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(71) Applicant: **OPTICOS S.r.l.**
24030 Brembate di Sopra (BG) (IT)

(72) Inventors:
- **Gafforio, Luca**
  24040 Comun Nuovo (BG) (IT)
- **Salvetti, Alberto**
  24124 Bergamo (BG) (IT)

(74) Representative: **Marietti, Andrea**
Marietti, Gislon e Trupiano S.r.l.
Via Larga, 16
20122 Milano (IT)

(54) Safety helmet with ventilation means

(57) There is described a safety helmet (1) comprising an outer shell (2) and at least one layer (3) of shock-absorbing material placed inside it, at least one inlet (4) obtained on the shell and passing at least therethrough, to fluidically connect the outer environment to the helmet inside, and one or more ventilation ducts (5) fluidically connected to the inlet and provided with one or more outflow holes (6) facing the inside of the helmet.

The helmet is characterized by comprising at least one padding layer (10) at least partially permeable to air, and substantially incompressible, or only partially compressible, for the air flow diffusion, and preferably the diffusion layer is arranged at least below the hole or holes of the ventilation ducts.

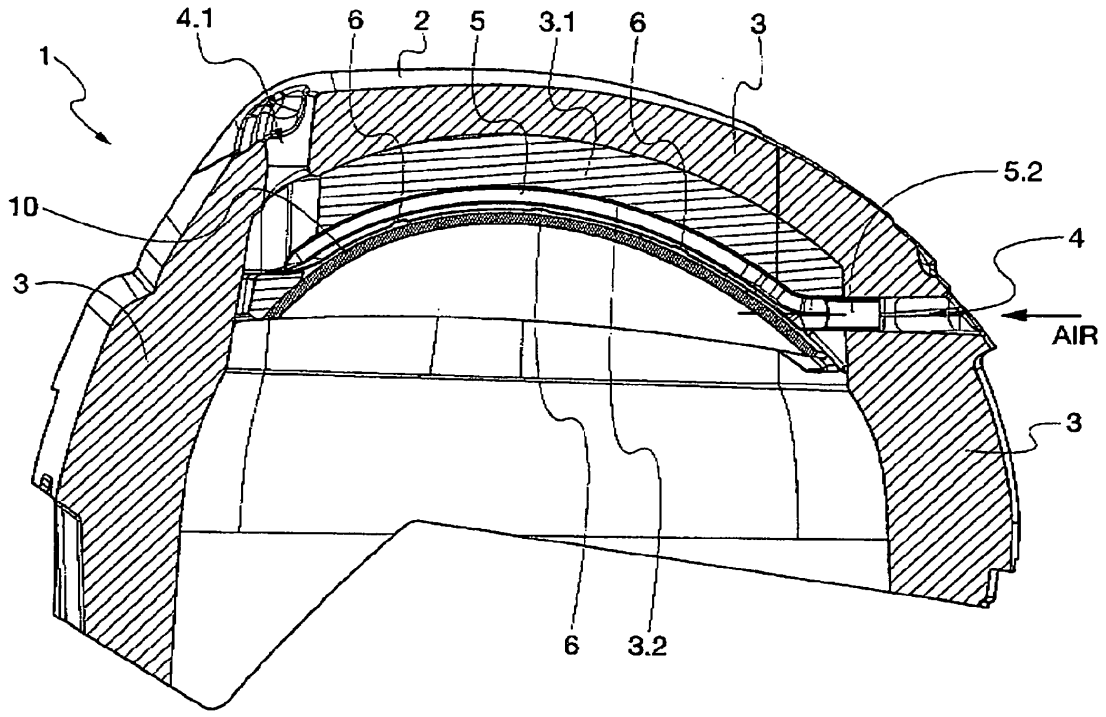

Fig. 1

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Description

[0001] The present invention relates to a safety helmet with ventilation means capable of enabling the passage of air in its inside to increase the user's comfort. Safety helmets, such as those used in the motorcycle and automobile sector, are formed by an outer shell, inserted inside which is a layer of shock-absorbing material capable of protecting the user's head in case of falls and, in general, in case of impact with surfaces, objects, etc.

[0002] Below the layer of shock-absorbing material, also so called protective layer, there is generally present a "comfort" layer, also called liner or inside padding, which prevents direct contact of the user's head with the protective layer, and therefore with the shock-absorbing material.

[0003] The material with which the protective layer is made, generally expanded polymer material (such as EPS), together with the materials constituting the comfort layer of the helmet, usually foam rubber covered with textile or textile in superimposed layers, do not offer good levels of breathability, substantially causing retention of the heat and moisture generated inside the helmet by the user.

[0004] Consequently, the heat and moisture present inside the helmet are not optimally dissipated and, above all in summer months, the user's comfort decreases considerably, with the uncomfortable perception of increased temperature and moisture inside the helmet.

[0005] For these reasons, helmets currently used in the motorcycle sector have been provided with apertures to aid the passage of outer air towards the inside of the helmet, and to thus improve dissipation of the heat and moisture that are generated inside it.

[0006] Generally, these apertures are obtained on the outer shell in a frontal position, for example in the area above the visor, or laterally thereto, and, according to a solution known in the art, through a related hole extend to the inside of the shell, and if necessary to the inside of the layer of shock-absorbing material, to allow inflowing air to reach, through the aforesaid comfort layer, the user's head. For example, GB-A-1456824, by the applicant Everitt W. Vero & Co. Ltd., describes a similar helmet, provided with apertures positioned laterally to the visor opening of the helmet.

[0007] These apertures and related holes are capable of improving lowering of the temperature only in a limited manner.

[0008] In fact, on the one hand it is clear that by means of these holes passing inside the shell and, if necessary, through the layer of protective material, the air coming from outside is only able to reach limited parts of the user's head, i.e. those positioned at these holes. On the other hand, diffusion of the air towards the user's head is limited by the comfort layer inside the helmet.

[0009] Obviously, the number of apertures that can be obtained in the shell must be limited to prevent structural weakening of the safety helmet, and therefore, according to another prior art solution, there is only one aperture for inflow of air, which is connected to channels obtained directly in the layer of shock-absorbing material, and therefore the air entering through the front inlet can be diffused by the aforesaid channels, in such a manner as to reach different areas of the user's head. For example, EP-A-0571065 by the applicant Shoei describes a solution of this kind.

[0010] Despite the presence of the aforesaid channels, provided with appropriate apertures for outflow of the air into the safety helmet, the efficacy of the air distribution is not high; in fact, there is the risk of the channels becoming obstructed by the comfort layer, adhering to the layer of shock-absorbing material, following contact with the user's head.

[0011] To further improve ventilation inside the helmet, air distribution ducts have been produced therein; these ducts, connected to an inlet in connection with the outer environment, extend in the shock-absorbing layer, or thereunder, and are provided with a plurality of holes arranged in such a manner as to reach different areas of the user's head.

