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(54) **SAFETY HELMET**

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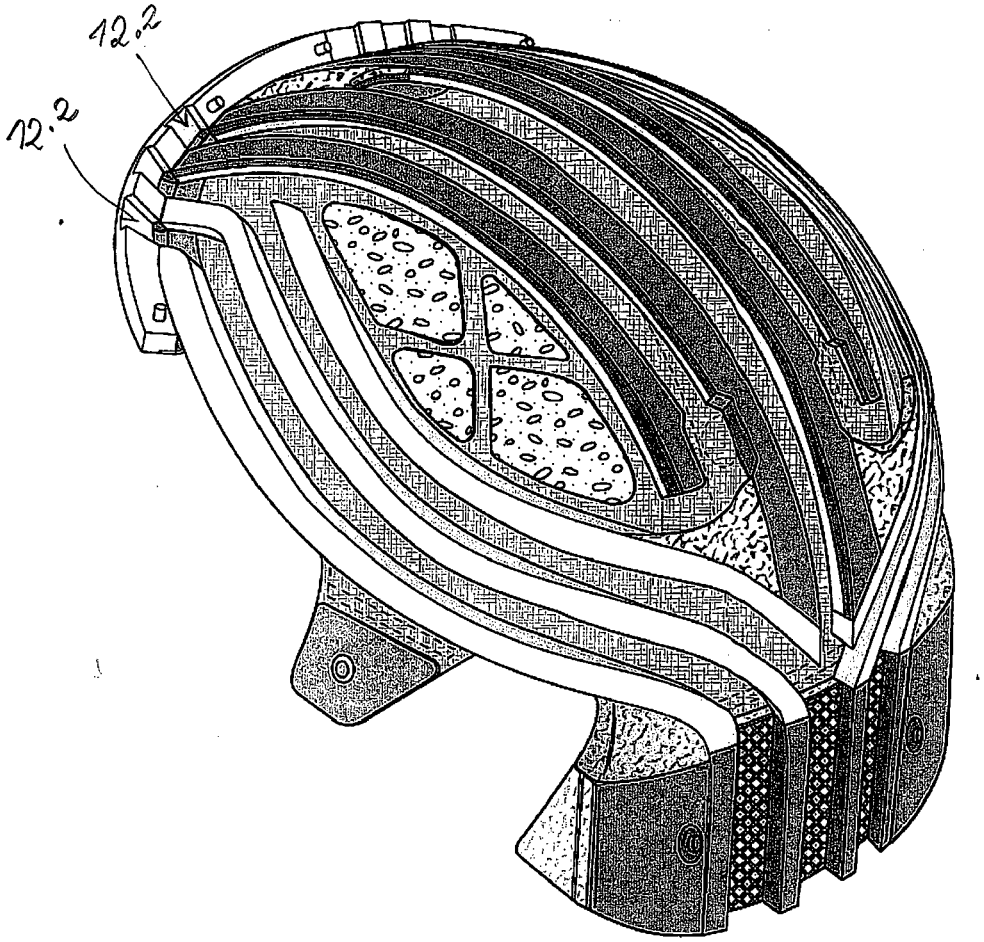
(52) **U.S. Cl.**

CPC ***A42B 3/283*** (2013.01); ***A42B 3/124*** (2013.01); ***A42B 3/125*** (2013.01); ***A42B 3/24*** (2013.01); ***A42B 3/286*** (2013.01); ***A42B 3/0493*** (2013.01)

(57) **ABSTRACT**

A safety helmet (**10**), including a rigid outer shell (**11**) and an inner part (**11.1**) made to absorb and deaden any impact endured by said helmet, and comprising an inner padding (**14***c*) which provides a canalisation structure (**16**) for conducting air between said at least one air intake opening (**12.1**) and said at least one air extraction opening (**13.1**), characterized in that it comprises a cap (**15**), which, when the helmet is worn by said person, cooperates with said padding to provide a plurality of air channels at said canalizations of said padding and covers the head of the person at least at the padding itself.



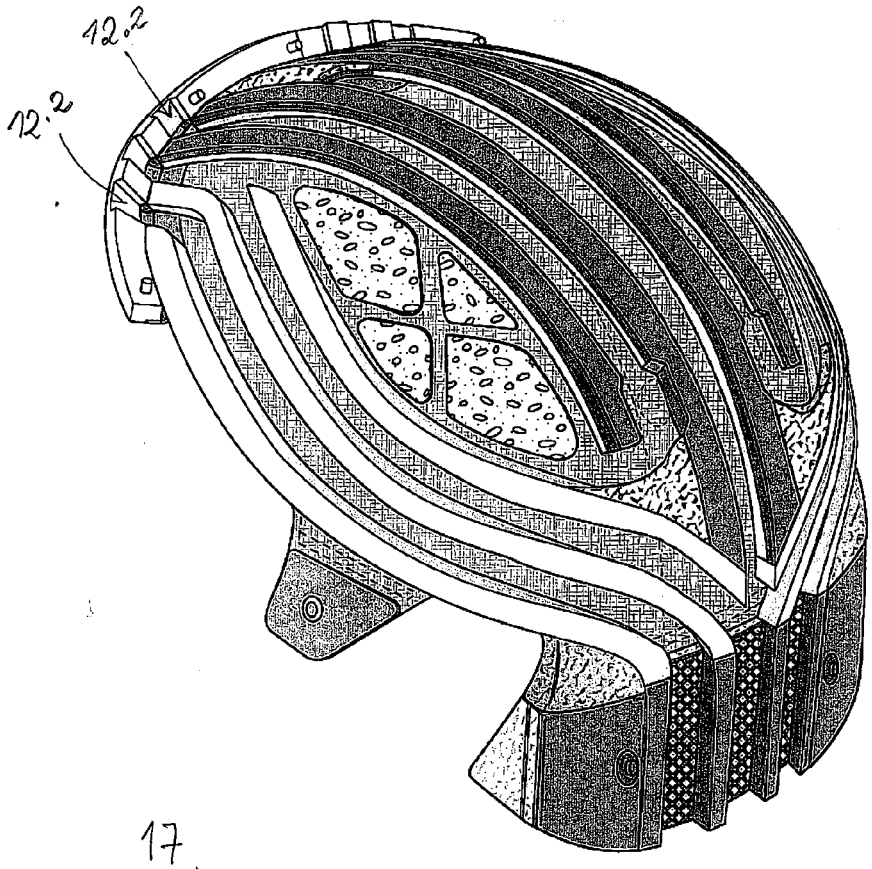


Fig. 1

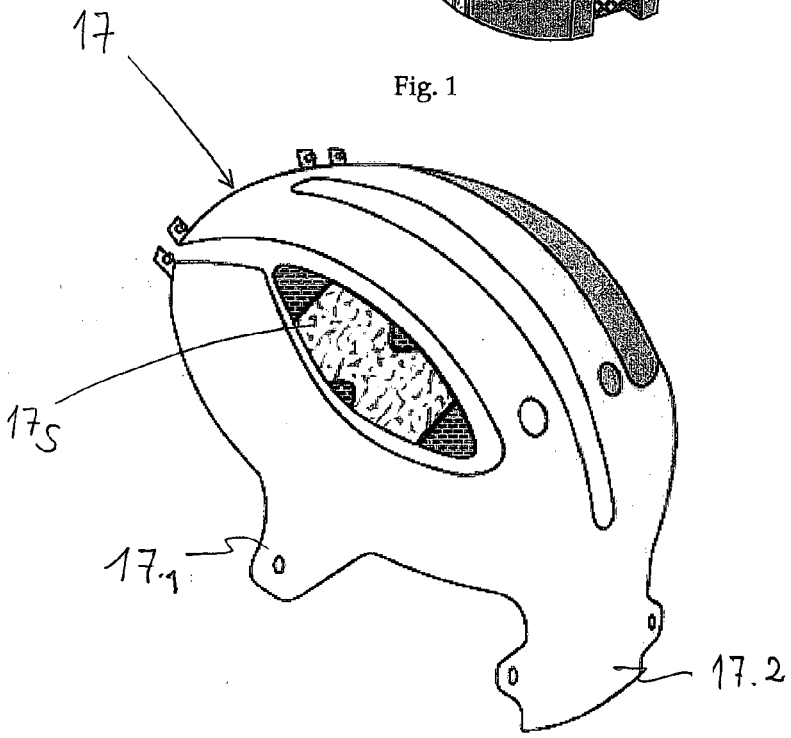
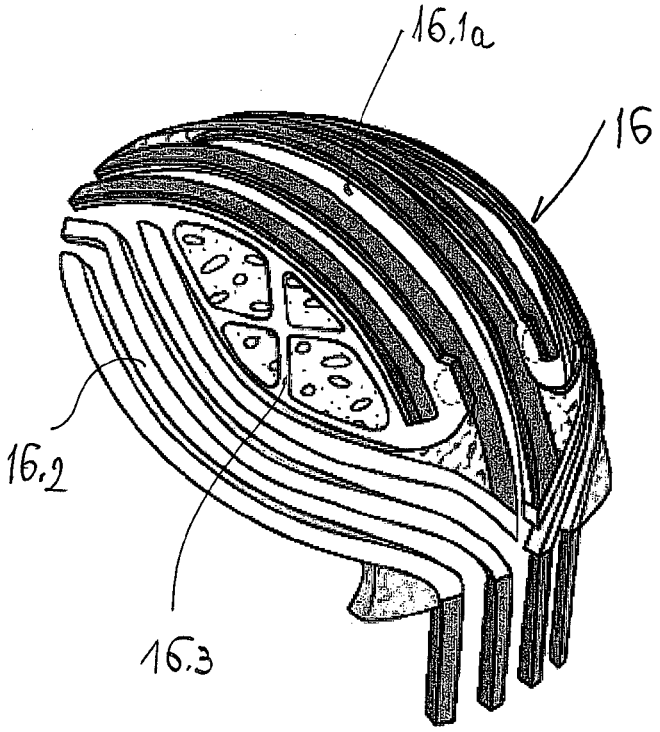


Fig. 2



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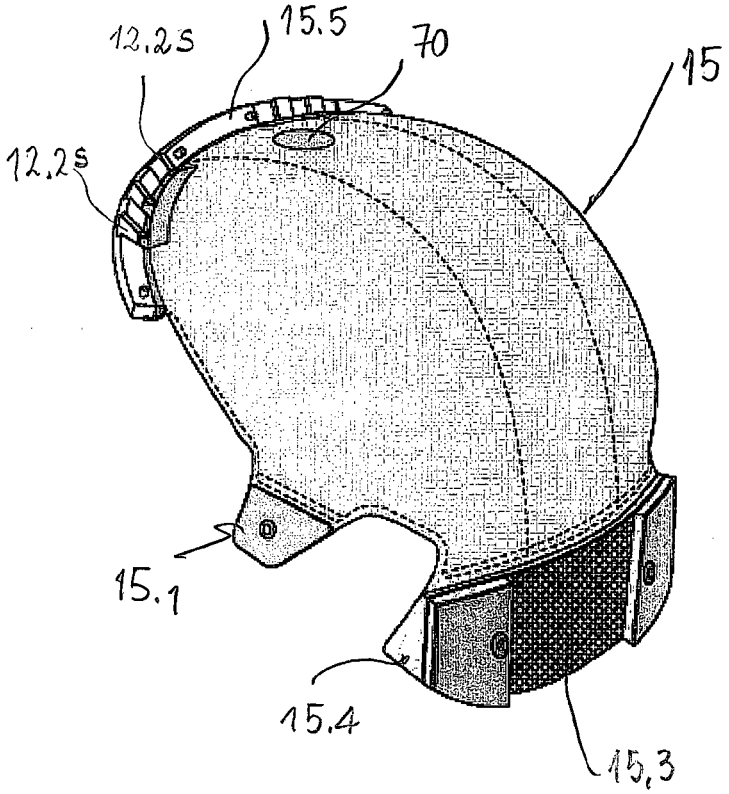

