereby the air flow into the helmet based on the measured tilting.

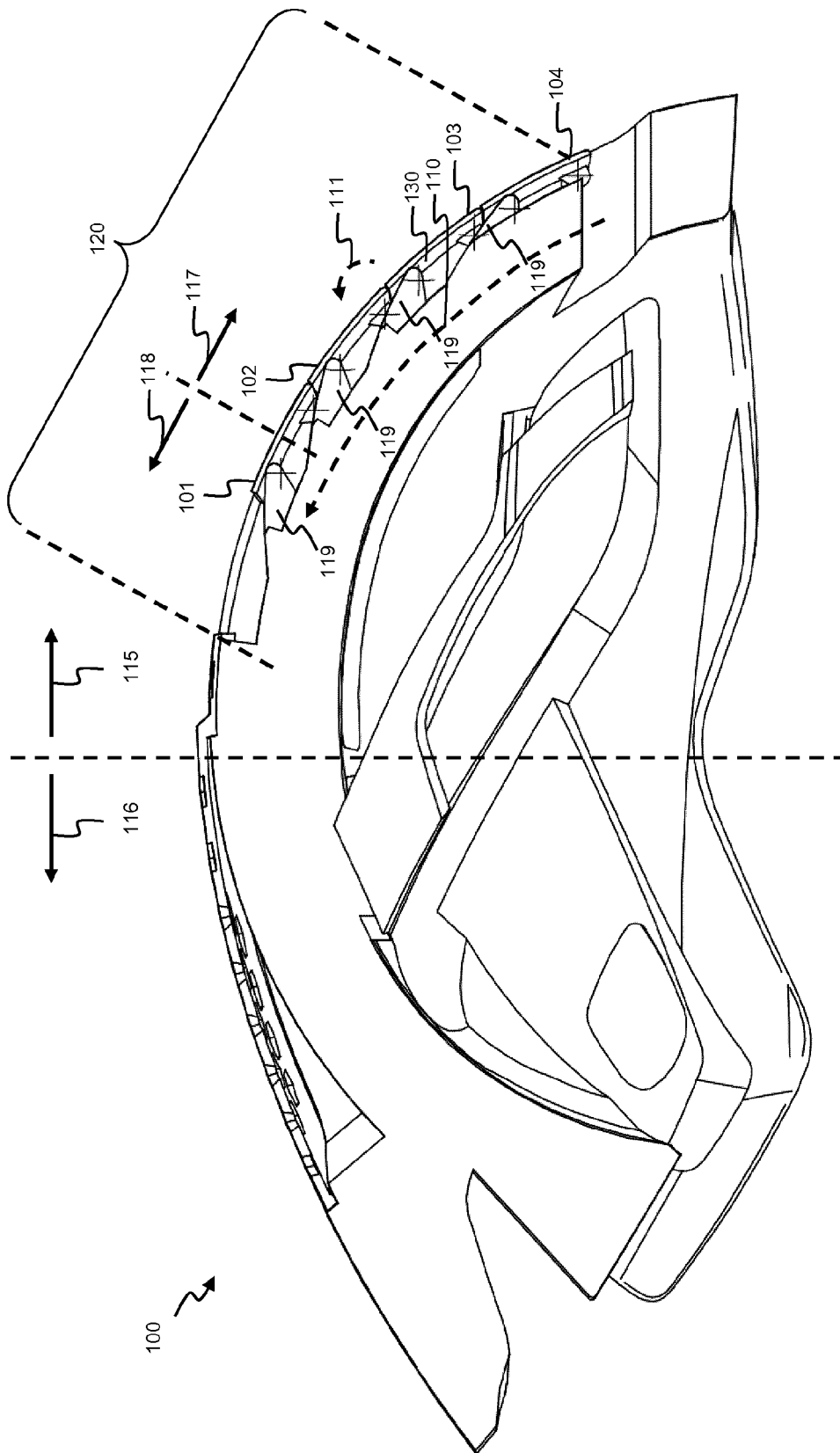


Fig. 1A