[0012] A ventilation system of this type is adopted inside the helmet described in US 4,519,099 by the applicant Honda, in which a duct made of elastic material is arranged between the layer of shock-absorbing material and the comfort layer which is intended to come into contact with the user's head. The ventilation duct is connected to the outer environment through a front inlet and a rear vent. Along the duct there are some holes facing the inside of the helmet, positioned in such a manner as to be aligned with corresponding holes obtained in the comfort layer.

[0013] This solution has some disadvantages.

[0014] In fact, the outflow holes of the ducts must be perfectly aligned with the corresponding holes positioned on the comfort layer, to prevent obstructing the air flow.

[0015] In the second place, when the user is wearing the helmet, the presence of the user's head causes compression of the comfort layer, and in particular of the related textile and/or foam rubber, in proximity of the holes provided in the duct, thus preventing correct distribution of the flow of air coming out from them, which therefore remains confined to a relatively limited area, at the hole, without supplying the desired ventilation inside the helmet and dissipation of the heat generated.

[0016] In fact, air is prevented from coming out from the holes by the presence of the comfort layer, and by the user's head which causes compression thereof in proximity of these holes, so that the air cannot be effectively distributed to reach an extensive area of the user's head.

[0017] The object of the present invention is to provide a helmet with improved ventilation inside, wherein the air can reach a particularly extensive area of the user's head.

[0018] In particular, the object of the present invention is to enable greater diffusion and distribution of the air coming out from the holes of the ventilation ducts in order

to increase the helmet's wearing comfort, increasing dissipation of the heat generated inside.

[0019] These and other objects are achieved by the safety helmet according to the independent claim 1; other detailed features are presented in the dependent claims.

[0020] The safety helmet according to the present invention comprises an outer shell and at least one layer of shock-absorbing material placed inside the shell, at least one inlet obtained in the shell and passing at least through it to fluidically connect the outer environment with the helmet inside, and one or more ventilation ducts fluidically connected to the inlet and provided with one or more outflow holes facing the inside of the helmet. The helmet is characterized in that it comprises at least one padding layer at least partially permeable to air, and substantially incompressible, or only partially compressible, for the diffusion of the air flow, and preferably the diffusion layer is arranged at least below the hole or holes of the ventilation ducts.

[0021] The diffusion layer enables the diffusion of the air coming out from the outflow holes of the ventilation ducts to be increased, thus improving ventilation inside the helmet, consequently increasing the dissipation of heat in the inside, without being compressed by the user when the helmet is worn.

[0022] This layer for the air flow diffusion is preferably made of a three-dimensional textile, and in general by a substantially incompressible textile which simultaneously enables the passage of air therethrough.

[0023] Advantageously, the presence of this material enables uniform diffusion of the air coming out from the holes provided in the ventilation ducts and therefore guarantees distribution of the air in an area of greater extension relative to ventilation systems mounted in helmets currently available on the market. According to different possible embodiments, the aforesaid diffusion layer is located in proximity of at least one of the outflow holes, or extends for a larger area, and preferably the layer for the air flow diffusion extends substantially below the whole internal surface of the layer of shock-absorbing material.

[0024] It must be noted that according to possible embodiments, the ventilation duct or ducts of the helmet can be obtained separately relative to the other parts of the helmet, generally in tubular form, or can be obtained at least partially directly in the layer of shock-absorbing material, for example through channels obtained in this layer of the helmet, which are closed at the bottom by a suitably shaped surface and provided with at least one outflow hole.

[0025] According to a possible embodiment, the helmet according to the present invention is provided with two or more ventilation ducts, each of which comprising at least one tubular portion, formed separately relative to the other parts of the helmet and subsequently inserted inside it, and mutually constrained in such a manner as to form a single piece, in the form of a small shell, which is particularly simple to install and to remove from the helmet. Moreover, the layer of shock-absorbing material is conveniently shaped to accommodate in its inside, at least partially, the ventilation duct or ducts provided in the helmet, by recessed impressions inside which the ducts can be at least partially accommodated, in such a manner as not to project inside the helmet below the layer of shock-absorbing material.

[0026] According to another aspect of the present invention, the helmet also comprises a comfort layer, usually called liner, which is arranged under the ventilation duct or ducts.

[0027] The comfort layer can also have at least one slot at one or more holes of the ventilation ducts to aid the passage of air coming out from these holes inside the helmet. Preferably, the layer for the air flow diffusion is arranged at least in correspondence of the slot or slots with which the comfort layer is provided.

[0028] In this way, when the comfort layer is installed in the helmet, the slots are arranged at each outflow hole of the ventilation ducts, in order to aid the passage of air coming out from them inside the helmet.

[0029] There will now be described, purely by way of non-limiting example, some preferred embodiments of the present invention, with reference to the accompanying figures, wherein:

- Fig. 1 is a longitudinal sectional view of the safety helmet according to the present invention, according to a plane passing through a ventilation duct;
- Fig. 2 is a cross sectional view of the safety helmet according to the present invention;
- Fig. 3 is a perspective view of two ventilation ducts mutually constrained to form a single piece which can be installed in a safety helmet according to the present invention;
- Fig. 4 is a bottom view of the helmet according to the present invention provided with the outer shell and with the layer of shock-absorbing material;
- Fig. 5 is a bottom view of the helmet according to Fig. 4 in which two ventilation ducts mutually constrained to form a single piece have been installed;
- Fig. 6 is a perspective view of the two ventilation ducts according to Fig. 3 below which a layer of material for air flow diffusion has been installed.

[0030] As can be seen in the accompanying figures, the safety helmet 1 according to the present invention, for example suitable for motorcycle use, comprises an outer shell 2, inside which there is arranged a layer 3 of shock-absorbing material, also known as protective layer, which enables the head of the user to be protected in case of impact with surfaces or foreign objects.

[0031] The outer shell 2, for example made of polycarbonate, is structured, as known, in such a manner as to have a portion to protect the user's head and at least one portion designed to be coupled with at least one related visor.

[0032] The protective layer 3 is made with materials

known in the art, which are able to ensure effective shock absorption in case of need, for example expanded materials, such as expanded polystyrene (EPS).

[0033] It must be noted that, in the particular embodiment of the invention shown in the sectional views of the helmet 1 of Figs. 2 and 3, the layer 3 of shock-absorbing material has an upper insert 3.1 which, according to different possible embodiments, can be excluded or can be integrated in the layer 3 of shock-absorbing material. For this reason, hereunder reference will be made solely to the layer 3 of shock-absorbing material, regardless of whether the upper insert 3.1. is present.

[0034] It must also be noted that in the accompanying figures, the shell 2 is only partially illustrated and known structural elements thereof, which are customarily fitted on helmets, for example for motorcycle use, such as the visor, chin guard, chin strap, etc. are omitted. The presence of these elements of the helmet is linked to different and possible production choices, and in any case they do not fall within the scope of the present invention and therefore are not described herein.