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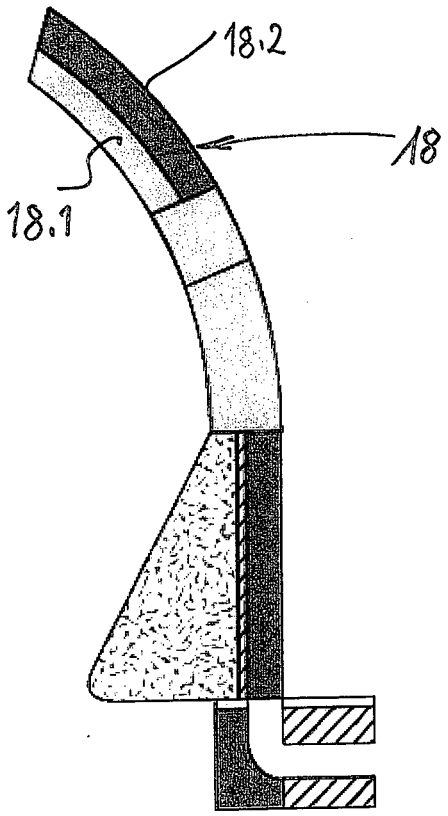

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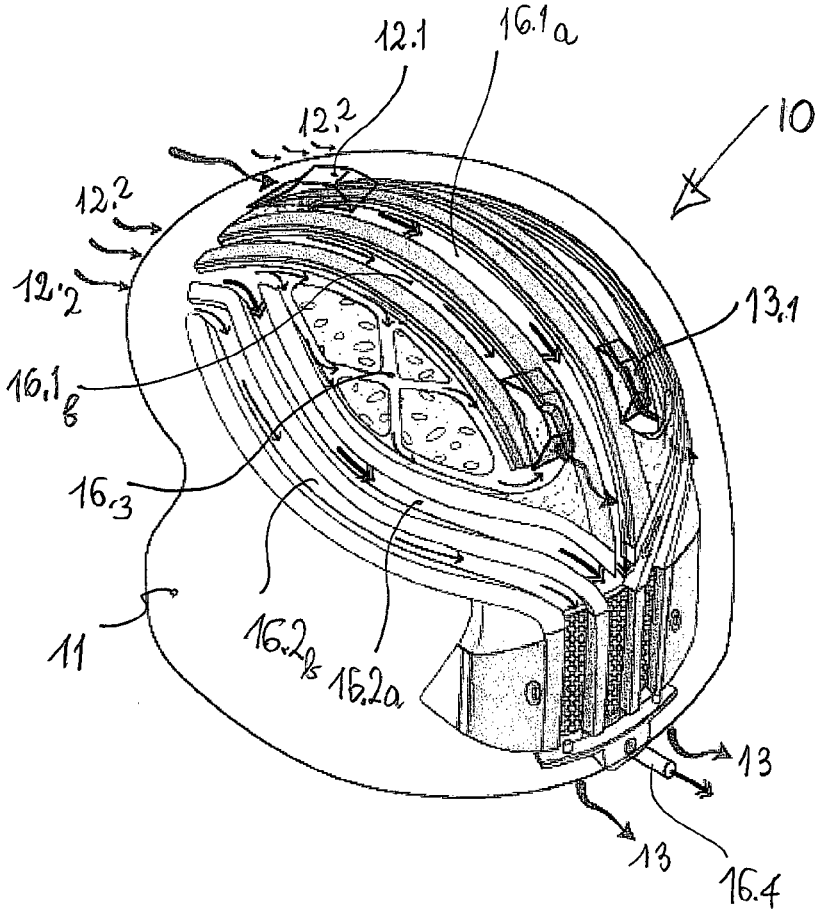
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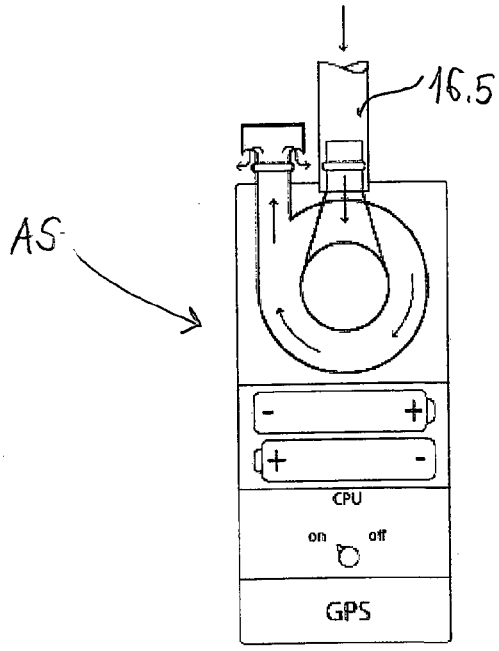
16.4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off
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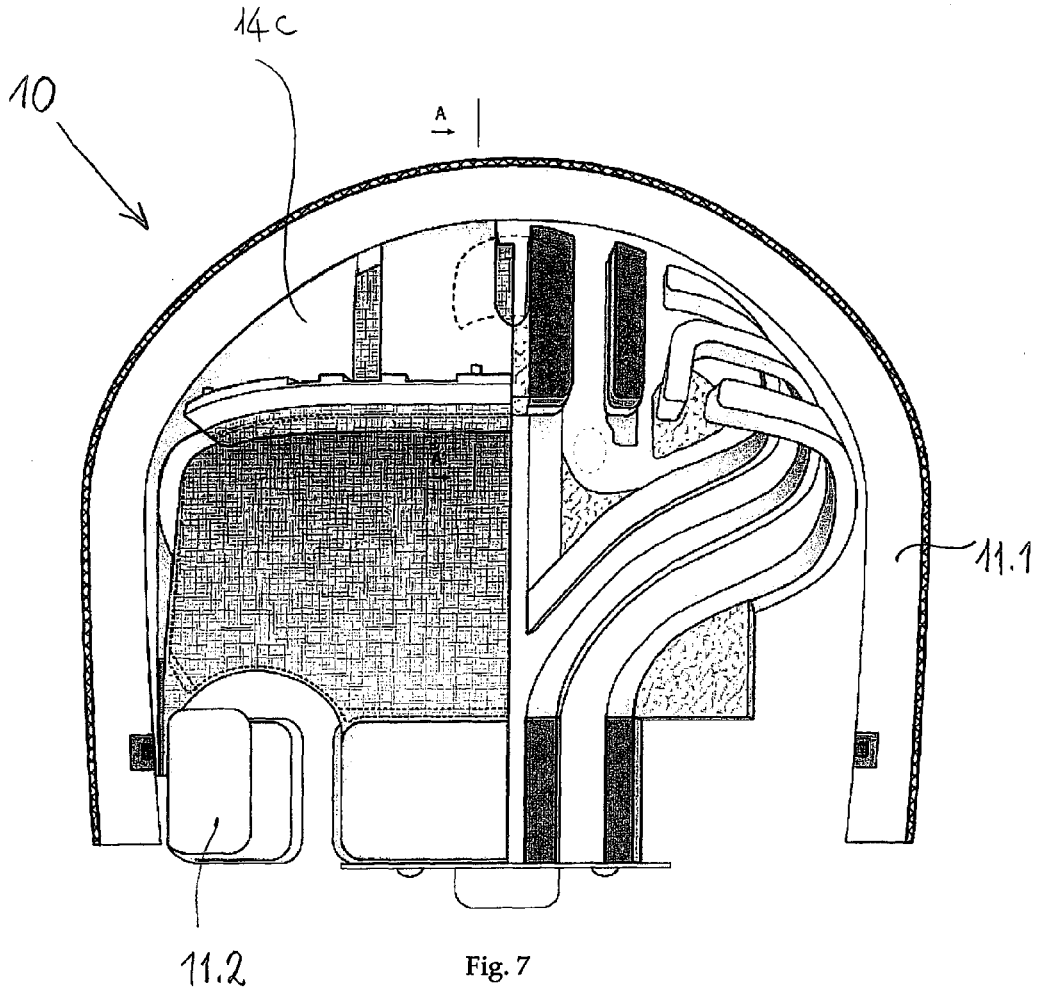
Fig. 6



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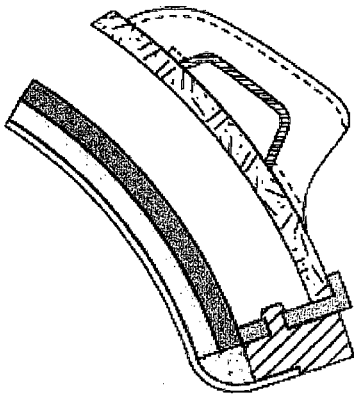

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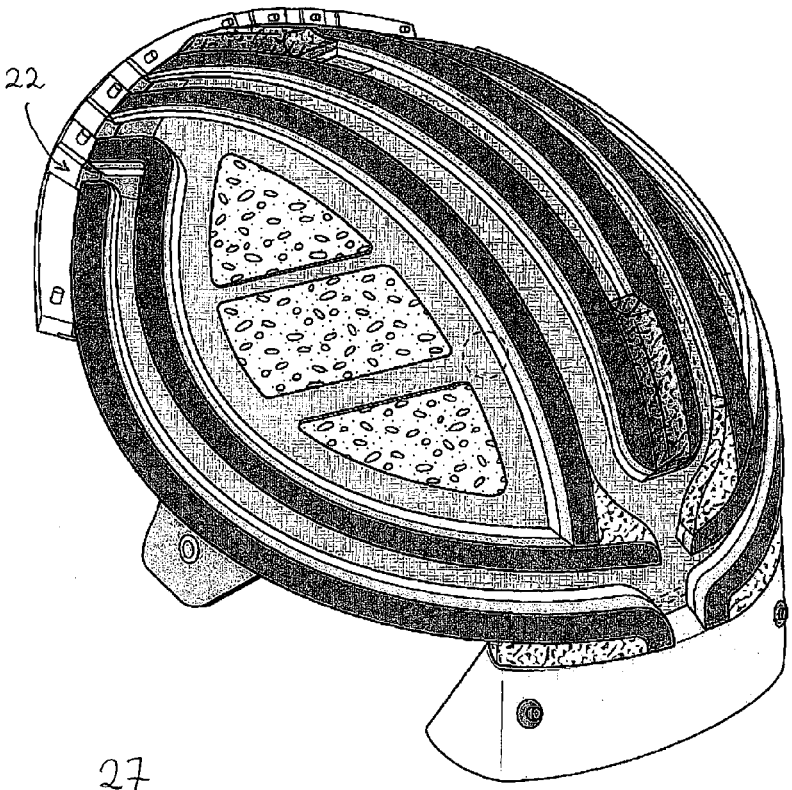