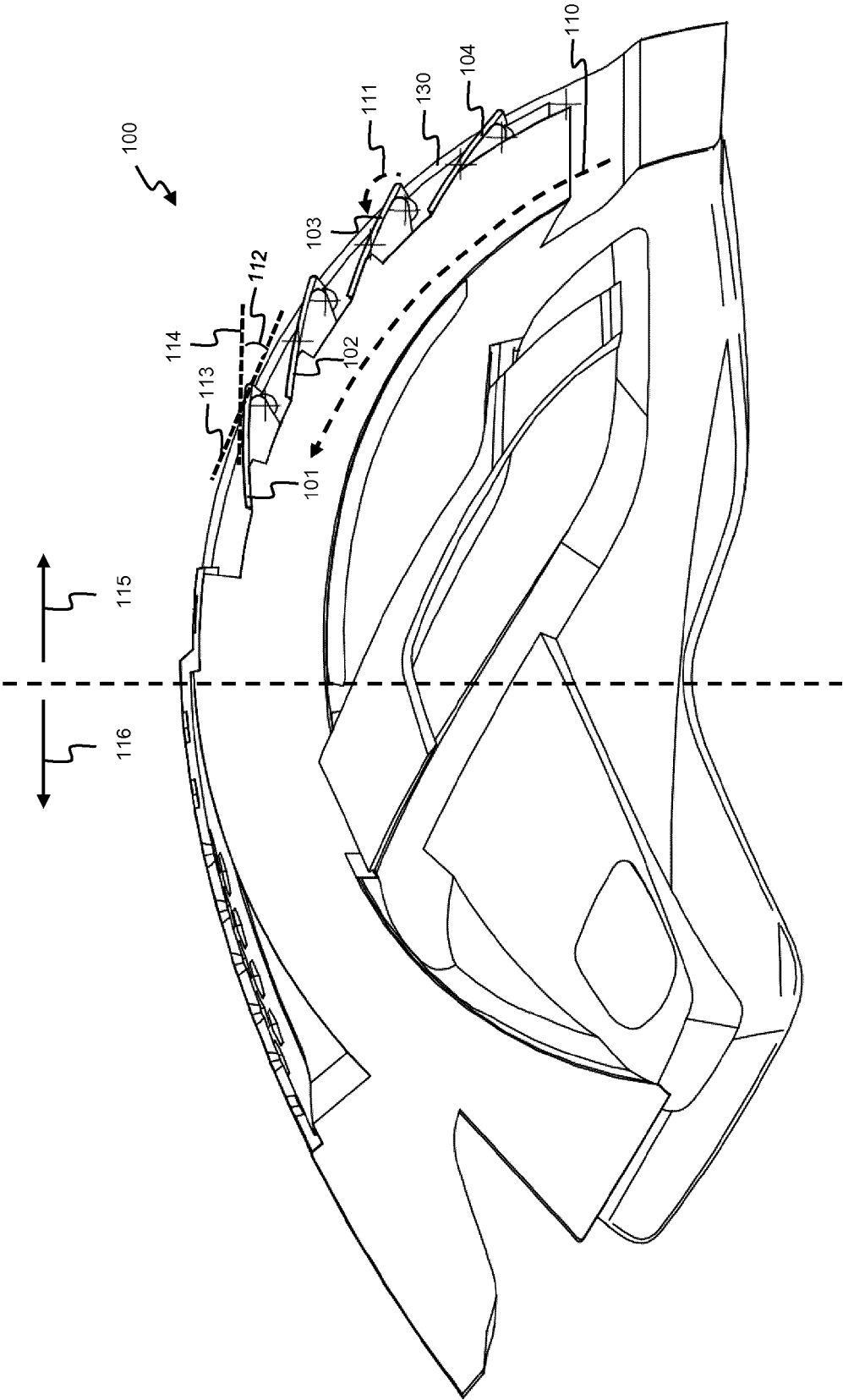


Fig. 1B

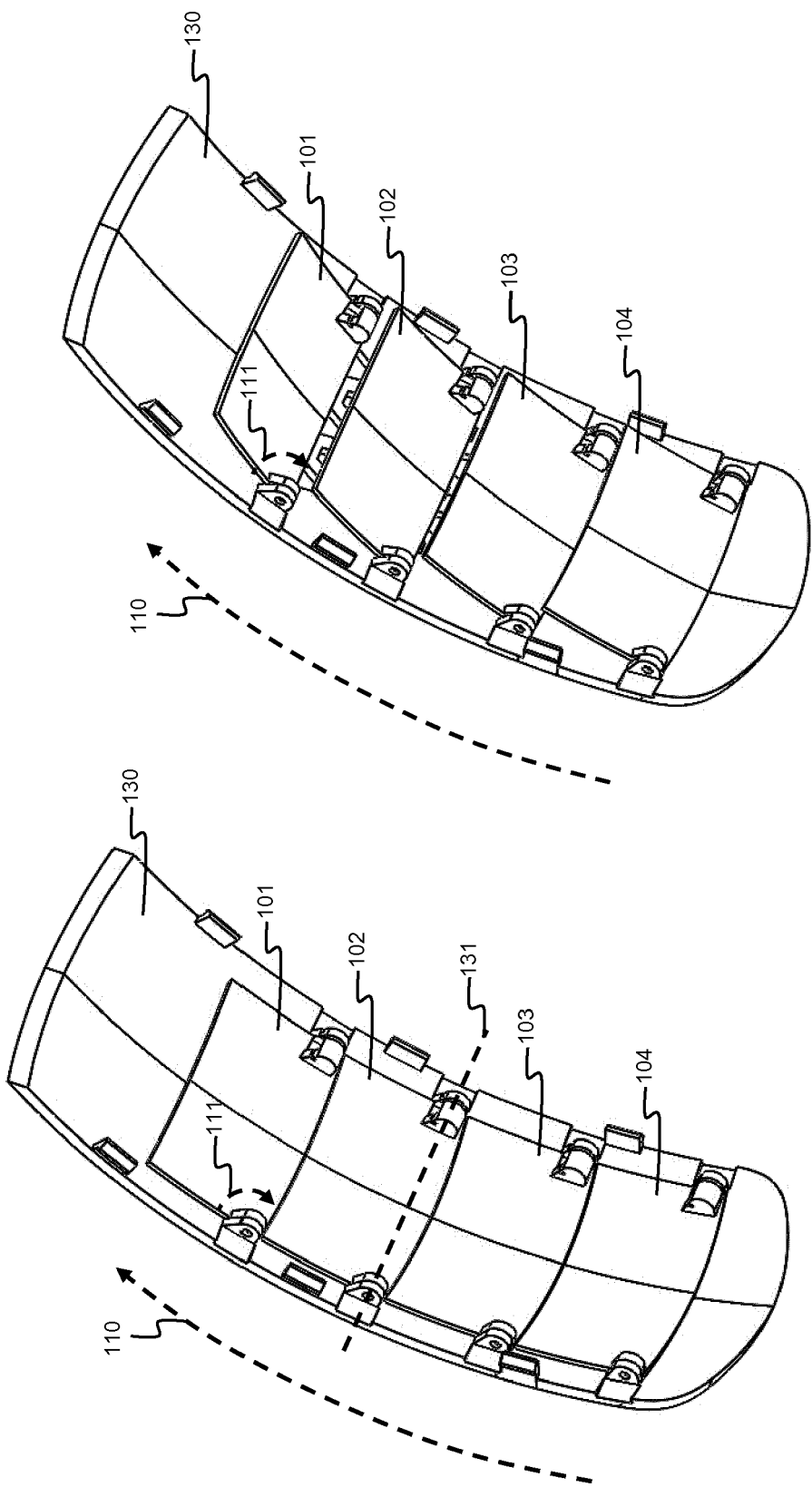


Fig. 2B

Fig. 2A

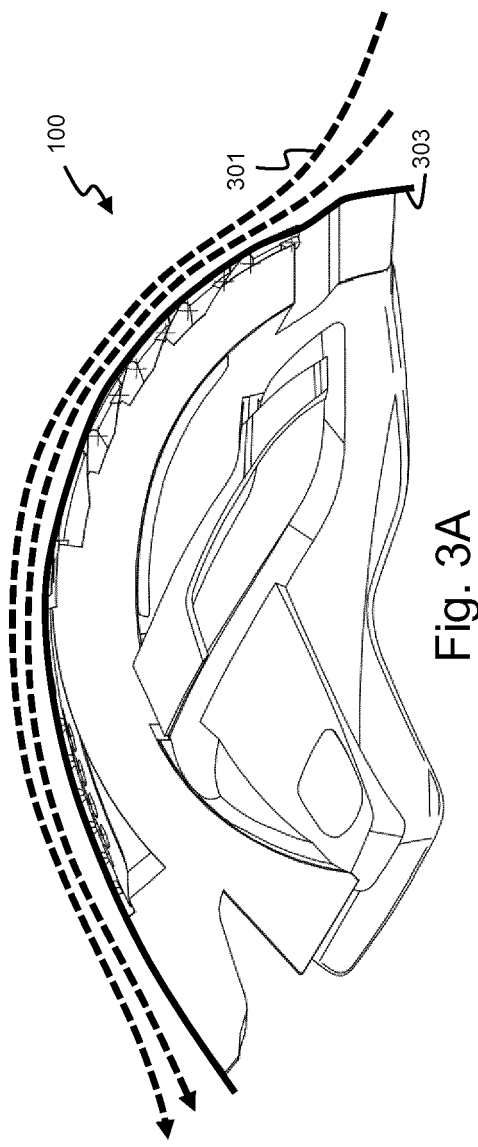