[0035] The helmet 1 according to the present invention also comprises at least one inlet 4 for an air flow, which is obtained on the shell 2 and, passing therethrough (Fig. 1), enables the outer environment to be fluidically connected to the inside of the helmet 1, in order to intercept and convey towards the inside of the helmet 1 an air flow coming from outside.

[0036] As shown in detail in the longitudinal sectional view of Fig. 1, the helmet 1 illustrated here has at least one inlet 4, obtained in the fashion of a hole passing through the shell 2 and through the layer 3 of shock-absorbing material.

[0037] However, it must be noted that according to an alternative embodiment of the present invention, the at least one inlet 4 can be obtained as a hole passing only through the shell 2 of the helmet 1, for example in the case in which the inlet 4 is arranged on a portion of the shell 2 without an underlying portion of a layer 3 of shock-absorbing material.

[0038] Usually, this inlet 4 is arranged in the front part of the shell, above the region for engagement of the visor, but it could also be positioned in the upper or lateral part of the shell, provided that this inlet 4 is structured and arranged frontally, i.e. capable of enabling outer air to flow towards the inside of the helmet 1, during forward motion of the user on the vehicle being driven.

[0039] The helmet 1 according to the present invention is also provided with at least one ventilation duct 5, fluidically connected to the at least one inlet 4, and extending inside the helmet 1, at least partially under the aforesaid layer 3 of shock-absorbing material, to carry the air flow entering through this inlet to one or more outflow holes 6 which are arranged at the lower surface, i.e. further towards the inside relative to the shell 2, of the duct 5.

[0040] These outflow holes 6 are facing the inside of the helmet, i.e. are directed in such a manner as to enable the passage of air from the duct 5 to the inside of the helmet, and in particular towards the user's head.

[0041] Each ventilation duct 5 is in particular provided with an inlet section 5.2 which is connected to the inlet 4 obtained on the shell 2 of the helmet 1 and passing therethrough, and with a plurality of outflow holes 6 arranged along each duct in lower position, i.e. towards the inside of the helmet 1.

[0042] According to an alternative embodiment of the present invention, not illustrated here, each inlet section 5.2 of each duct 5 can be connected to an inlet 4, separate, obtained at the shell 2 of the helmet.

[0043] In the case illustrated here in which each helmet 1 has at least two ventilation ducts 5, the inlet section 5.2 of these latter can be fluidically connected to the inlet or inlets 4.

[0044] The extension and form of the ducts 5, and the shape and arrangement of the related outflow holes 6 enables the air flow to reach different areas of the user's head, and preferably they extend in the upper part of the head and, in some cases, reach the rear part of this helmet 1.

[0045] Moreover, it is clear that the length of the ventilation ducts 5, their transverse sizes and the number of outflow holes 6 present thereon can be modified during the design stage, together with other characteristics, to vary the fluid dynamic performance for carrying the air flow in its inside.

[0046] In particular, the diameter of the outflow holes 6 also makes it possible to adjust and change the air flow coming out in the different internal areas of the helmet. In this regard, preferably, the diameter of the holes 6 is differentiated along the longitudinal extension of the ventilation duct 5. The holes 6 positioned along the duct 5 closest to the inlet 4 from which the air enters have a smaller diameter relative to those positioned in succession along the duct 5 at a greater distance relative to the inlet 4, so that the flow coming out from each of them is substantially constant.

[0047] In the particular embodiment of the present invention illustrated here, the helmet 1 comprises two ventilation ducts 5 having a plurality of outflow holes 6, obtained along the lower surface of each of these ducts 5, i.e. along that surface of the duct 4 facing the inside of the shell 2.

[0048] In general, these ducts 5 can comprise at least one tubular portion and can be obtained, preferably in deformable material, separately from the other elements of the helmet, for example in a single piece, or by coupling two or more parts, according to different known construction methods.

[0049] According to one aspect of the present invention, the ventilation ducts 5 provided in the helmet 1 are constituted by separate tubes preferably made of elastic material, or in any case flexible (for example a polymer material such as PVC, latex, silicone and the like), in such a manner that they are deformable and are not rigid in case of impact.

[0050] According to a possible alternative embodiment

of the present invention, not shown here, at least part of the ventilation ducts 5 can be obtained directly inside the layer 3 of shock-absorbing material, for example by means of channels excavated inside this layer 3 which are closed at the bottom (i.e. towards the inside of the helmet 1) by means of a surface, or other equivalent complementary part, on which one or more outflow holes 6 are arranged.

[0051] In the case in which the ducts 5 are obtained separately relative to the other structural elements of the helmet 1, the layer 3 of shock-absorbing material can be conveniently shaped to accommodate in its inside, at least partially, the tubular portion of the ventilation ducts 5.

[0052] In this case, the layer 3 of shock-absorbing material is provided with recessed impressions 7, inside which the ducts 5 can be accommodated at least partially, in such a manner that they do not project in an unwieldy manner inside the helmet 1, below the layer of protective material 3.

[0053] As shown in particular in Fig. 4, which shows the impressions 7 to accommodate the ventilation ducts 5, these impressions 7 can be shaped in a manner geometrically corresponding to the shape of the ventilation ducts (5) to be accommodated in their inside.

[0054] In fact, the ducts 5 are preferably obtained according to a predetermined shape and are such as to maintain this shape when they are installed inside the helmet 1, and in particular in the impressions 7 provided in the protective layer 3. Naturally, according to a further embodiment of the present invention, not illustrated here, the ventilation ducts 5 can be obtained in such a manner as to be able to change their shape and thus adapt to the form of the impressions 7 present on the protective layer 3.

[0055] In the helmet 1 described here, the ventilation ducts 5 installed inside the corresponding impressions 7 do not project from the lower surface 3.2 of the protective layer 3, and in particular, the surface of the ducts on which the outflow holes 6 are obtained is preferably at a height equal to or less than the lower surface 3.2 of the protective layer 3, in such a manner that it does not project therefrom.

[0056] According to the particular embodiment of the present invention illustrated here, the ventilation ducts 5, each of which comprises at least one tubular portion, can be mutually constrained by one or more joining elements 5.1., for example plate-like, which enable a single piece to be formed between these ducts 5, in this way facilitating operations to install and remove the ducts from the inside of the helmet 1.

[0057] Therefore, the tubular portions of two or more ducts 5, or the ducts 5 themselves, in the case in which they are constituted by tubes obtained as separate parts, can be mutually constrained to form a single piece. The perspective view of Fig. 3 shows the two ventilation ducts 5 of the helmet illustrated here, constituted by tubes made of flexible material, which are mutually constrained by two joining elements 5.1, to form a single piece, like a small shell.

