(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 May 2016 (26.05.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/079606 A1

(51) International Patent Classification:
A42B 3/28 (2006.01) *A42B 3/04* (2006.01)
A62B 23/02 (2006.01)

(21) International Application Number:
PCT/IB2015/054619

(22) International Filing Date:
19 June 2015 (19.06.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
5815/CHE/2014 19 November 2014 (19.11.2014) IN

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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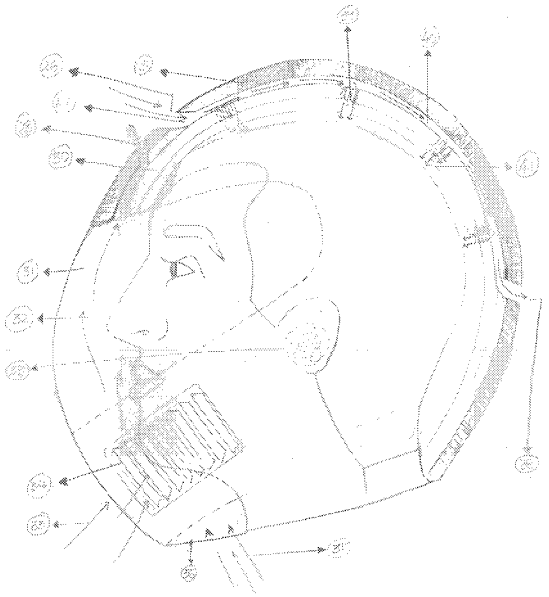
(54) Title: MOTORCYCLE HELMET WITH INBUILT AIR FILTRATION SYSTEM

FIG.5



(57) Abstract: This invention is about a motorcycle helmet which not only safeguards the user against the head injury but comes along with built in air filtration system designed to filter the air inhaled by the motorcycle user from fine dust particles due to various sources mainly through soil, toxic fumes like Carbon monoxide, Nitric oxides, etc. produced from the vehicular pollution, which has been major cause for various respiratory disorders, facial dermatological disorders such as acne etc., eye infection, Hair loss. The newly designed helmet incorporates an air filtration system which has a disposable filter membrane attached primarily along the bottom soffit of the helmet, along the chin arch of the helmet on either sides symmetrically placed which purifies the air pollutants. Also ingressed air from the front filters is expelled out through the top vent near the forehead portion of the helmet thus ensuring proper air exchange to the helmet user and also air inlet vent with filter at forehead portion of the helmet is placed and air outlet vent is provided at the back head portion of the helmet for filtered air exchange in the scalp and hair, which resolves sweat issue problem. As well as Polaroid glass fiber made visor is fitted as visor to the helmet which protects against harmful UV rays and also provides clear vision with visor during night driving. As well near the ear portion of the helmet adequate sound apertures are provided for proper audibility of sound.

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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

TITLE

Motorcycle Helmet with Inbuilt Air Filtration System

FIELD OF INVENTION

The present invention relates to a safety helmet with a specified air filtration system, more specifically with respect to motorcycle helmets.

BACKGROUND OF THE INVENTION

The present invention relates to a new design combination of motorcycle safety helmet and air filtration system specifically for providing filtered air to the user.

Studies shows that air pollution is a major problem to the Environment and public health in developing countries and is also accounted as a contributing factor for heart stroke, heart diseases, lung cancer, and both chronic and acute respiratory diseases, including asthma [W.H.O March-2014]. Most of the Indian cities are experiencing rapid urbanization and majority of the country's population is expected to be living in the cities in the next two decades [journal by Jerad D Lid]. It also resulted in tremendous increase in the number of motor vehicles and other automobiles thus becoming the main source of air pollution on the roads thereby making the air unfit for breathing for road users. In 2011 in India reported 141.8 million registered motorcycles [Source: Road Transport Year book 2012]. An increase of ~ 10-12% in motorcycles usage every year is observed.

According to the Road Transport Year Book 2012, the majority of the vehicles being used in India are two wheelers which was recorded as 71.8%

Prolonged human exposure to solar UV radiation will result in acute and chronic health effects on the skin, eye and immune system. Also prolonged exposure of UV-rays mainly causes serious damage to eyes leading to cataract etc. Increased number of sunburn cases and increased skin pigmentation and acne problems are being registered from the vehicle users [W.H.O article].