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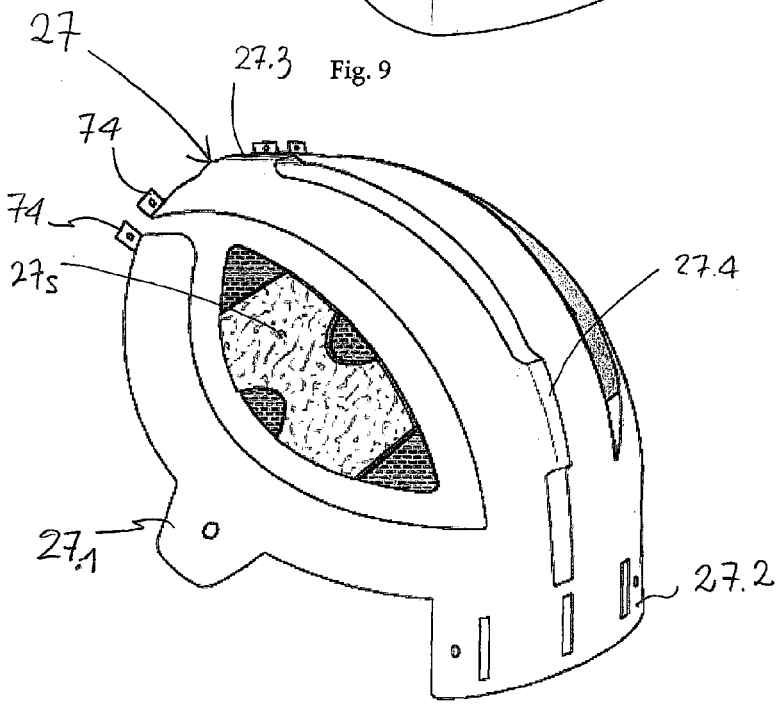

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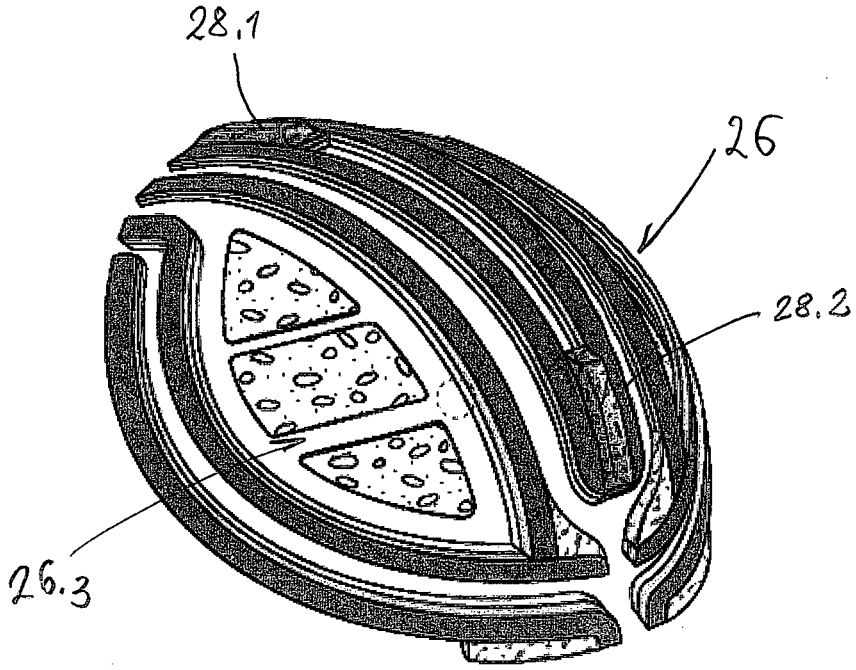

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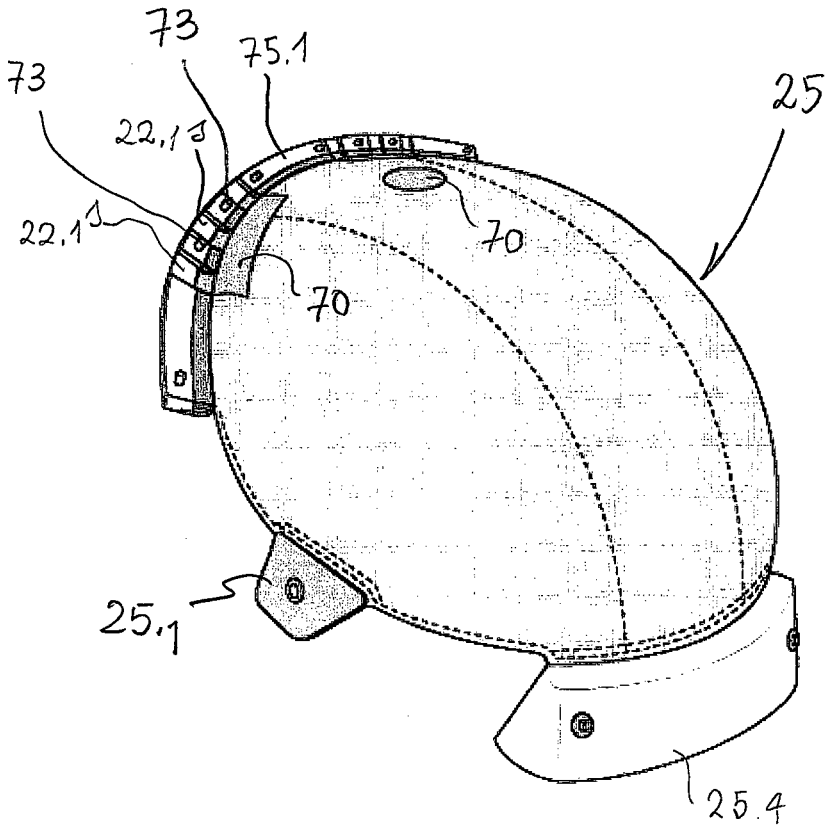

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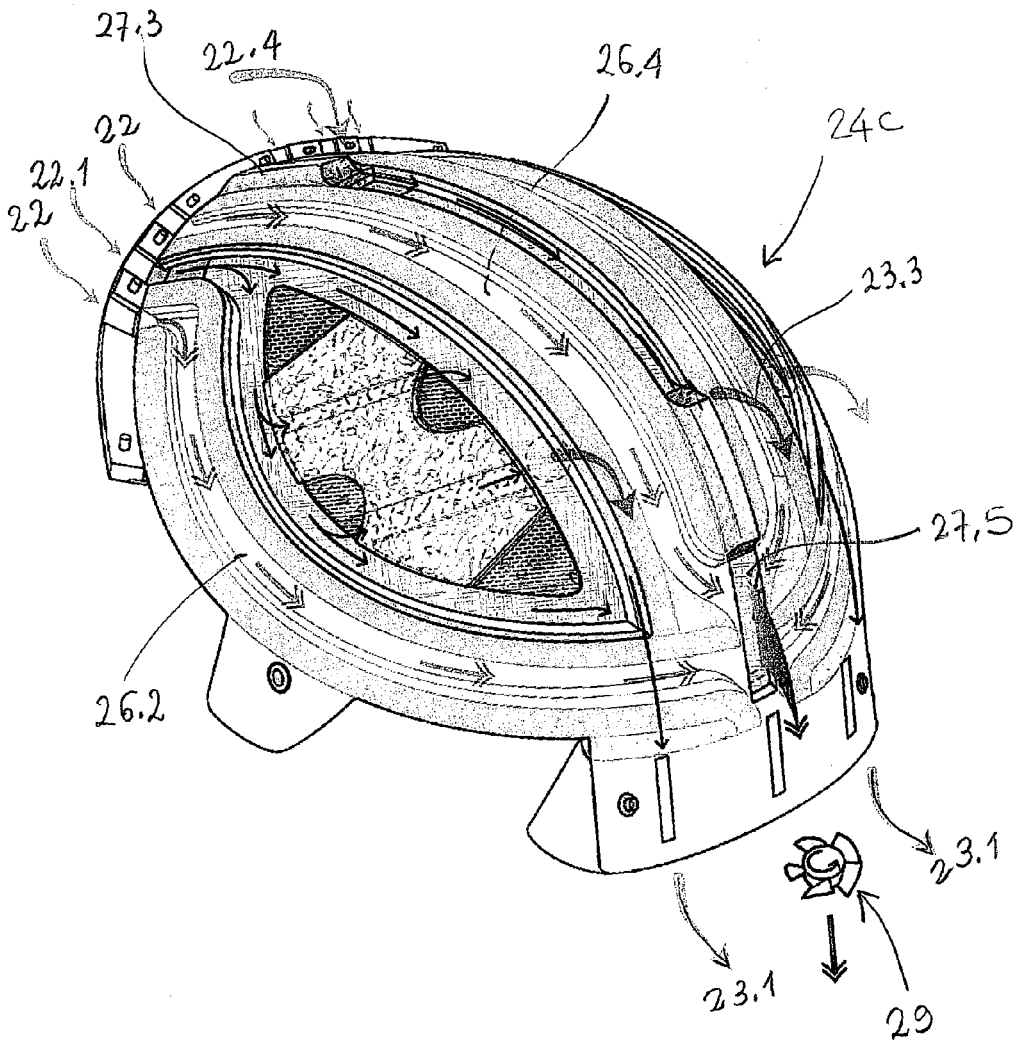