[0058] As can be seen in Fig. 3, the two ventilation ducts 5 of the helmet 1 here described are shaped in such a manner as to have a tubular shape substantially elongated to reach the rear part of the shell 2 and are spread apart in the direction of flow of the air, while the two respective joining elements 5.1 are constituted by flat elements, arranged substantially transversely relative to the longitudinal extension of the ducts 5 and, in the embodiment illustrated here, they do not permit the passage of air inside them.

[0059] However, according to alternative embodiments the joining elements 5.1 between two or more ventilation ducts 5 can also be structured for the passage of the air flow inside them, and can in turn be provided with outflow holes 6.

[0060] It must be observed that a tab 5.3 is provided at the perimeter of the ventilation ducts 5 to facilitate coupling with the layer 3 of shock-absorbing material.

[0061] Figs. 4 and 5 are bottom views of the helmet 1, i.e. viewed from the aperture through which the user puts on the helmet passing it over the head, which show the shell 2 and the layer 3 of shock-absorbing material without and with the ventilation ducts installed in its inside.

[0062] Fig. 5 shows a bottom view of the helmet 1 in which the ventilation ducts 5, each comprising at least one tubular portion, mutually constrained to form a single piece, are accommodated inside the corresponding impressions 7 obtained in the layer 3 of shock-absorbing material.

[0063] Advantageously, the helmet 1 according to the present invention also comprises a padding layer 10 at least partially permeable to air, and substantially incompressible, or only partially compressible, for the diffusion of the air flow coming out from the outflow hole or holes 6 provided in the ventilation duct 5. This diffusion layer 10 is arranged at least below the outflow holes 6 of the ventilation duct 5, and has the purpose of increasing the diffusion of the air coming out from the holes and improving ventilation inside the helmet thus increasing the dissipation of heat and moisture in its inside.

[0064] This padding layer 10 for the diffusion of the air flow coming out from the holes 6 is preferably made of a three-dimensional textile (or 3D textile).

[0065] As is known in the art, three-dimensional textile is a particular type of textile in which the textile fibres, which can be differentiated on the three axes, are arranged and woven in space according to three orthogonal axes, in such a manner that the textile thus produced has high characteristics of substantial incompressibility and permeability to fluids, to enable the passage of air therethrough, even when it is partially compressed.

[0066] It must be noted that, here and hereunder, the terms "substantial incompressibility" or "partial compressibility" are intended generically as that property of the textile, or of the padding layer 10, not to be compressed till losing its characteristic of permeability to flu-

ids, i.e. that property which enables the textile, or the padding layer 10, to have between its fibres, or between its components, at least one free space through which a fluid can pass, even when this textile, or padding layer 10, is compressed.

[0067] As stated, the presence of this material enables uniform diffusion of the air coming out from the outflow holes 6 provided on the ventilation ducts 5 and therefore guarantees distribution of the air in an area of larger extension relative to ventilation systems mounted on helmets currently available on the market. Moreover, the substantial surface incompressibility of the diffusion layer 10, and in particular of the three-dimensional textile of which it is constituted, prevents direct contact of the user's head with the outflow holes 6 of the ventilation ducts 5, thereby preventing the head from obstructing the air flow.

[0068] According to a possible embodiment of the present invention, the diffusion layer 10 is located only in proximity of one or more outflow holes 6 provided on the ventilation duct 5.

[0069] Alternatively, the layer 10 for the diffusion of the air flow extends for a greater surface, and preferably it extends substantially below the whole inner surface of the layer of shock-absorbing material.

[0070] In the case illustrated here, in which the helmet 1 comprises two ventilation ducts 5 mutually joined by said joining elements 5.1, the layer 10 for the diffusion of the air flow can be arranged internally at these ducts 5 and the related joining elements 5.1.

[0071] As can be noted in Fig. 6, which shows a perspective view of two tubular shaped ventilation ducts 5 mutually constrained to form a single piece (according to the embodiment of Fig. 3), the diffusion layer 10 is arranged below this single piece formed by the ducts 5 and by the joining elements 5.1, and is preferably fastened (for example by gluing or stitching) to this single piece.

[0072] In this way, the assembly constituted by the tubular ventilation ducts 5, by the joining elements 5.1 and by the permeable and incompressible padding layer 10 for the diffusion of the air flow, is obtained separately from the other components of the helmet 1 and is then easily assembled inside the shell 2, below the shock-absorbing layer 3, in this case provided with the aforesaid impressions 7 to partially accommodate the tubular ducts 5, for example by simple gluing or juxtaposing of parts.

[0073] Although Fig. 6 shows a layer 10 for the diffusion of the air flow which extends to abundantly cover the area defined by the ducts 5 and by the joining elements 5.1, alternative embodiments of the present invention can comprise a plurality of regions, also separate from one another, of this layer 10 for the diffusion of the air flow, in which each of these regions can be constrained to a ventilation duct 5 at, and therefore below, a related outflow hole 6.

[0074] According to another aspect of the present invention, the helmet 1 comprises, as is known, a comfort layer, also called liner, which is intended for contacting the user's head, improving comfort when the helmet is worn.

[0075] The comfort layer, which is not illustrated in the accompanying figures, and which is constituted by textile or by foam rubber covered with textile, is arranged, in the helmet 1 illustrated here, below the ventilation ducts 5, in such a manner that the layer 10 for the diffusion of the flow can be arranged between the ventilation ducts 5 and this comfort layer, above all when this latter is constituted by simple textile of adequate thickness, but without foam rubber.

[0076] In fact, in the case in which the comfort layer is constituted by simple textile, although making the helmet 1 more comfortable to wear, it may not completely prevent the distribution of the air flow inside this helmet 1.

[0077] This comfort layer, according to an alternative embodiment of this invention, can instead have one or more slots (i.e. through openings of suitable area obtained inside this comfort layer) arranged at one or more holes 6 of the ventilation ducts 5, in order to aid the passage of air coming out from these holes 6 inside the helmet 1.

[0078] In this case, the layer 10 for the diffusion of the air flow is preferably arranged only at these slots of the comfort layer, so that this latter substantially only surrounds the holes 6 for the diffusion of the air flow covered by the layer 10, preferably made of three-dimensional textile.

[0079] As will be apparent to those skilled in the art, this solution makes it possible to obtain optimal distribution of the air flow inside the helmet 1, as the air flow coming out from the holes 6 is substantially not obstructed by any impermeable obstacle, and makes the helmet 1 extremely comfortable to wear, as the comfort layer (which in this case can also comprise foam rubber covered with textile) extends for the majority of the inside surface of the helmet 1.

[0080] It must be noted that using the solution with a plurality of slots arranged at the related plurality of outflow holes 6 and inside which the aforesaid layer 10 for the diffusion of the air flow is placed, any discomfort due to the relative rigidity of the three-dimensional textile preferably used to obtain this layer is greatly alleviated by the properties of comfortableness of the comfort layer surrounding this layer 10.