The existing motorcycle helmets are mainly designed for safety against head injury during the road accidents and it does not provide any protection against the inhalation of dust particles, air pollutants nor against the UV rays. Motorcycle users has resorted to use non-integrated respirators such as masks, handkerchief etc. that are not comfortable to wear, carry and during high temperatures results in sweating which makes the usage of masks uncomfortable. Also most of the existing helmets have no provision for proper air circulation in the scalp region which results in sweat, as well for some of the users this is leading to hair loss due to which motorcycle users are forced to avoid usage of helmet. The regular helmet makes it difficult for breathing as there are no proper outlets for the ingressed air to escape, this results in suffocation of user when the vehicle is at halt near

traffic singles etc. due to which the user opens the visor there by exposing himself to the air pollution which is at its peak at traffic signal as vehicles tend to release more pollutants during the start of vehicle when the signal is free to move.

There by a need exists for a motorcycle safety helmet not just safe against the head injury but also safety against the air pollutants on roads, which will protect the motorcycle user from inhalation of hazardous pollutants.

OBJECT OF INVENTION

The object of the present invention is to provide a two-wheeler safety helmet which protects against head injury and also protects against inhalation of hazardous air pollutants on the road, with the help of an air filtration mechanism used in the safety helmet.

SUMMARY OF THE PRESENT INVENTION

The present invention describes a helmet which consists of a chin air filtering arrangement arranged along a chin arc region of the helmet, and the chin arc filtering arrangement further comprises a chin air inlet, an air control grid to control air flow into the chin air inlet and a chin air filtering membrane to filter the air flowing into the helmet. The chin arc region of the helmet is defined by the region of the helmet adjacent to a chin of a wearer when the wearer wears the helmet.

In one of the embodiments, the chin air filtering arrangement is in plurality and placed in symmetry along the chin arc region of the helmet. The chin air filtering arrangement comprises a detachable fiber mesh, such that to place the chin air filtering membrane between the detachable fiber mesh and the chin air inlet. The detachable fiber mesh is adapted to be detached from the chin air filtering arrangement to replace the chin air filtering membrane upon the desired level of usage i.e. once the filter clogs.

In another embodiments of the invention, a primary neck air filtering membrane, an elastic mesh membrane and a Velcro arrangement is present, such that the primary neck membrane is supported with the elastic mesh membrane, and the elastic membrane seals between a bottom soffit of the helmet and periphery of the neck with the Velcro arrangement all along perimeter of the helmet with an elastic band. This ensures that the air entering into the helmet from the bottom is passed through the membrane only.

In a further embodiment, the helmet comprises a scalp region inlet with air filter which supplies pollution free air to scalp region, and a scalp region outlet located in a top region of the helmet, such that the location of the inlet and outlet on the helmet is closer to scalp of a wearer when the helmet is borne; and the scalp region inlet allows flow of air into the

helmet to the scalp region when the helmet is borne and the scalp region outlet allows flow air out of the helmet.

In yet another embodiment, the helmet comprises pores in a liner of the helmet, and the liner is adapted to cover the scalp region when the helmet is borne and the pores allows circulation of air to the scalp region when the helmet is borne. It also comprises a rare vent placed in a back region of the helmet near to scalp ending and neck beginning when the helmet is borne and adapted to send out the air from the scalp area by ensuring proper air exchange to the helmet user.

Another embodiment of the helmet comprises a Polaroid visor to cover eye area of the wearer when the helmet is borne, which helps the user protection against UV rays, Clear night vision. It also consists of a slit opening near the ear region on the helmet which allows clear sound audibility to the helmet user when the helmet is borne.

In yet another embodiment, the primary neck filtering membrane is replaceable and placed at top of the elastic mesh membrane. The shape of the primary neck filtering membrane is such that it follows the profile of the helmet bottom portion ensuring that there is no free air gap left for pollutants to escape from the primary neck filtering membrane. The primary neck filtering membrane is in two pieces and symmetrically placed on either side of the elastic mesh membrane, and is disposable.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 Front view of the helmet showing an air inlet vent, exhaust vent at top of the visor and air inlet apertures with filter at the chin arch region symmetrically placed.

Fig.2 Rear view of helmet showing exhaust vents.

Fig.3 Detail isometric view of the air filter system (with grids, air filter, mesh) at chin arch position.

Fig.4 Bottom view of the helmet with detail depiction of air filter membrane arrangement at bottom of helmet.

Fig.5 Longitudinal section of the helmet showing air circulation depiction within the helmet.