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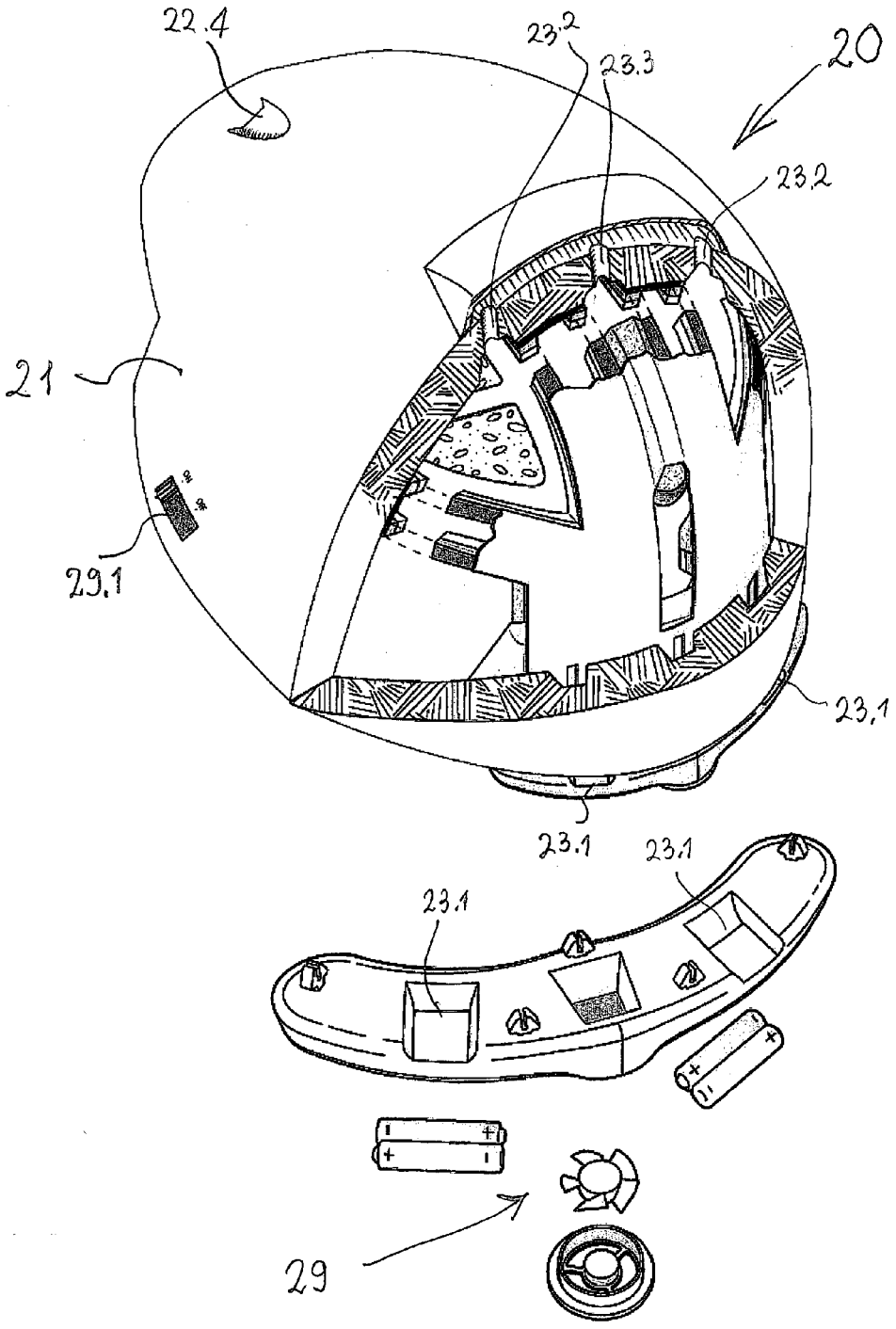

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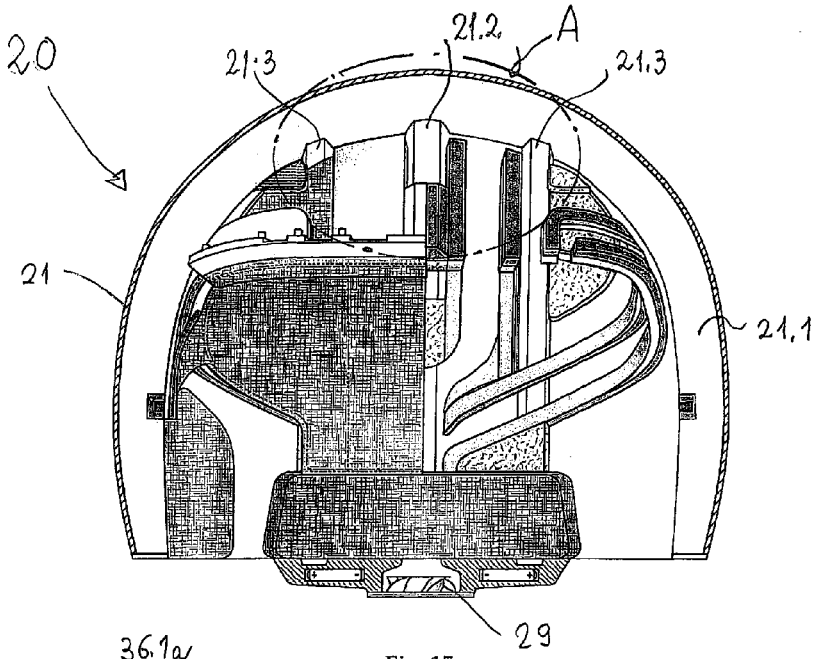

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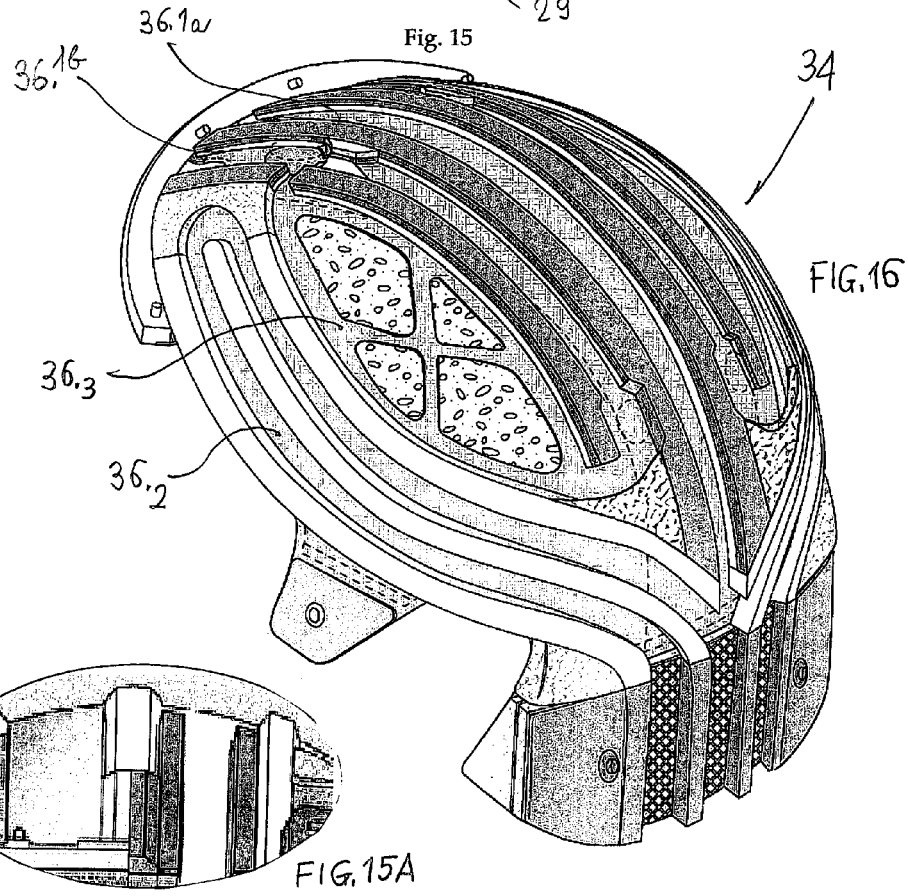
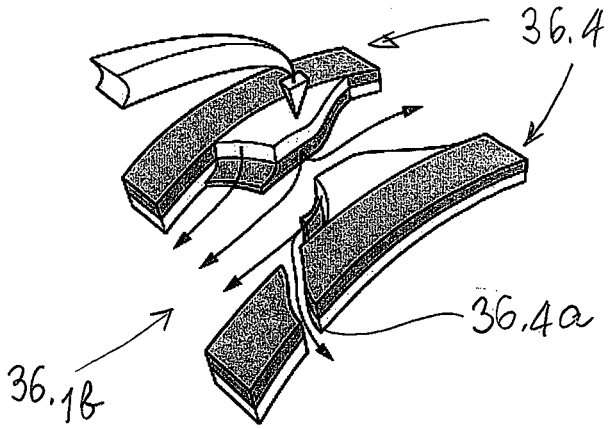


FIG.16

FIG.15A



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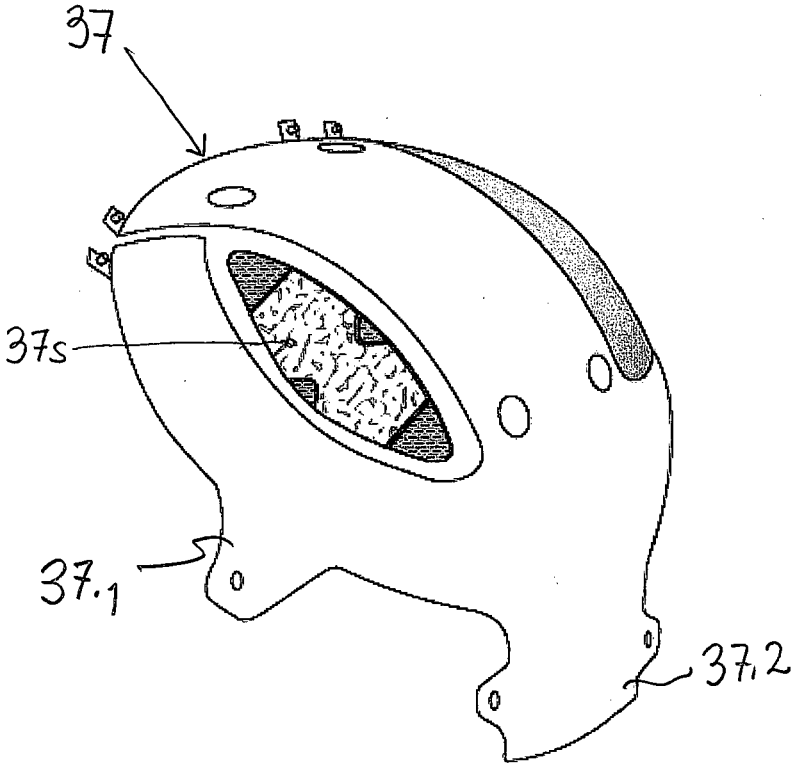

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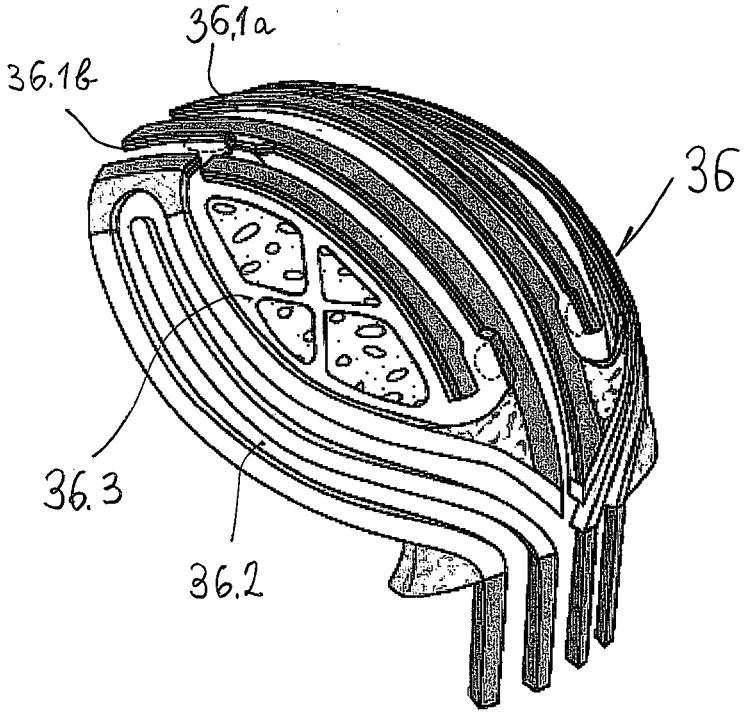