[0081] Preferably, each slot obtained in the comfort layer has the size equal to, or even more preferably, greater than the diameter of the corresponding outflow hole, so that possible compression of the comfort layer occurring when the user is wearing the helmet does not cause obstruction, even only partial, of the flow coming out from the outflow holes 6 of the ducts 5.

[0082] According to some possible embodiments, the comfort layer, regardless of whether it is provided with the aforesaid slots, extends substantially over the whole inner surface of the layer 3 of shock-absorbing material, and is usually obtained in a single piece, although it is

possible for it to be obtained in several parts.

[0083] In this regard, it must be noted that the ventilation ducts 5 can act as a support for the comfort layer, or for some of its parts.

[0084] In particular, in the embodiment illustrated in Fig. 3, in which two or more ducts 5 are mutually constrained by the joining elements 5.1, the single piece thus formed can be used to support, by constraining it thereto, besides the aforesaid permeable and substantially incompressible padding layers, the comfort layer, or a part of it.

[0085] Moreover, the helmet according to the present invention can be provided with one or more additional inlets (not shown in the accompanying figures) intended to fluidically connect the outer environment with the inside of the helmet, which are usually used with conventional ventilation systems, for example they can be connected to channels to carry the air flow obtained directly in the layer of shock-absorbing material.

[0086] In addition, the helmet can also be provided with one or more vents 4.1 to extract the air which are obtained on the shell 2, in rear position, and pass at least therethrough to fluidically connect the inside of the helmet with the outer environment.

[0087] These optional vents 4.1 for extraction of the air can be fluidically connected to conventional ventilation systems such as the channels to carry the air flow obtained directly in the layer 3 of shock-absorbing material, or alternatively, they can be connected to the ventilation ducts 5, at the end portion thereof, to further increase the efficiency of the ventilation inside the helmet 1. Alternatively, the layer 10 for the diffusion of the air flow can be obtained with sizes such as to enable its extension up to the lower edge of the rear part of the shell 2 of the helmet, in such a manner as to supply a further fluid connection between the inside of the helmet and the outer environment, thus increasing the efficiency of the ventilation.

[0088] Moreover, it must be noted that the inlet 4 and the vent 4.1 for extraction of the air obtained on the shell 2 of the helmet and passing at least therethrough to fluidically connect the outer environment with the helmet inside, can be provided, according to prior art, with means for adjusting the air flow (not shown here) capable of changing, according to need, the flow of air coming in or coming out, changing the amplitude of the inlet 4 and vent 4.1, for example using rotating deflectors.

Claims

1. Safety helmet (1) of the type comprising at least one outer shell (2) and at least one layer (3) of shock - absorbing material placed inside of said shell, at least one inlet (4) obtained on said shell (2) and passing at least therethrough, as well as at least one ventilation duct (5) provided with one or more outflow holes (6) facing the inside of the helmet, said at least one duct (5) being fluidically connected to said at least one inlet (4) to carry the air from said at least one inlet (4) to said one or more holes (6), **characterized by** comprising at least one padding layer (10) at least partially permeable to air, and substantially incompressible, or only partially compressible, for the air flow diffusion, said at least one layer (10) for the diffusion of the air flow being arranged at least below said one or more holes (6).

2. Helmet according to the preceding claim, wherein said diffusion layer (10) is made of a three-dimensional textile

3. Helmet according to claim 1 or 2, wherein said layer (10) for the diffusion of the air flow extends substantially below the whole inner surface of said layer (3) of shock - absorbing material.

4. Helmet according to any one of the preceding claims, comprising a comfort layer placed below said at least one ventilation duct (5), and intended to come into contact with the user's head, **characterized in that** said layer (10) for the flow diffusion is arranged between said at least one air distribution duct (5) and said comfort layer.

5. Helmet according to any one of claims 1 to 3, comprising a comfort layer placed below said at least one ventilation duct (5), and intended to come into contact with the user's head, **characterized in that** said comfort layer has at least one slot at said one or more holes (6) of said at least one ventilation duct (5) to aid the passage of air coming out from said one or more holes (6) inside the helmet, said layer (10) for the air flow diffusion being arranged at least in correspondence of said at least one slot.

6. Helmet according to claim 5, wherein said at least one slot obtained in said comfort layer has the size equal or greater than the diameter of the corresponding hole (6) of said at least one ventilation duct.

7. Helmet according to any one of the preceding claims, wherein said at least one ventilation duct (5) comprises at least one tubular portion, said layer (3) of shock - absorbing material being conveniently shaped to accommodate in its inside, at least partially, said at least one tubular portion of said at least one ventilation duct (5).

8. Helmet according to claim 7, wherein said layer (3) of shock - absorbing material comprises at least one recessed impression (7) having a shape corresponding to that of the ventilation duct (5) to be accommodated in its inside.

9. Helmet according to any one of the preceding claims, wherein at least part of said at least one ventilation

duct (5) is obtained directly into said layer (3) of shock - absorbing material.

10. Helmet according to any one of the preceding claims, **characterized by** comprising at least two or more ventilation ducts (5), each comprising at least one tubular portion, **characterized in that** at least said tubular portions of said two or more ducts are mutually constrained to form a single piece.

11. Helmet according to claim 10, **characterized in that** said layer (10) for the air flow diffusion is directly constrained to said two or more ducts, at least at said respective one or more holes (6).

12. Helmet according to any one of the preceding claims, **characterized by** comprising at least one additional air inlet, obtained on said shell (2) and passing at least through it to fluidically connect the outer environment with the inside of the helmet.

13. Helmet according to any one of the preceding claims, **characterized by** comprising means for adjusting the air flow inside said at least one ventilation duct (5), said adjusting means being arranged at said at least one opening (4, 4.1) to change the width thereof.