Fig.6 Shows the sound audibility provision near the ear region.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Present invention has come up with a combination of motorcycle safety helmet with inbuilt air filtration system. The significance about this invention is that the air filtration apertures are incorporated within the helmet unlike the non integrated conventional masks. When the helmet visor is closed the air supply and exchange of the air to the user is primarily received from the bottom of the helmet i.e. from the gap between the chin portion and inner face of the helmet. Additionally in the newly designed helmet two symmetrically placed air inlet provision is made near the chin arch portion of the helmet for air ingression, even when the visor is closed. The air filter membrane is attached along lower rim of the helmet covering the gap between the helmet inner face and the neck portion with an elastic material which forms a seal around the neck thus ensuring that the air passing through the bottom of the helmet is passed through the filter media, as well as the air filter is placed in the air inlet apertures near the chin arch portion thus ensuring the filtered air supply to the helmet user while driving on roads. The other embodiment of the present invention is few more air vents are arranged at fore head of the helmet, which allows ingressed air from bottom and chin arch filters to escape from the top air vent thus ensuring proper air exchange. Also air inlet vent with filter at forehead portion of the helmet is placed and air outlet vent is provided at the rear end of the helmet for the filtered air exchange in the scalp and hair. Polaroid glass fiber made visor is fitted as visor to the helmet which protects against harmful UV rays and also provides clear vision with visor during night driving. As well near the ear portion of the helmet adequate sound apertures are provided for proper audibility of sound.

The primary objective of the present invention is to provide a safety helmet which just not only provides safety against head injury during an accident but also performs a safety tool against the air pollution which is a major cause for several respiratory disorders.

The foregoing other objectives, features and advantages of the present invention will be more readily understood upon consideration of the following detailed description of the invention taken in conjunction with detailed figures.

Fig.1 shows the front view of the present proposed helmet. Two air filter arrangements are incorporated on either side of the helmet symmetrically placed along the chin arch region. These apertures (air inlets) have front air control fiber vertical grids through which the volume of air to be ingressed into the helmet can be controlled by adjusting the grids which revolves along vertical plane of axis (4). Sufficient size of opening is provided to ensure adequate and comfortable air inflow is ensured to user through the filter system. A super-vent with air filter is provided at the top front region (1) for air flow in the top head scalp region which also has air control grids which can control the volume of air inflow. The air filter provided to the air inlet (1) helps the no polluted air to scalp portion which helps to prevent the hair loss due to air pollution and sweat. The

helmet visor is made of unbreakable Polaroid glass fiber (3). This Polaroid glass protects the eye and skin pigmentation from UV rays as well it provides clear vision during night driving without the visor being raised otherwise the air filter system doesn't work as the air from the visor portion is not a filtered air. The air outlet (2) is provided to have a proper air exchange i.e the air entered from the bottom of the helmet and through chin arch filters is exited through the fore head vent (2).

Fig 2 shows rear view of helmet with two exhaust (5) vents through which the air ingressed from super vent (4) is exited. The philosophy behind the air inlet to the scalp region and exit works by forced air principle i.e the inlet is X area of opening (4) and the outlet is 1/2X (5). By having such two opening sizes the scalp region has proper filtered air supply throughout. A metal mesh type design is used at vents. When viewed diagonally the air filter membrane along the chin arch region (6) is seen. The filter along the bottom side of the helmet (7) is

Shown in the dotted line Fig 3 shows detail isometric description of the air filter system integrated into the helmet chin arch region. The air control vertical fiber grids (12) rotate along the vertical axis (13). The air flow volume is controlled by the vertical grids (12) by rotating the grids along vertical axis (13). Behind this grid a fiber mesh grid support (11) is placed to support the air filter membrane (10). The disposable air filter membrane (10) filters the dust particles and the air pollutants (carbon monoxide, Nitroxides, other vehicular pollutants) making the air fit to breathe. A similar fiber mesh (11) grid support (9) is placed behind this air filter membrane to support the filter from being disturbed from the air pressure which it is subjected to during the vehicular movement. This mesh (9) is slid along the vertical slot provided (14). This mesh (9) acts as a support to the air filter, also provides disposable air filter membrane exchange.