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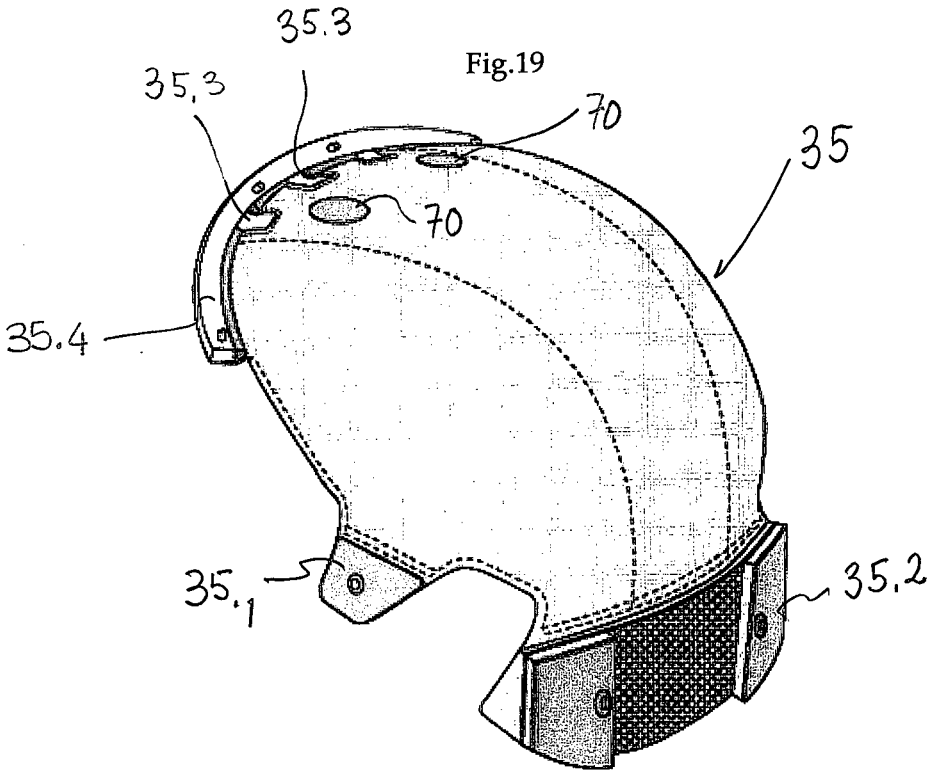

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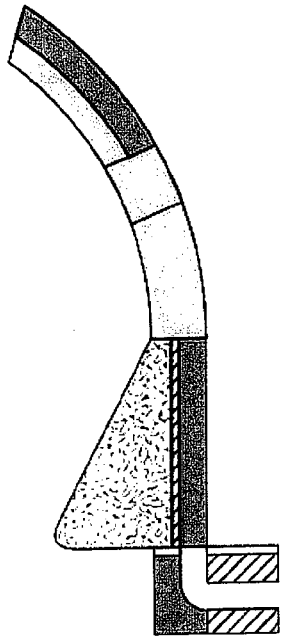

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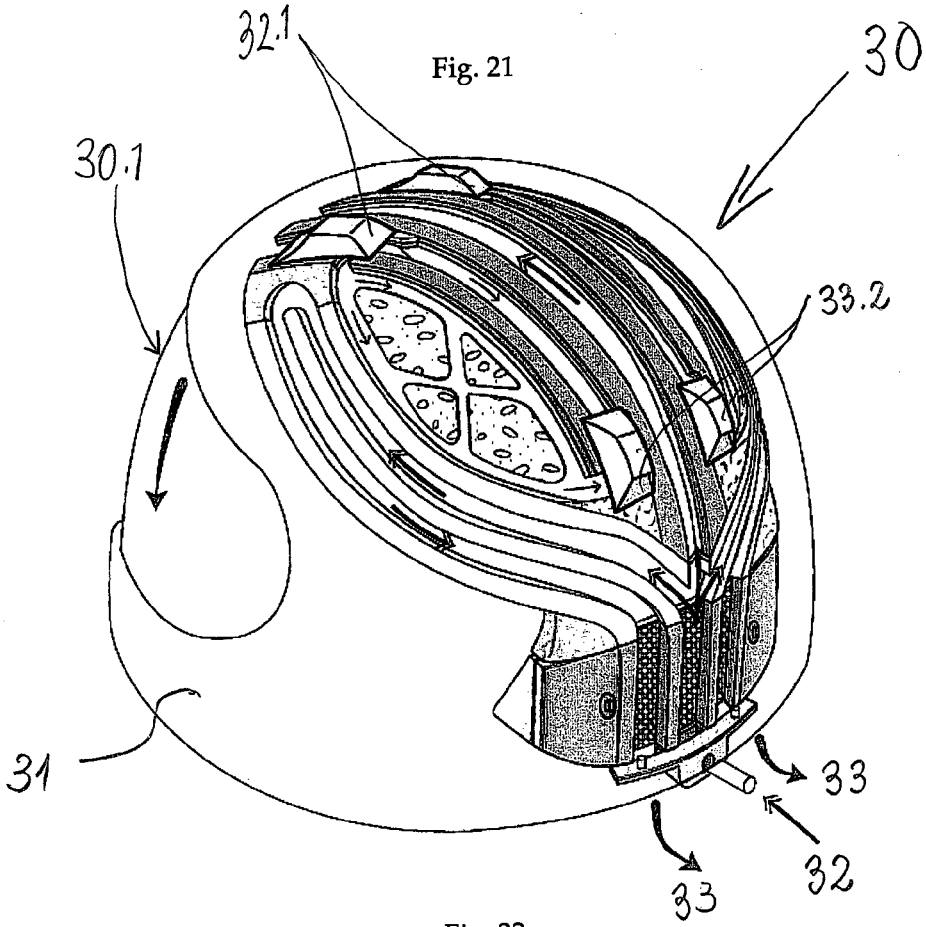

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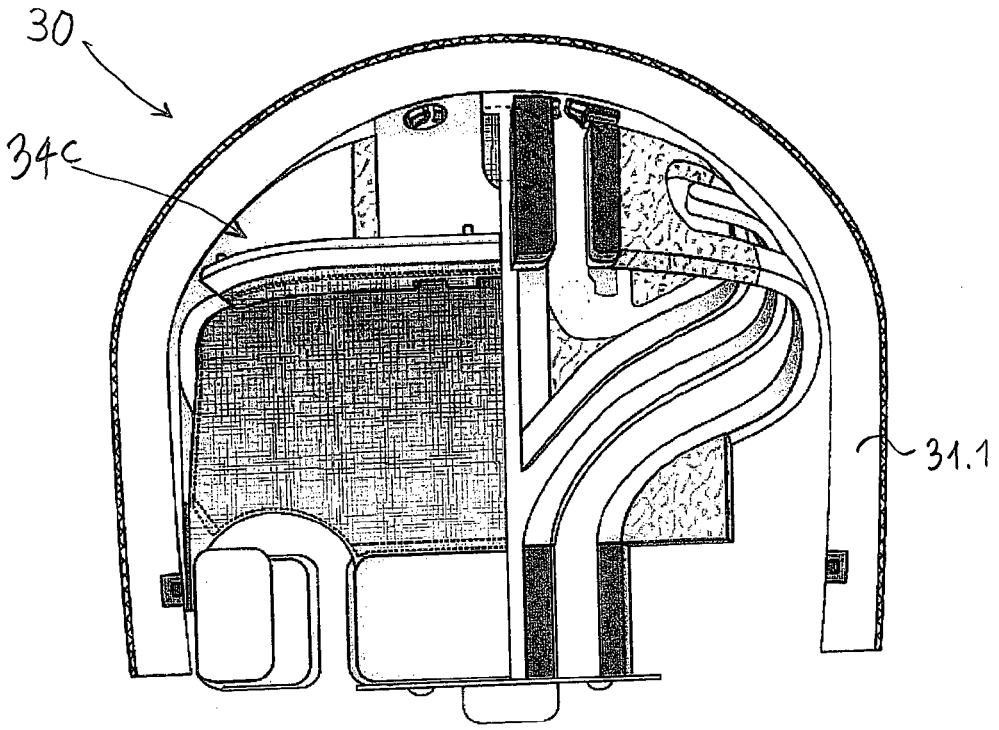

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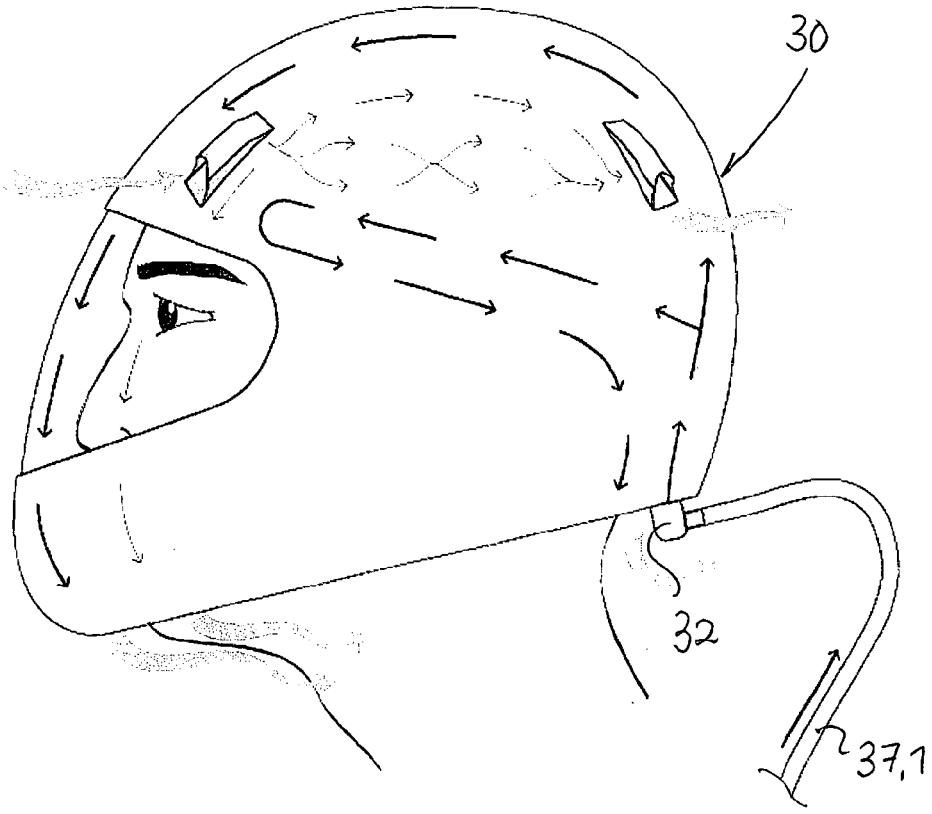