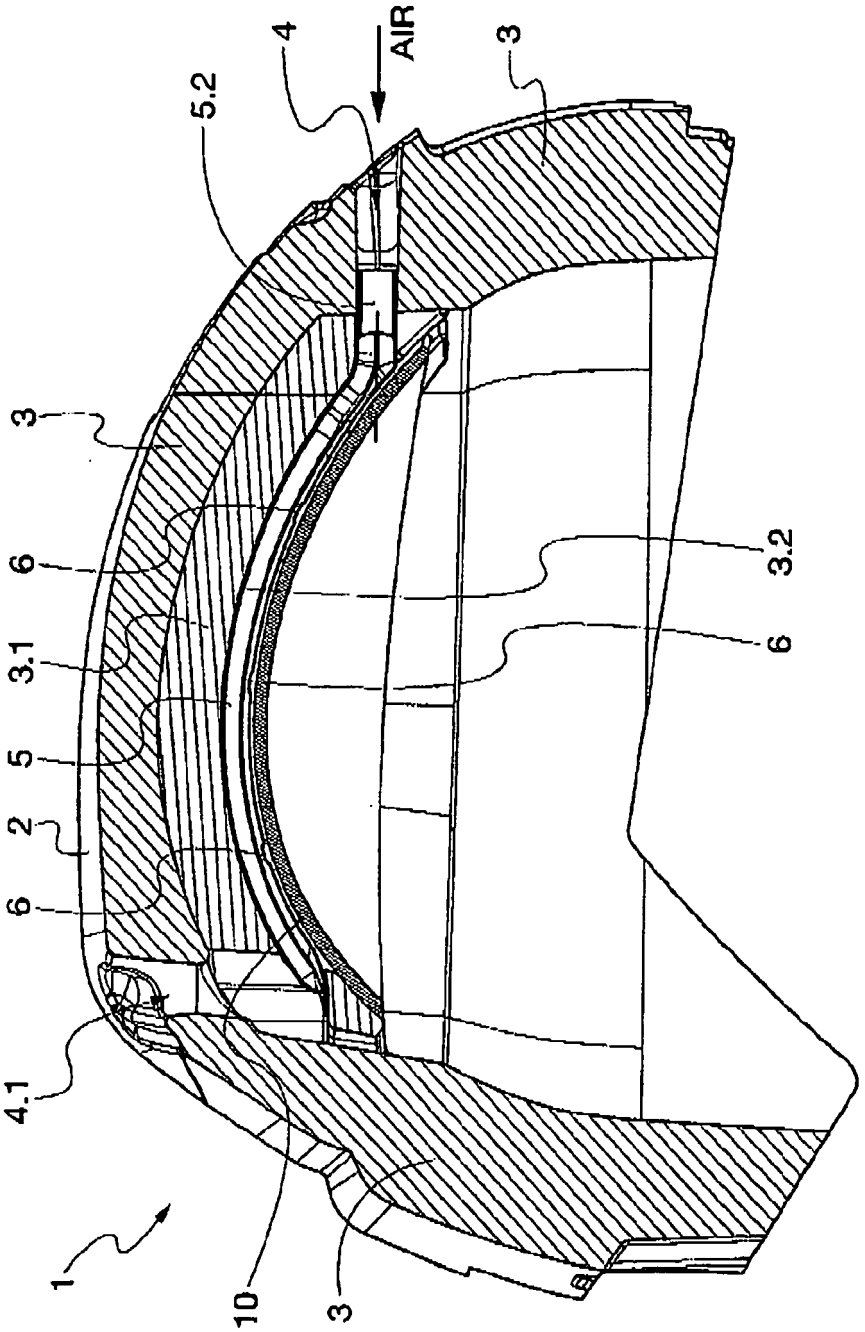

Fig. 1

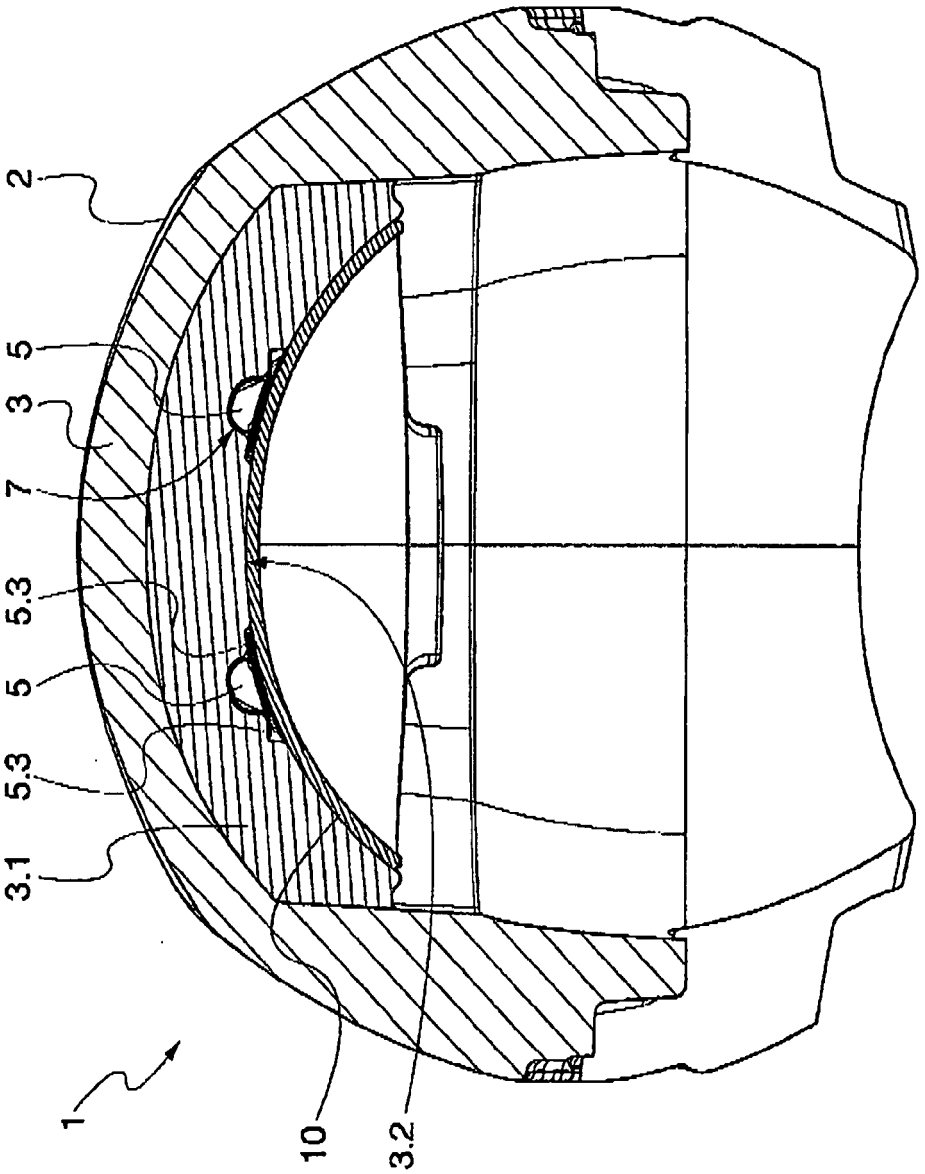

Fig. 2

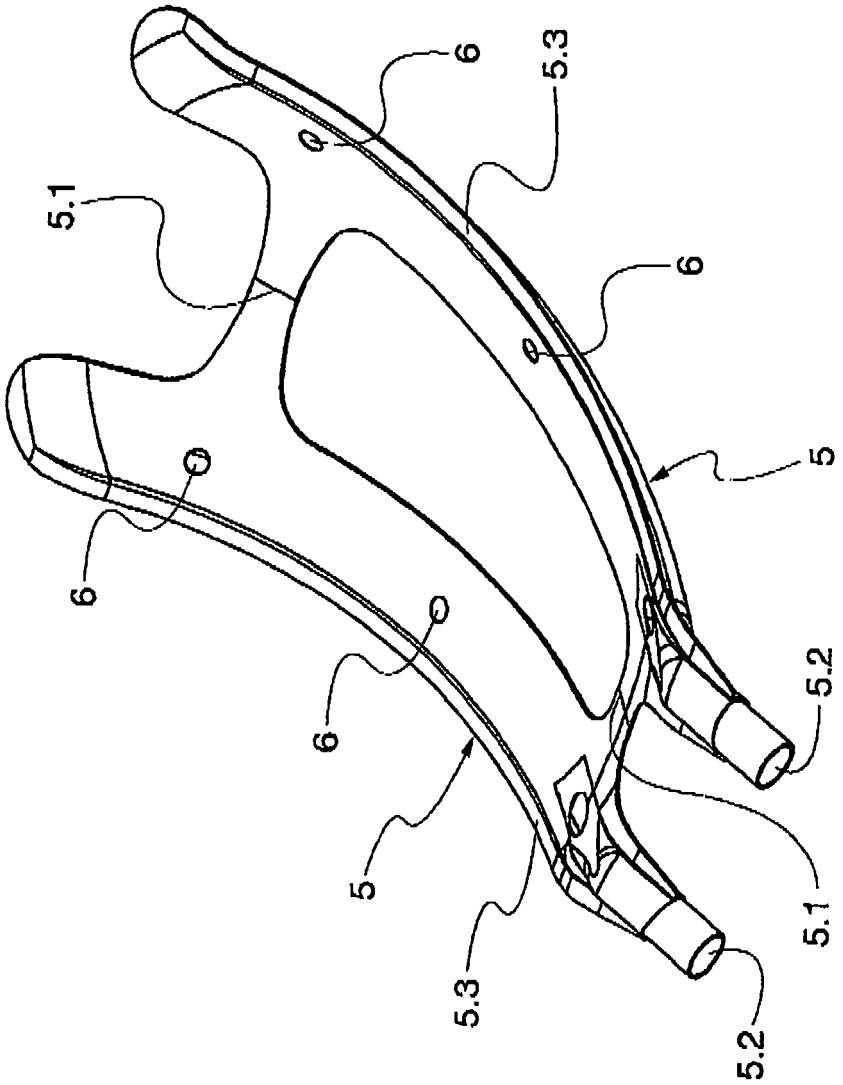

Fig. 3

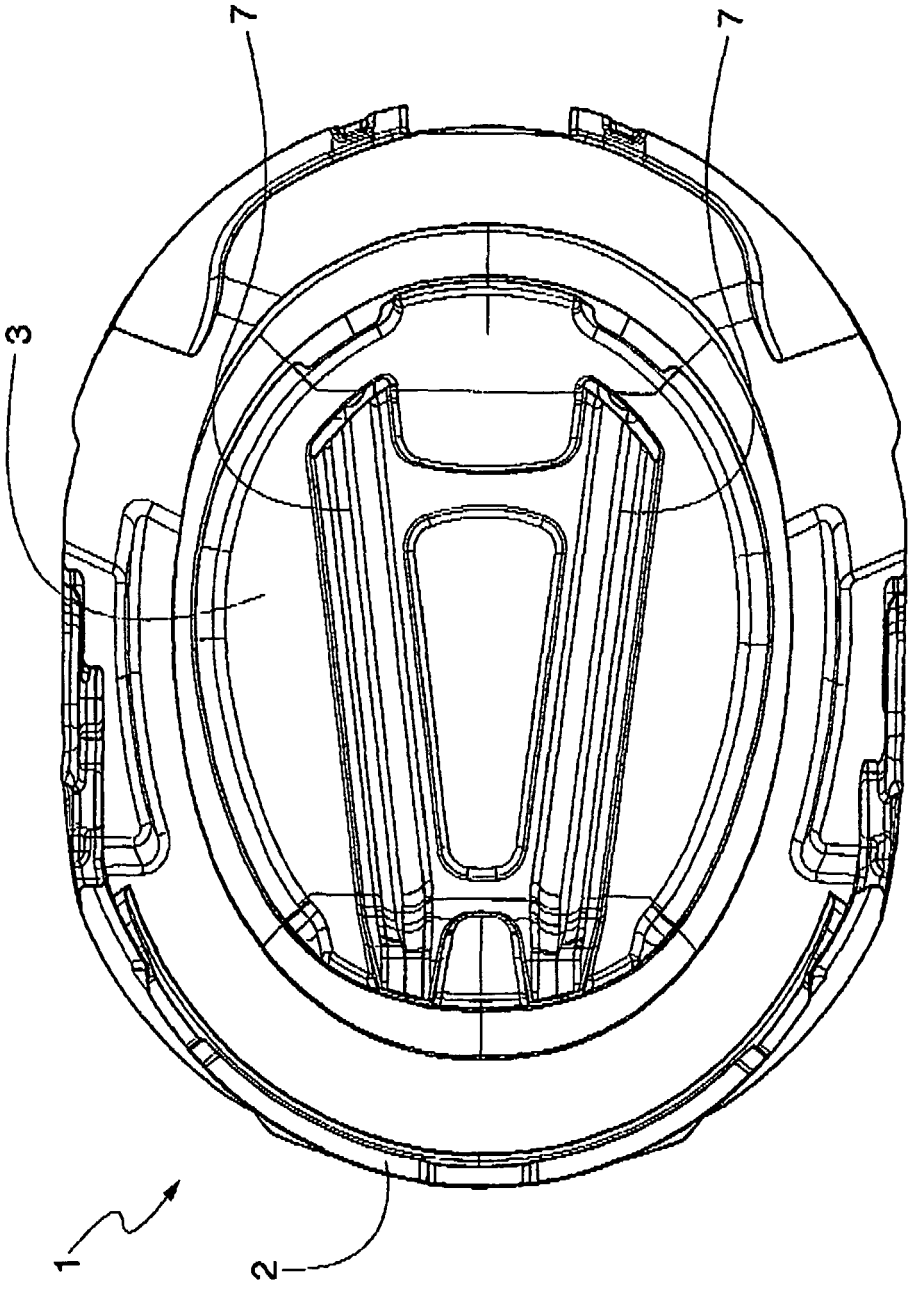