Figure 4 shows the bottom of the present proposed helmet. The primary air filter membrane is placed at the bottom of the helmet as primarily the air supply to the helmet user is from the bottom of the helmet. A detachable elastic membrane mesh (21) attached along the lower rim of the helmet such that it forms a complete seal between the neck portion (23) and the inner face of the helmet. The lower rim of the helmet has a Velcro arrangement by which the elastic supporting membrane to the filter is easily detachable so that the inner filters can be replaced with ease. This kind of arrangement also allows the existing helmets to attach the bottom filter with ease. On top of the elastic mesh (21) the air filter membrane (15) is attached in two parts by means of Velcro (20). Thus the air passing through the air filter (15) provides pollution and dust free air to the motorcycle user. The air Filter membrane is a disposable filter i.e. why which a Velcro arrangement is made to detach the filter and easy provision for changing the air filter (15) is made. The outer layer of the air filter extends to the entire region of the bottom of the helmet, whereas the inner membrane extends only up to half of the region. The inner filter membrane is made into two partitions (15). The division between these two parts is

shown in the figure (16). This figure also clearly shows the outer shell (17), inner shell (19), the helmet inner cushion (18).

Figure 5 demonstrates the filtered air flow pattern from the air filters (36,34). The air passes through the vertical grids (35), then passes through the mesh and then through the air filter (34) and exits from air outlet (28). The air passing (37) through the filter membrane (36) provided at the bottom of the helmet exits from air outlet (28) partly and excess air revered from the same entry (37). The air gets filtered as it passes through the filter membrane and gets purified making it safe to breathe to the user. Proper space is provided between the grid and the face to allow this action. The exhaled air (32) moves up and moves out through the air hose provided above the visor

An air inlet vent (26) with air filter is provided in the fore head region of the helmet and a air outlet rare event (38) at the back through which the air escapes. The apertures sizes are designed such a way that the front end air inlet opening size is twice the outlet. The apertures are so designed that the air passes the super vent along the space between the inner shell of the helmet and the liner which has Pores (39) through which the air is evenly spread in the scalp region of the helmet. This avoids the sweat formation and helps to prevent hair loss to the users having hair loss issue due to sweat and also makes user comfortable.

Figure 6.0 shows the side view of the helmet, a super vent (42), air exhaust (43), rare vent (45) and ear holes (44). The ear holes are provided to make the external sounds (horns) audible to the wearer. These provisions are made near the ear region on either side of the helmet. This provision has 3 slits and a mesh beneath. The splits allow the external sounds audible (it is important as most of the conventional helmets seal the ear portion making the external sound un-audible). The mesh is also attached with dust filter.

CLAIMS:

1. A helmet comprising:
   - a chin air filtering arrangement arranged along a chin arc region of the helmet, wherein the chin arc filtering arrangement further comprises a chin air inlet, an air control grid to control air flow into the chin air inlet and a chin air filtering membrane to filter the air flowing into the helmet
   - Wherein the chin arc region of the helmet is defined by the region of the helmet adjacent to a chin of a wearer when the wearer wears the helmet.

2. The helmet according to claim 1, wherein the chin air filtering arrangement is in plurality and placed in symmetry along the chin arc region of the helmet.

3. The helmet according to any of the claims 1 or 2, wherein the chin air filtering arrangement comprising a detachable fiber mesh, such that to place the chin air filtering membrane between the detachable fiber mesh and the chin air inlet, the detachable fiber mesh adapted to be detached from the chin air filtering arrangement to replace the chin air filtering membrane.

4. The helmet according to any of the claims 1 to 3 comprising a primary neck air filtering membrane, an elastic mesh membrane and a Velcro arrangement, such that the primary neck membrane is supported with the elastic mesh membrane, the elastic membrane seals between a bottom soffit of the helmet and periphery of the neck with the Velcro arrangement all along perimeter of the helmet with an elastic band.

5. The helmet according to any of the claims 1 to 4 comprising a scalp region inlet with air filter and a scalp region outlet located in a top region of the helmet, such that the location of the inlet and outlet on the helmet is closer to scalp of a wearer when the helmet is borne, wherein the scalp region inlet allows flow of air into the helmet to the scalp region when the helmet is borne and the scalp region outlet allows flow air out of the helmet.

6. The helmet according to any of the claims 1 to 5 comprising pores in a liner of the helmet, wherein the liner is adapted to cover the scalp region when the helmet is borne and the pores allows circulation of air to the scalp region when the helmet is borne.

7. The helmet according to any of the claims 1 to 6 comprising a rare vent placed in a back region of the helmet near to scalp ending and neck beginning when the helmet is borne and adapted to flow out the air out of the scalp area.

8. The helmet according to the claims 1 to 7 comprising:
   - a polaroid visor to cover eyes area of the wearer when the helmet is borne,.