Fig. 3A

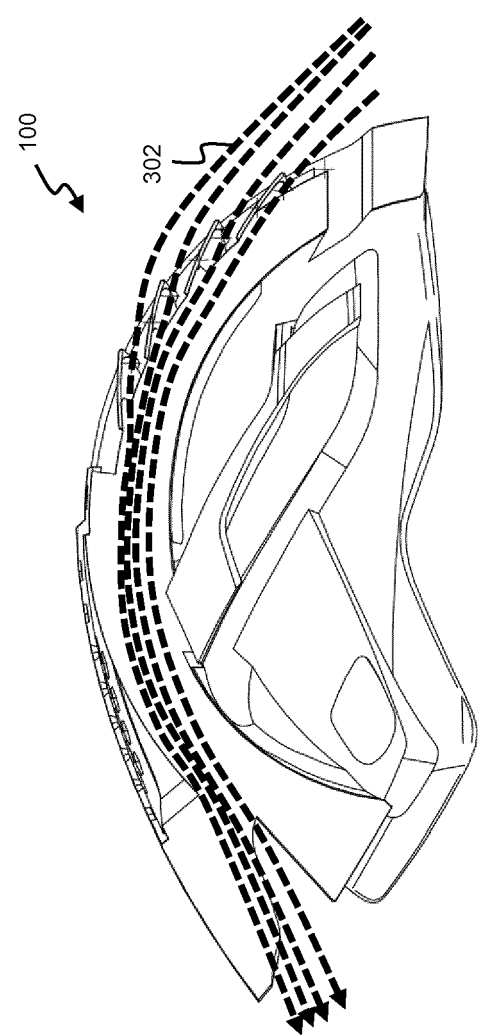


Fig. 3B

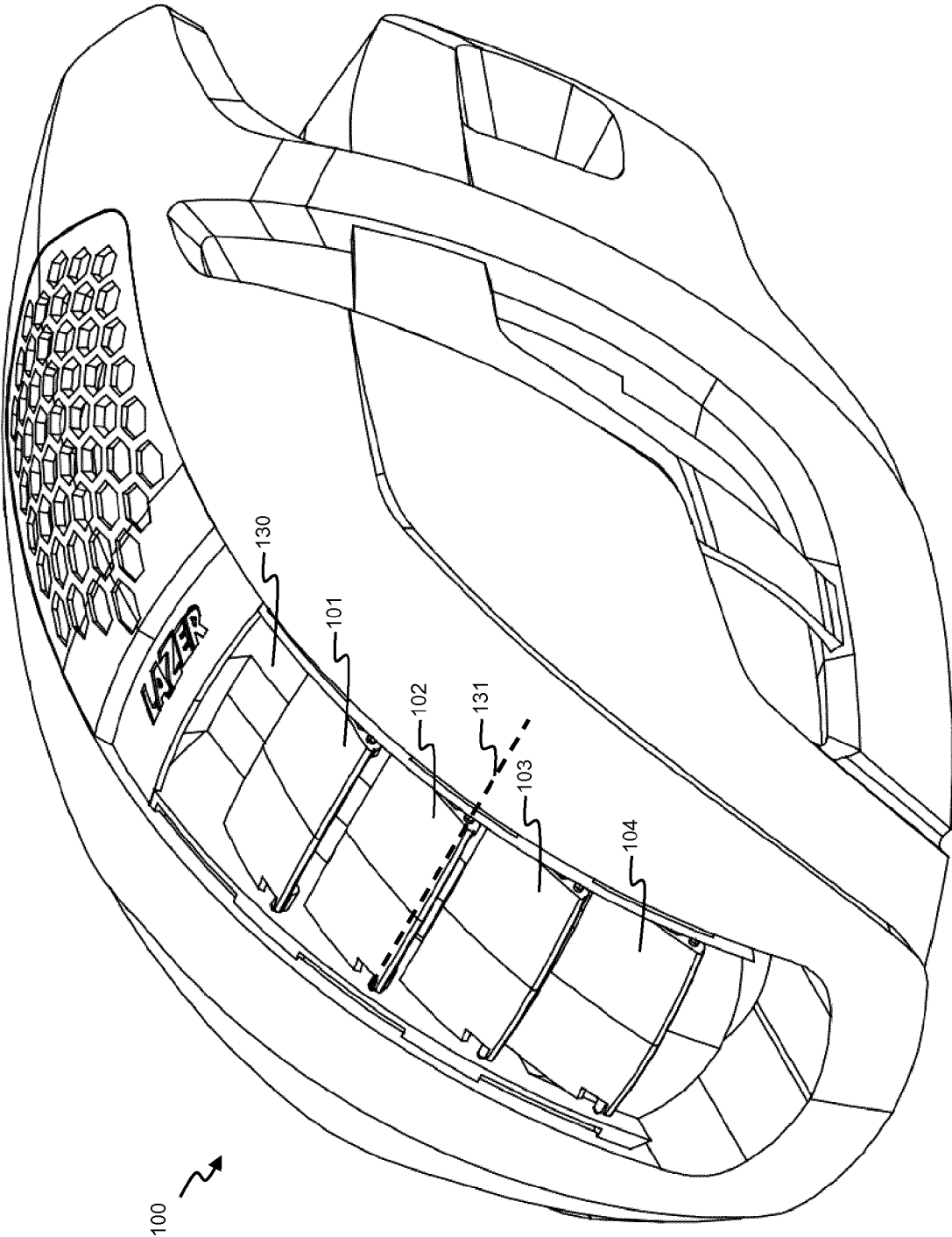