Fig. 4

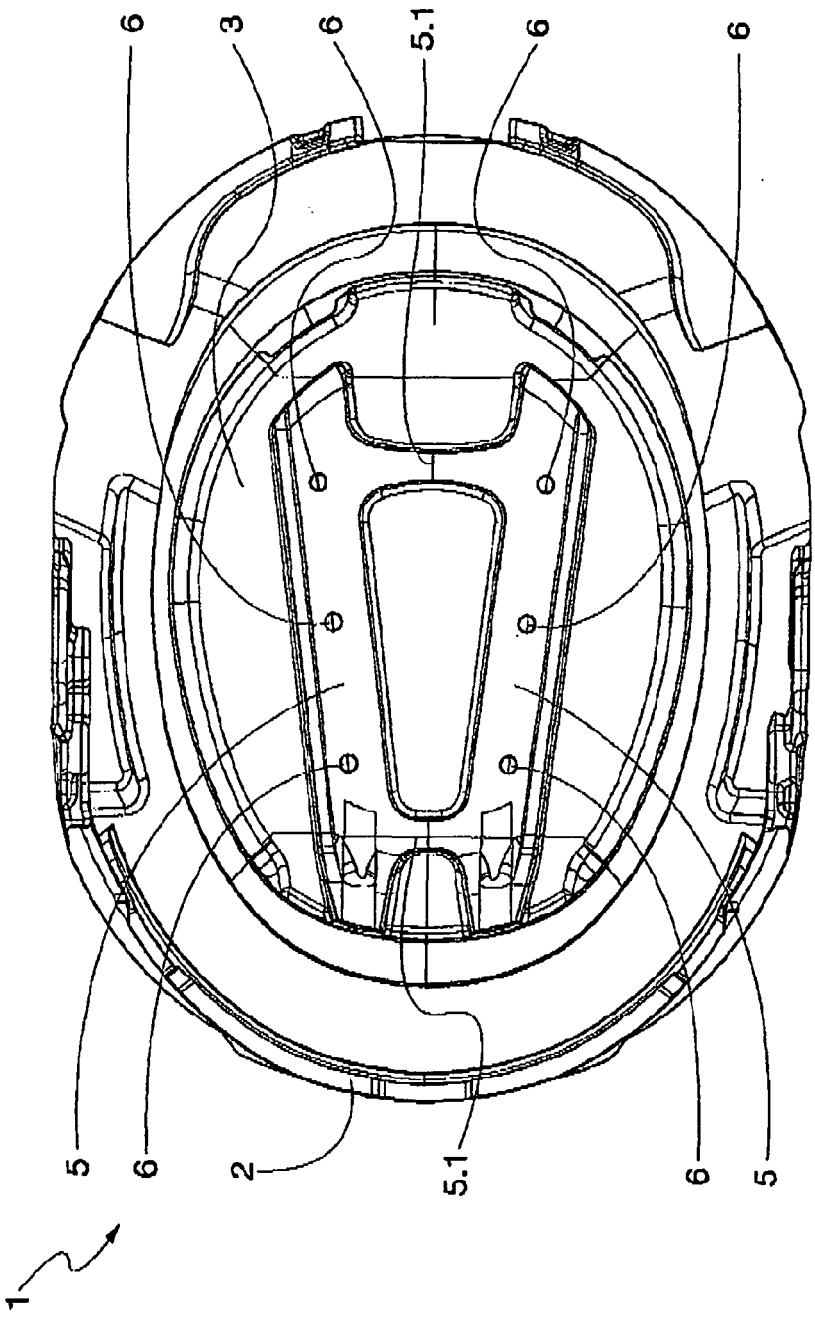

Fig. 5

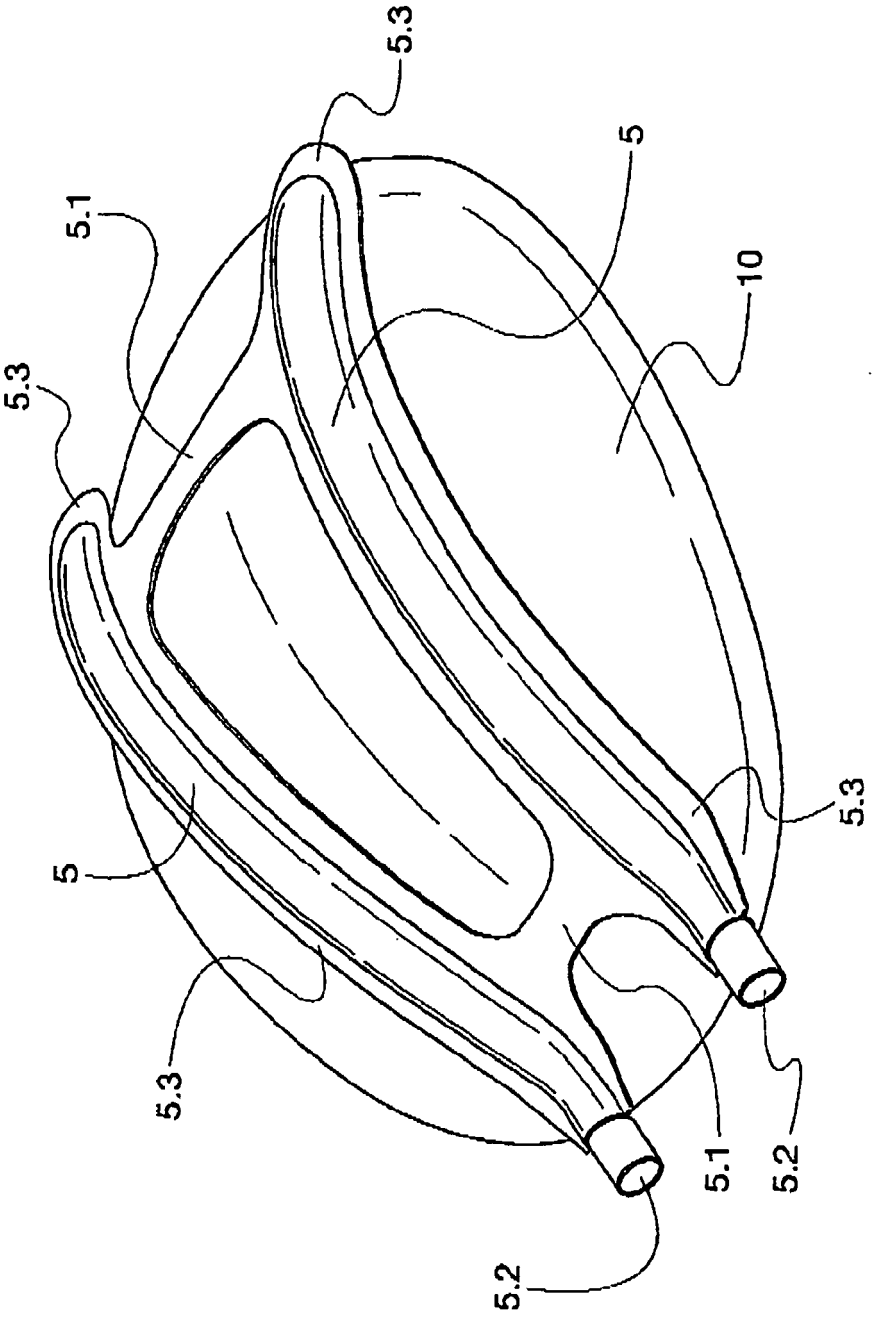

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 12 00 5256

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Place of search	Date of completion of the search	Examiner
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