9. The helmet according to the claims 1 to 8 comprising:
   - a slit opening near the ear region on the helmet which allows clear sound audibility to the helmet user when the helmet is borne.

10. A chin air filtering membrane for a helmet, the chin air filtering membrane is adapted to be arranged along a chin arc region of the helmet and to filter the air flowing into the helmet, wherein the chin arc region of the helmet is defined by the region of the helmet adjacent to a chin of a wearer when the wearer wears the helmet.

11. A primary neck filtering membrane for a helmet, wherein the helmet comprises an elastic mesh membrane and a Velcro arrangement, the primary neck membrane is adapted to be placed in the helmet, such that the primary neck membrane is supported with the elastic mesh membrane, the elastic membrane seals between a bottom soffit of the helmet and periphery of the neck with the Velcro arrangement all along perimeter of the helmet with an elastic band.

12. The primary neck filtering membrane according to the claim 11, wherein the primary neck filtering membrane is replaceable and placed at top of the elastic mesh membrane.

13. The primary neck filtering membrane according to any of the claims 11 or 12, wherein shape of the primary neck filtering membrane is such that the neck filtering membrane follows profile of the helmet bottom portion ensuring that there is no free air gap left for pollutants to escape from the primary neck filtering membrane.

14. The primary neck filtering membrane according to any of the claims 11 to 13, wherein the primary neck filtering membrane is disposable

15. The primary neck filtering membrane according to any of the claims 11 to 14, wherein the primary neck filtering membrane is in two pieces and symmetrically placed on either side of the elastic mesh membrane.