Fig. 4

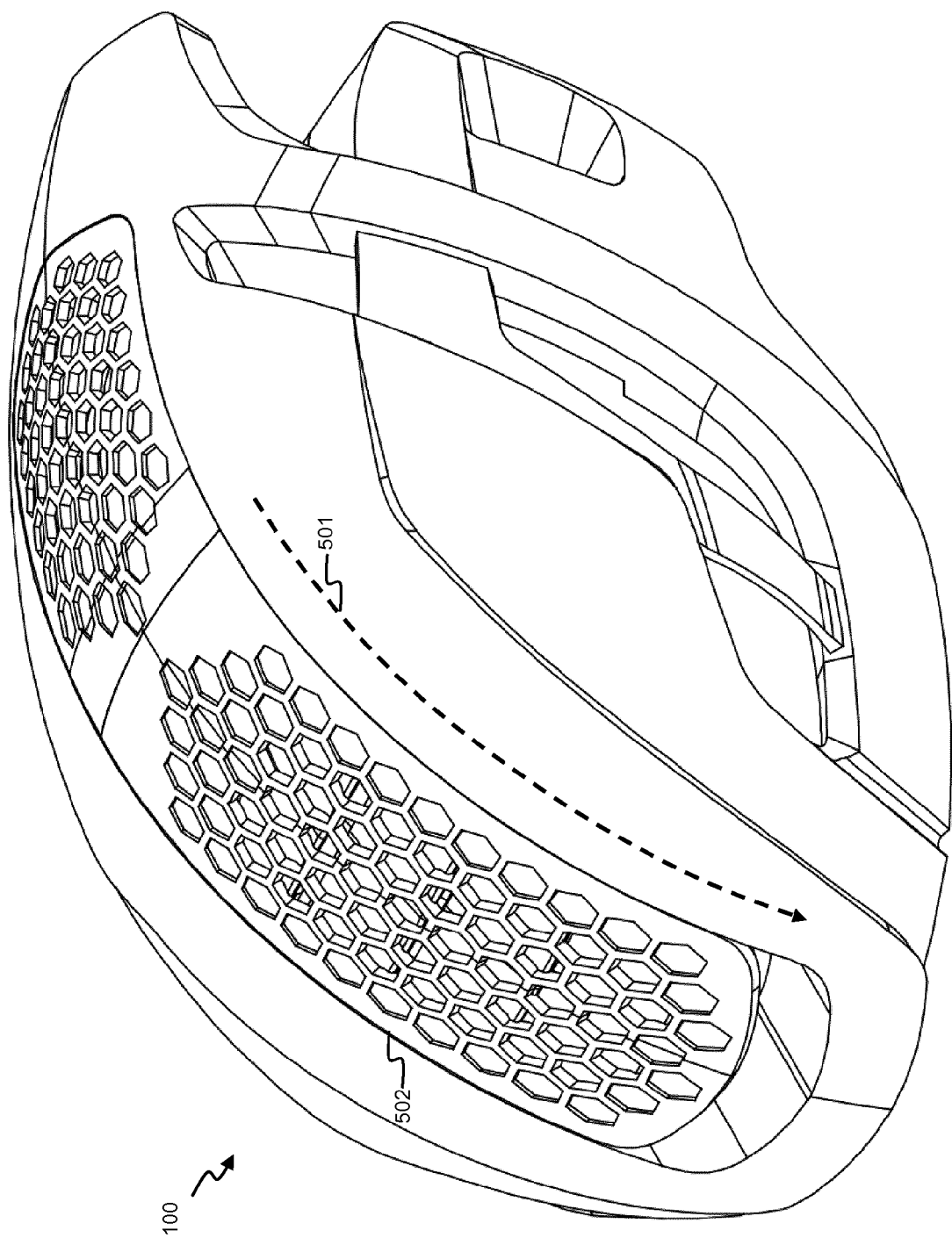


Fig. 5

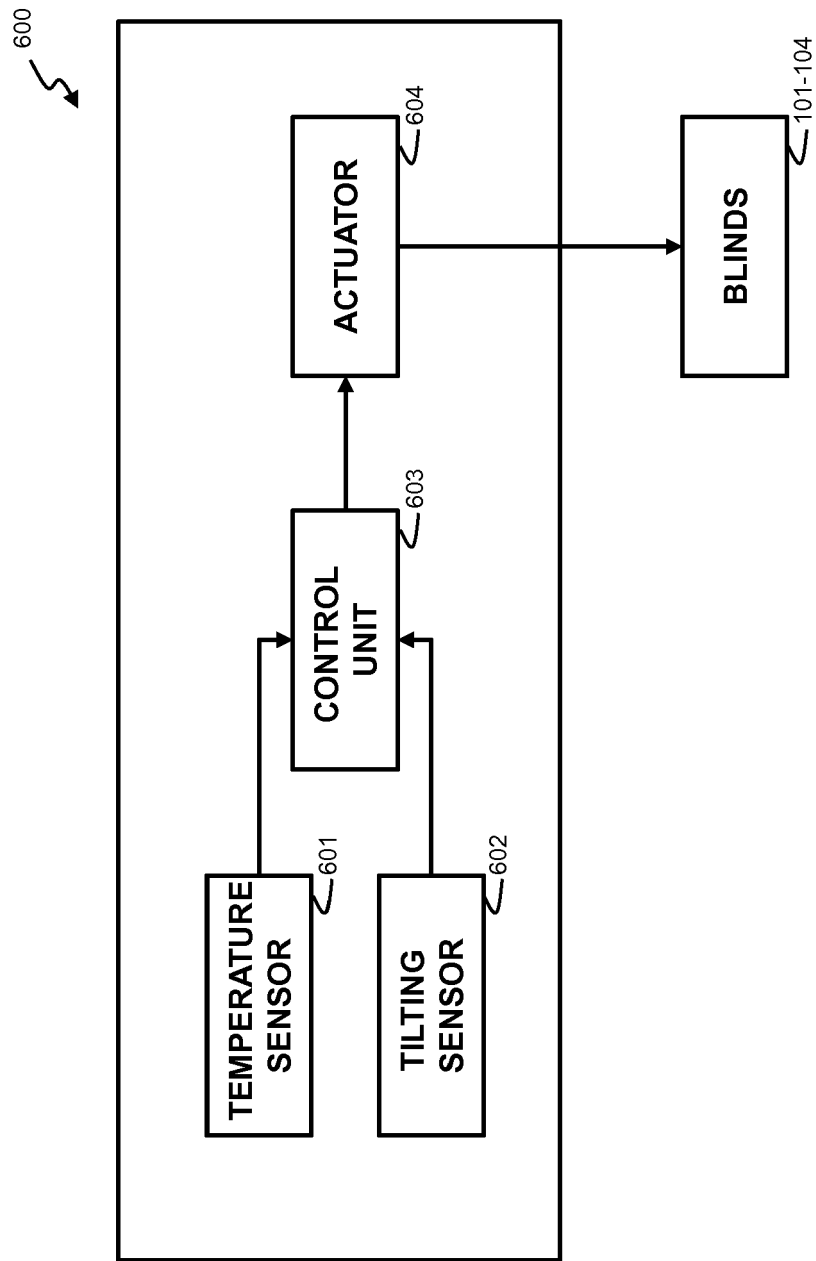


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 16 17 8832

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 January 2017	Examiner Guisan, Thierry
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EP 16 17 8832

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82