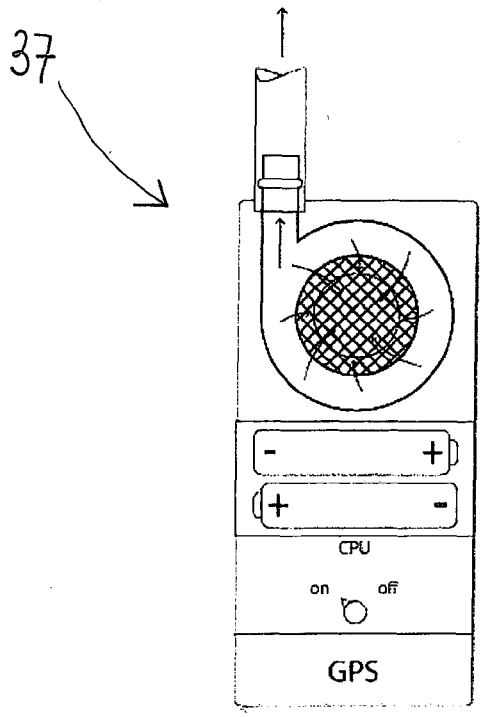

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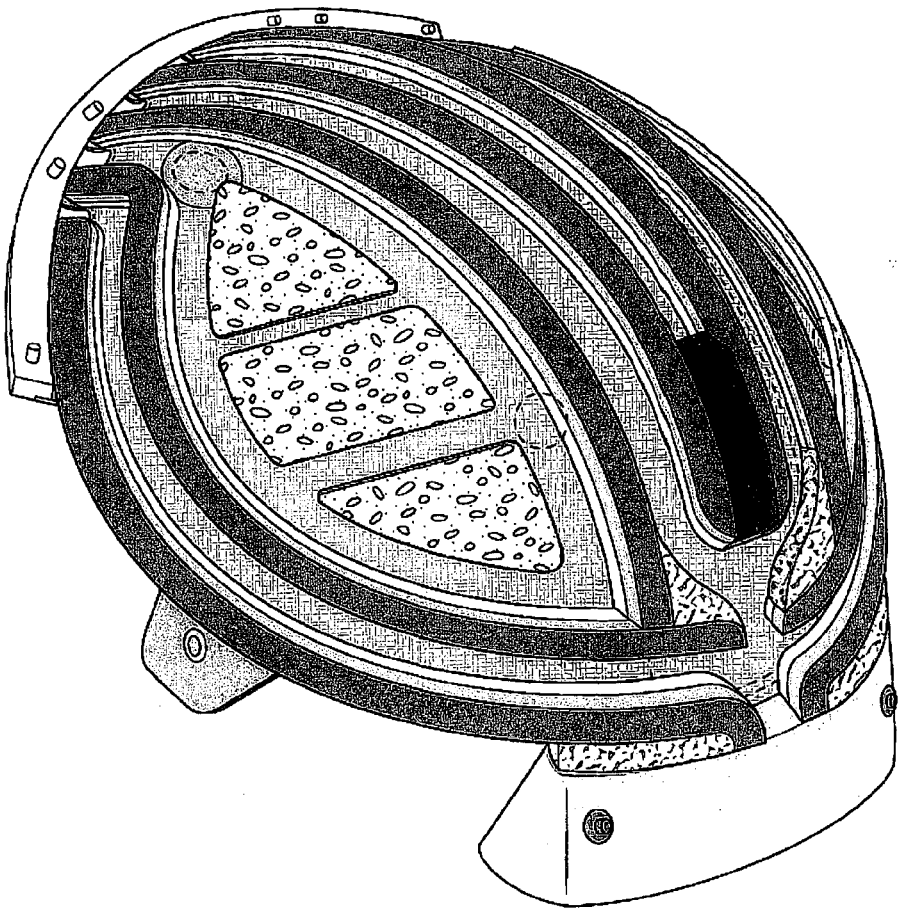

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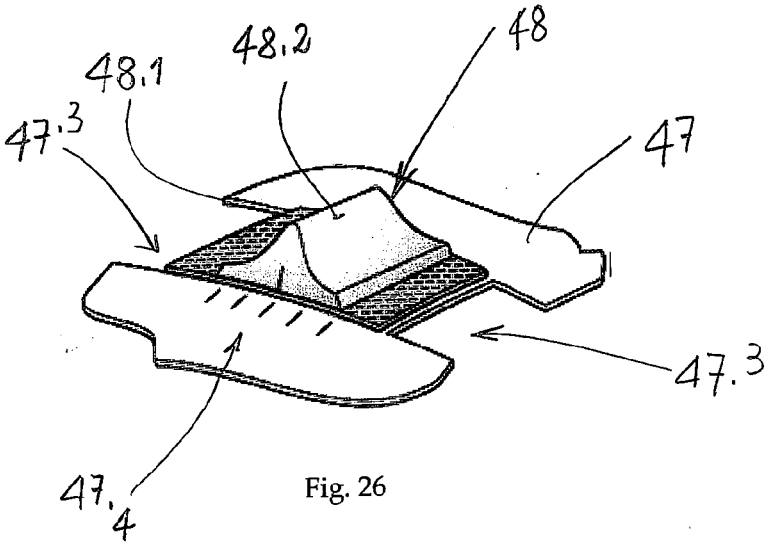

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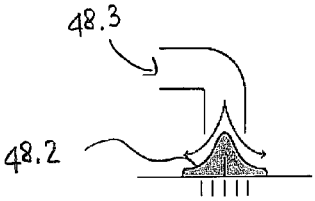


Fig. 26a

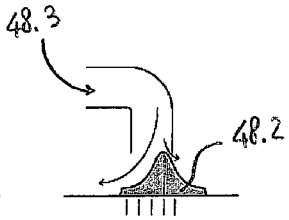


Fig. 26b

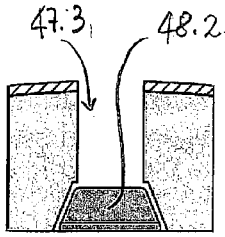
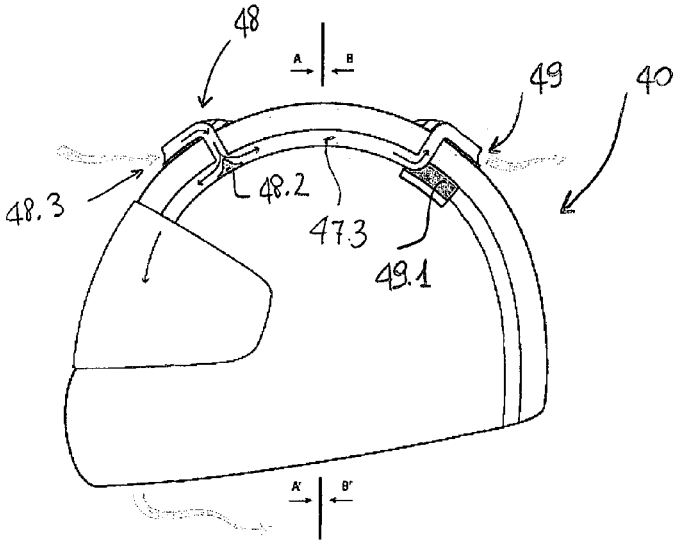


Fig. 26c



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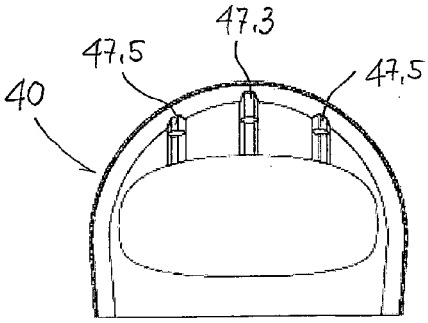

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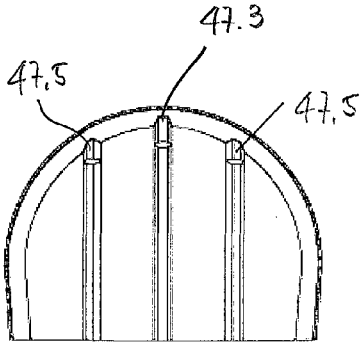

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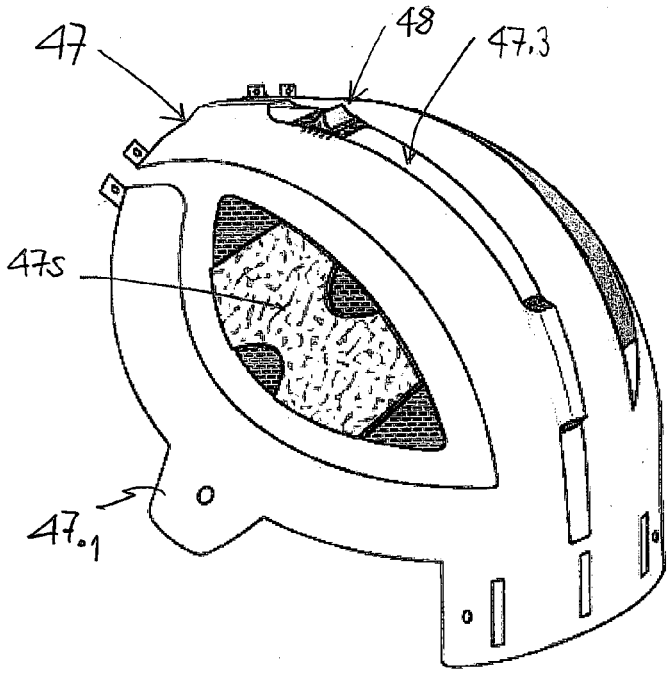