FIG.1

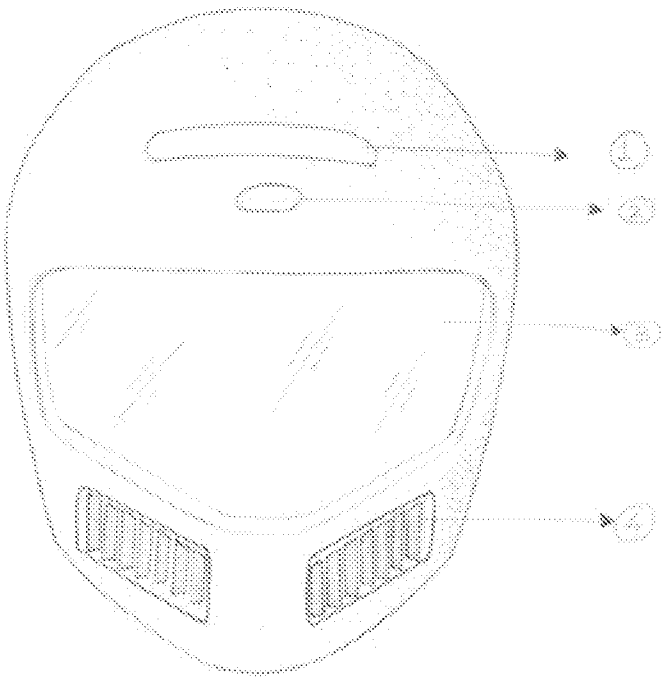


FIG. 2

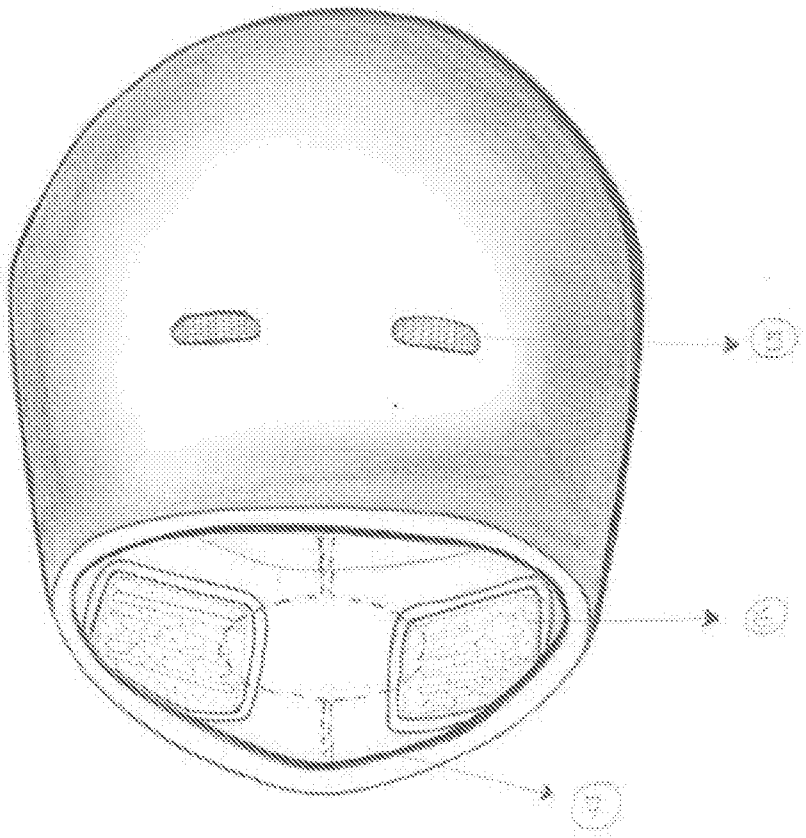


FIG. 3

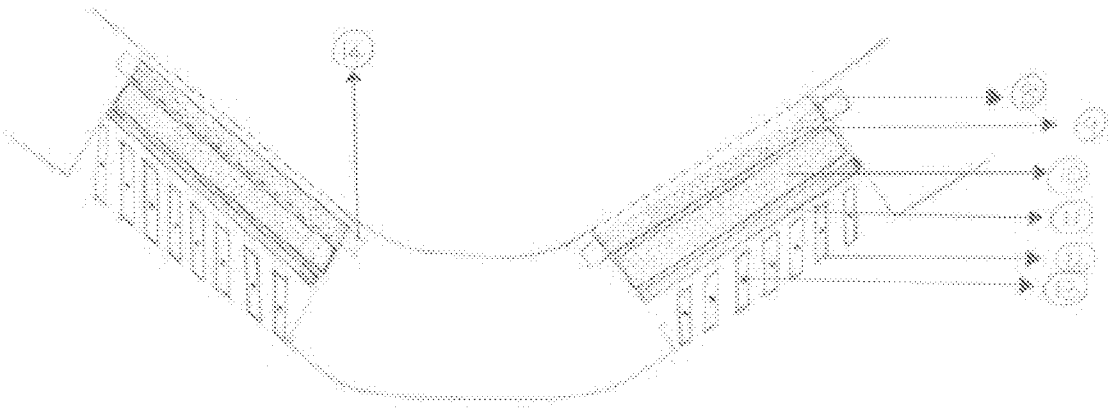


FIG. 4

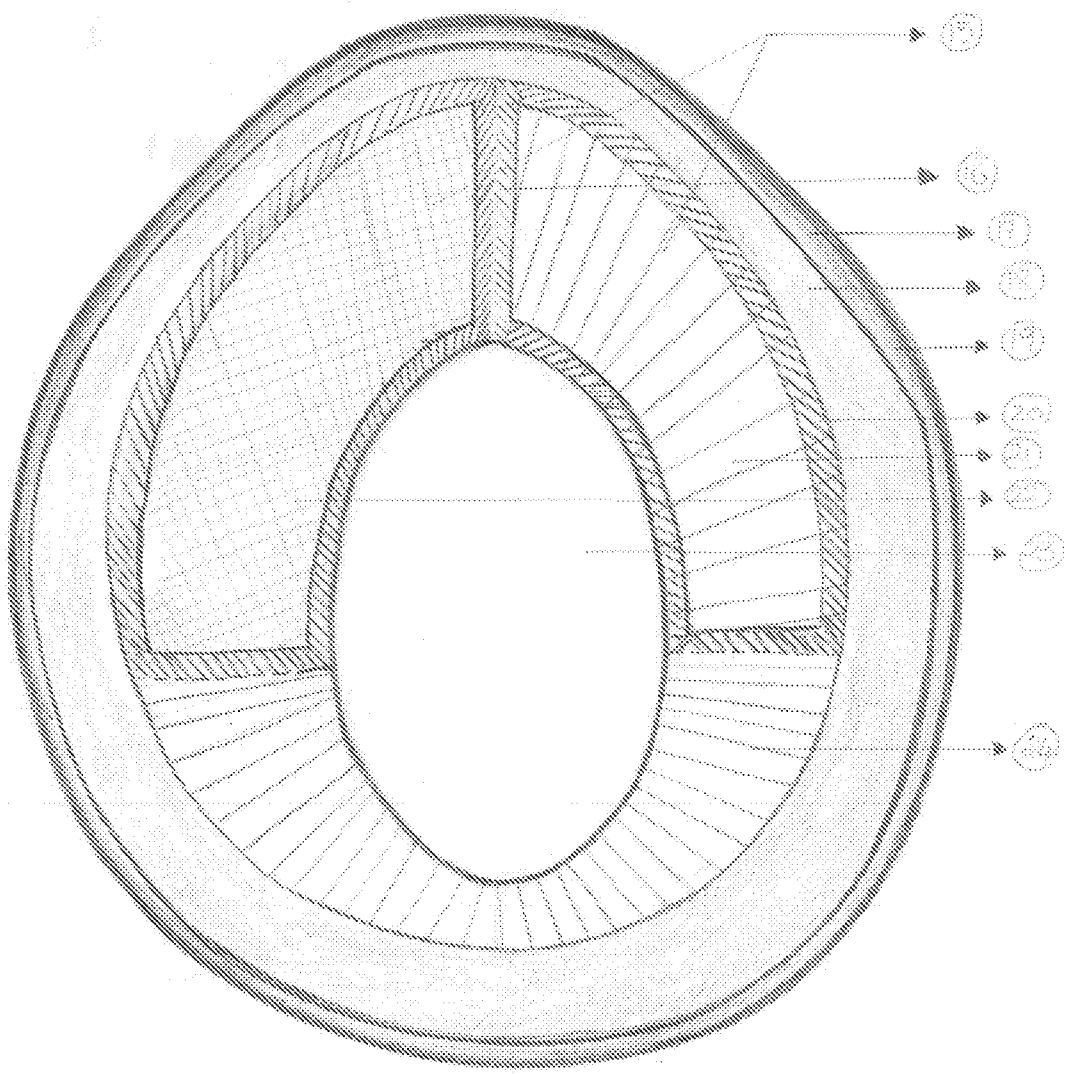


FIG.5

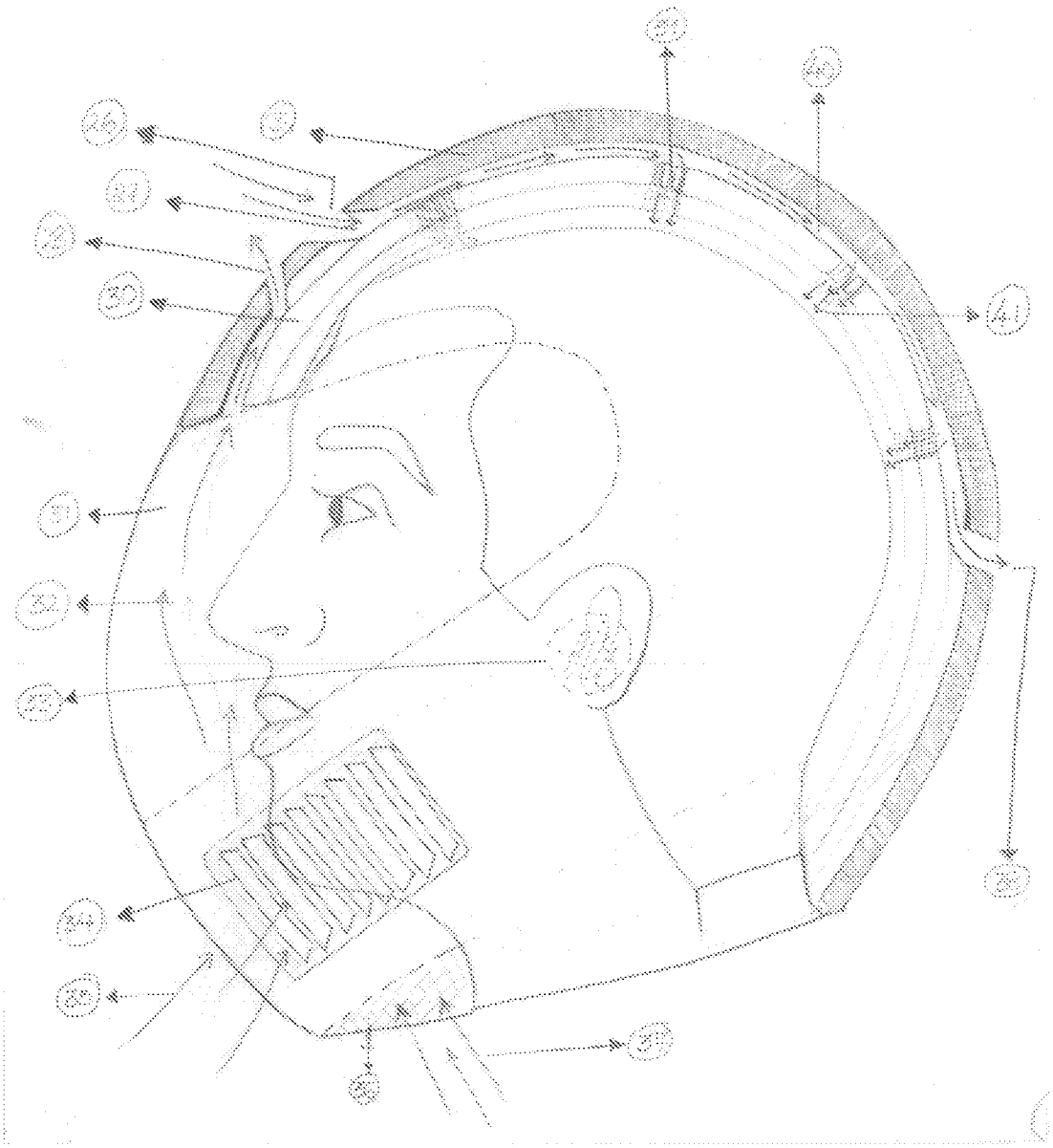
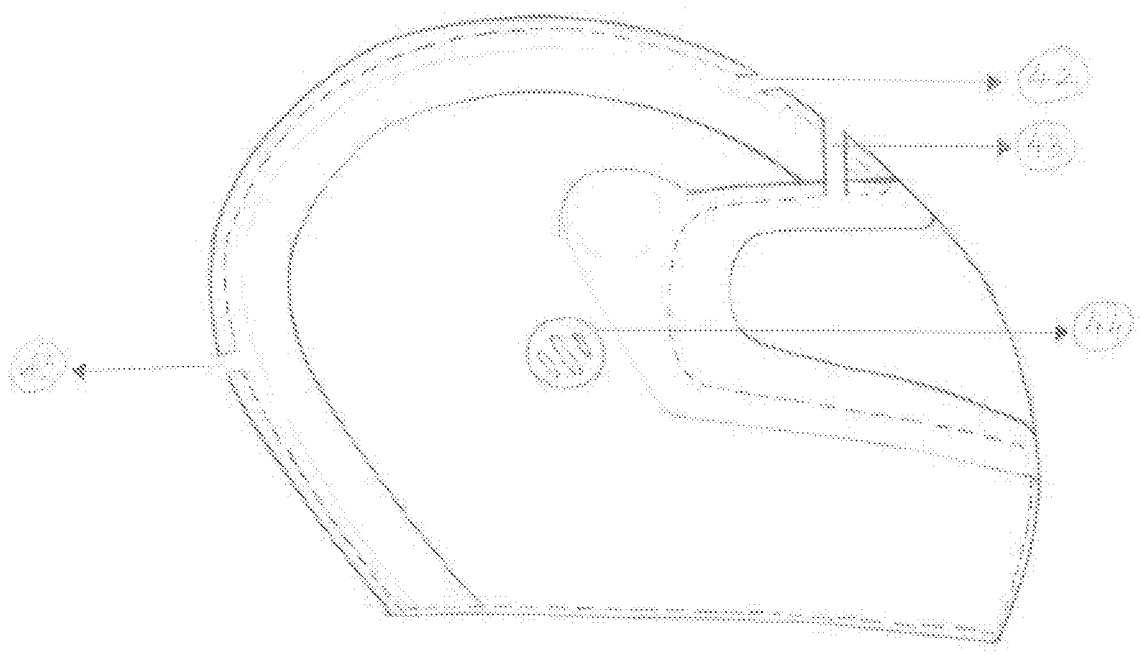


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2015/054619

A. CLASSIFICATION OF SUBJECT MATTER
A42B3/28,A62B23/02,A42B3/04 Version=2015.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A42B, A62B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

IPO Internal Database, PatSeer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE19633767 A1 (INES Sauthoff) February 26, 1998 & No family. Whole document	1, 3, 4, 8, 10-14
X	US20090014005 A1 (MACKINNON Stuart) January 15, 2009 & No family. Whole document	2, 15
X	US5139017 A (MACCLOUD Russell D.) August 18, 1992 & No family. Whole document	5-7
X	US3778844 A (Hori M. et al.) December 18, 1973 & No family. Whole document	9

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

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