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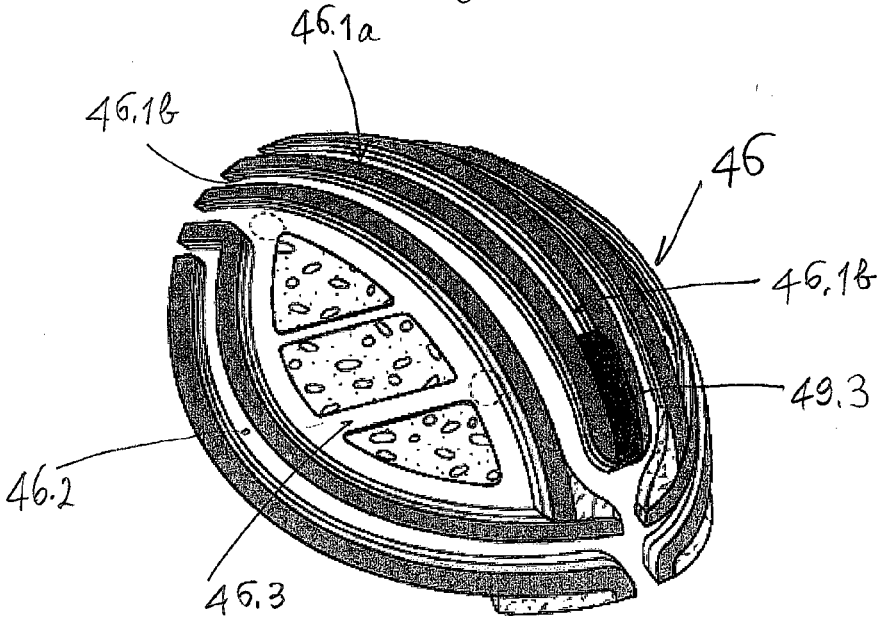

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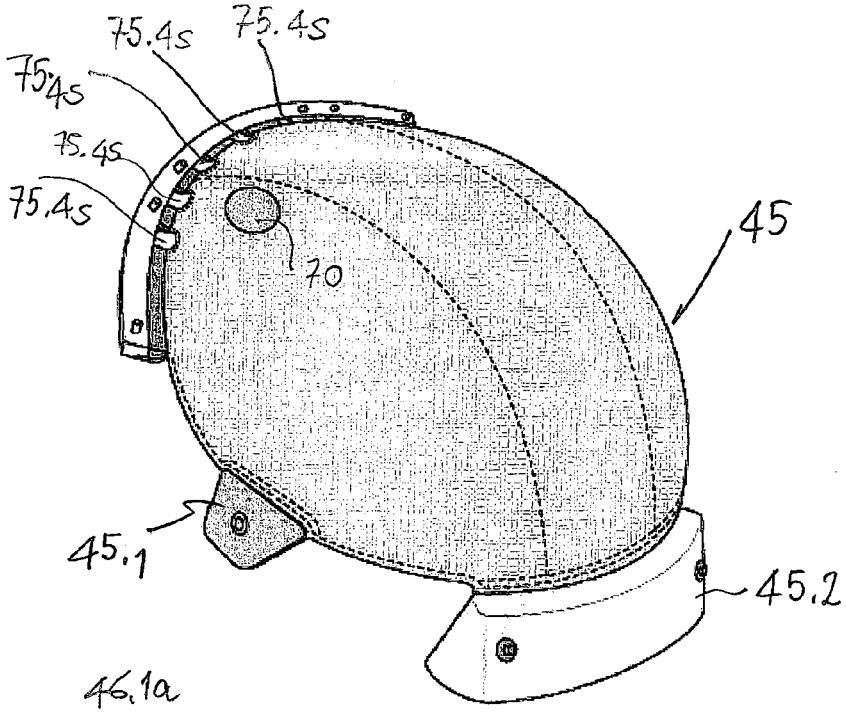
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45.2

Fig. 29

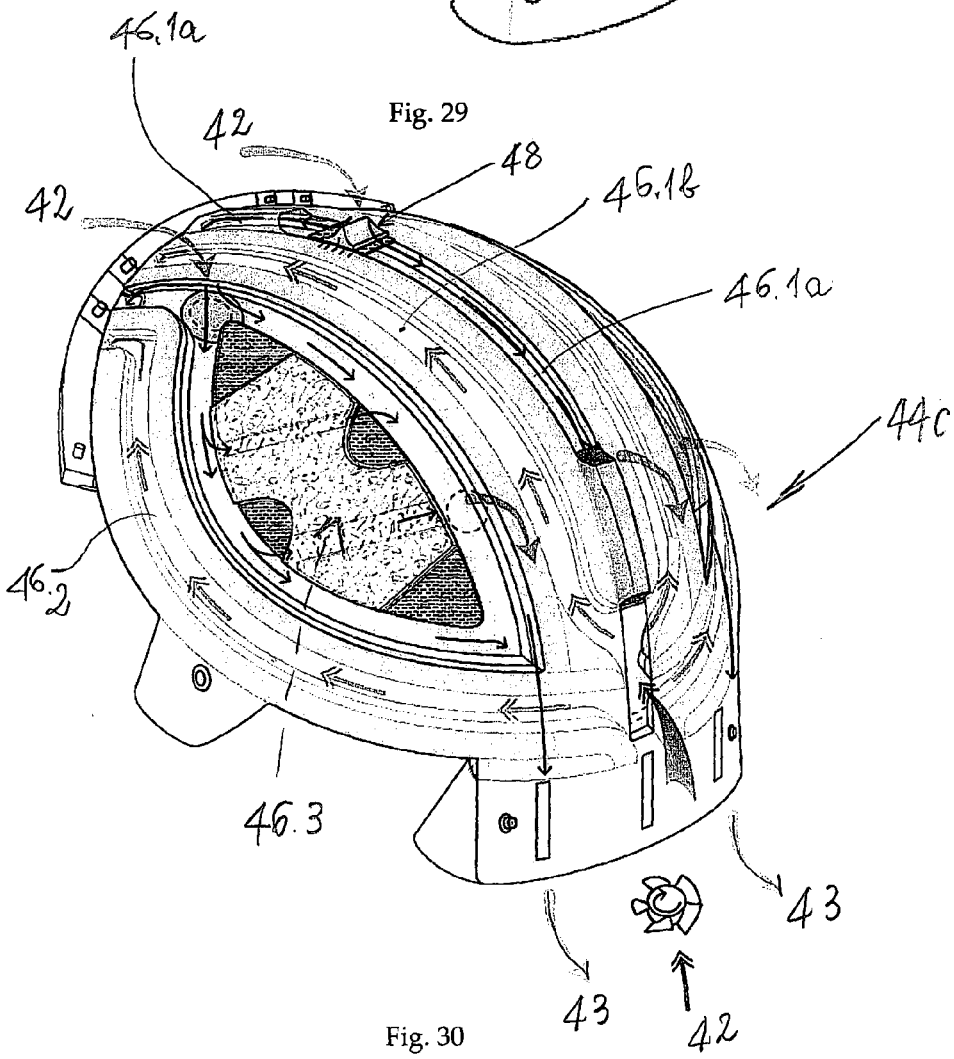
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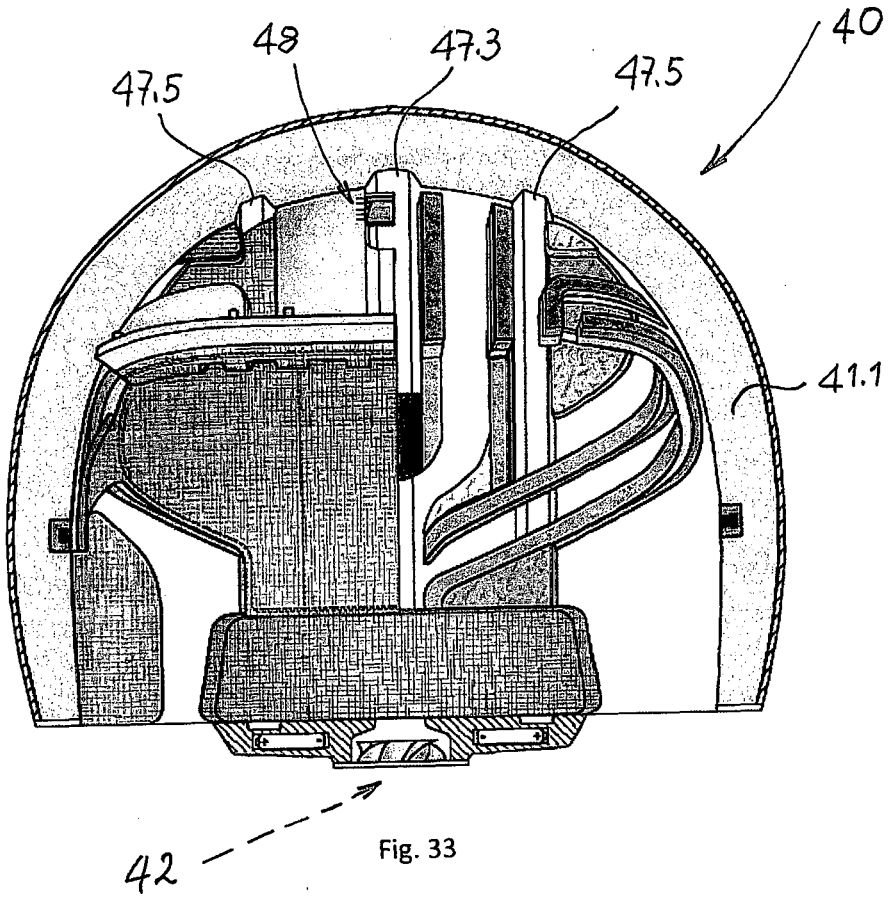
Fig. 30



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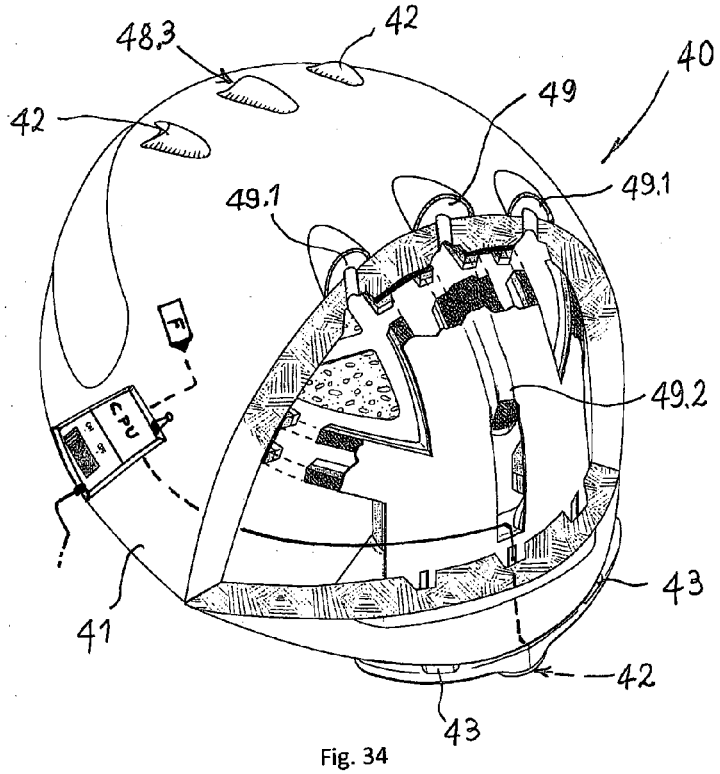

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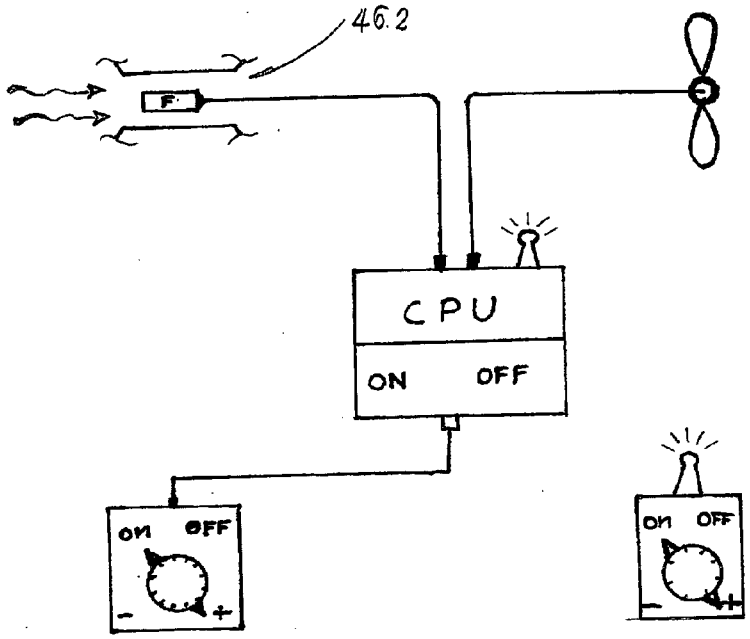
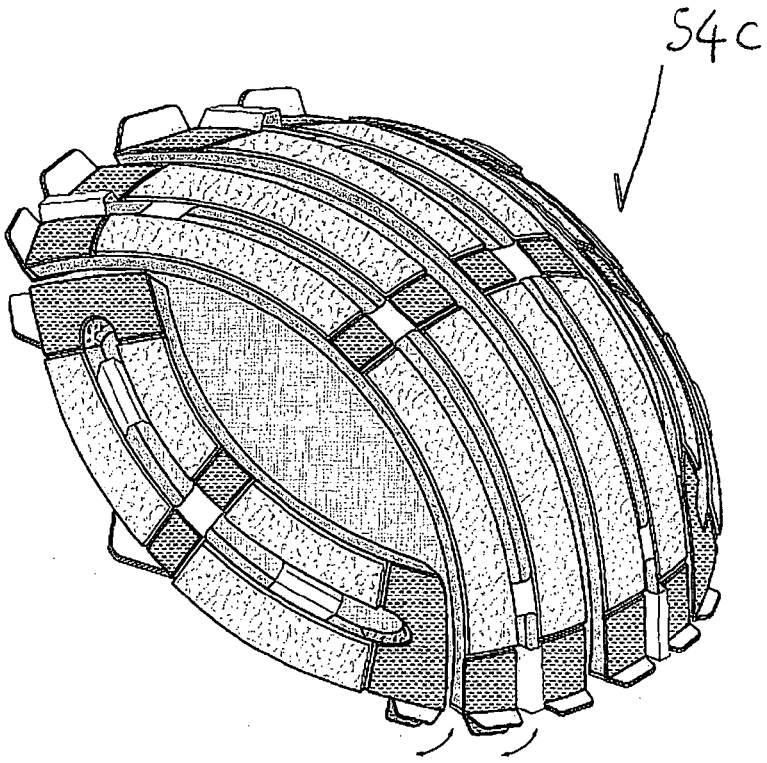


Fig. 34A



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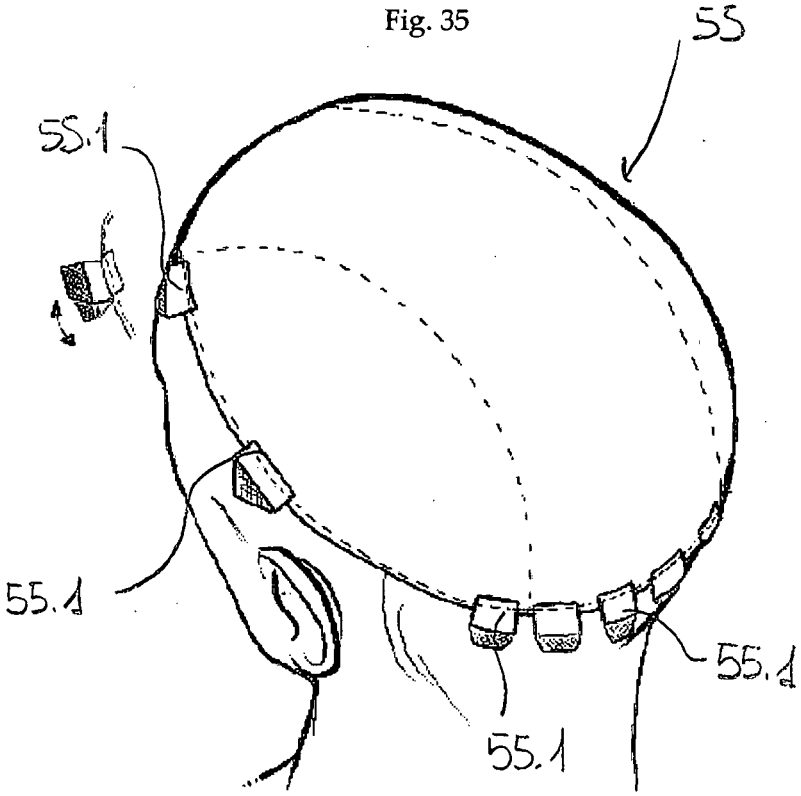

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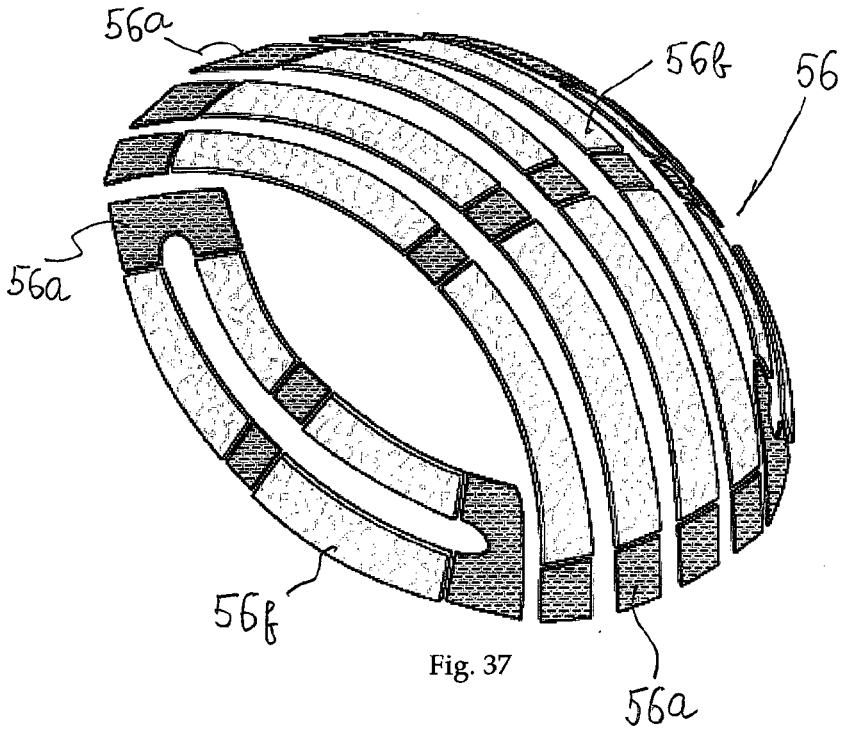

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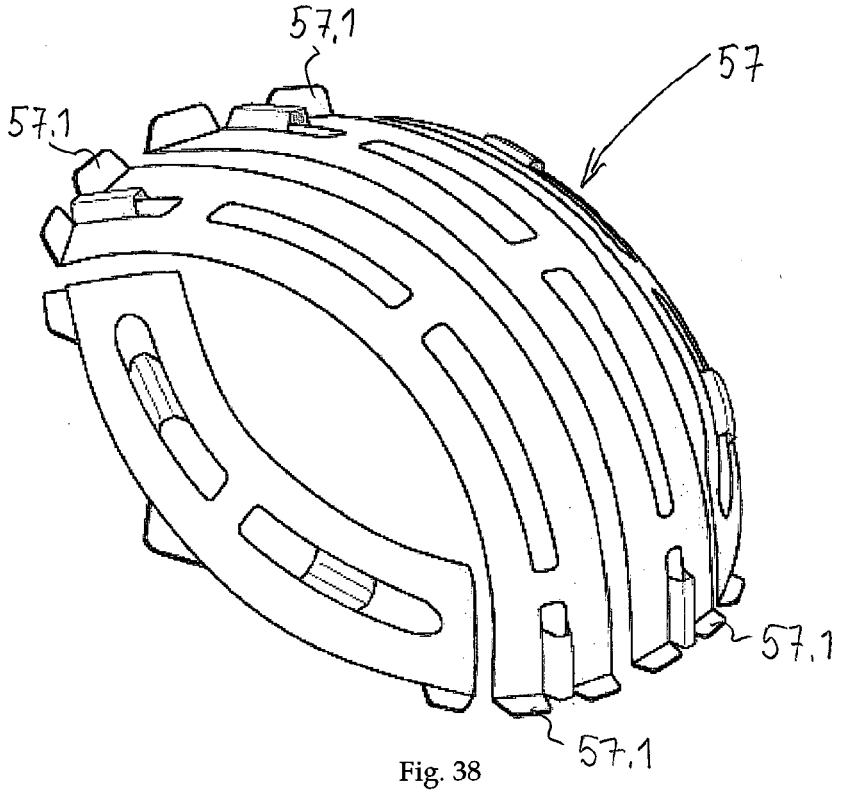

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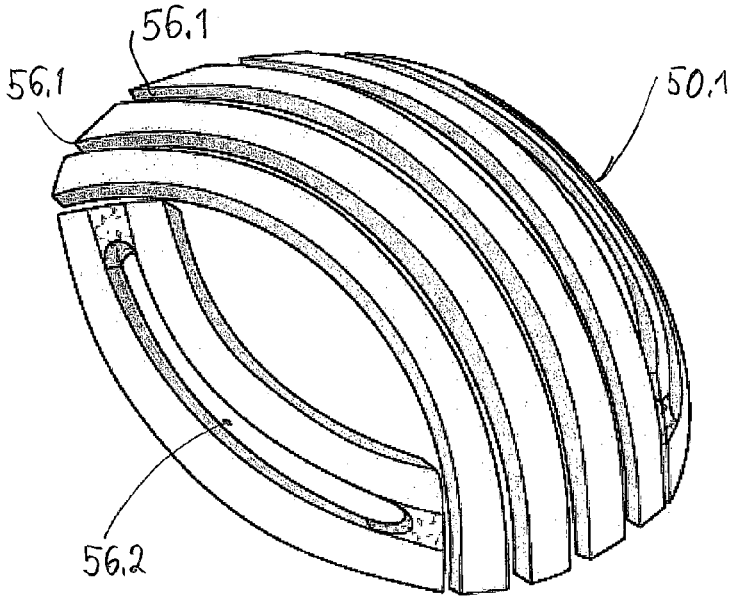
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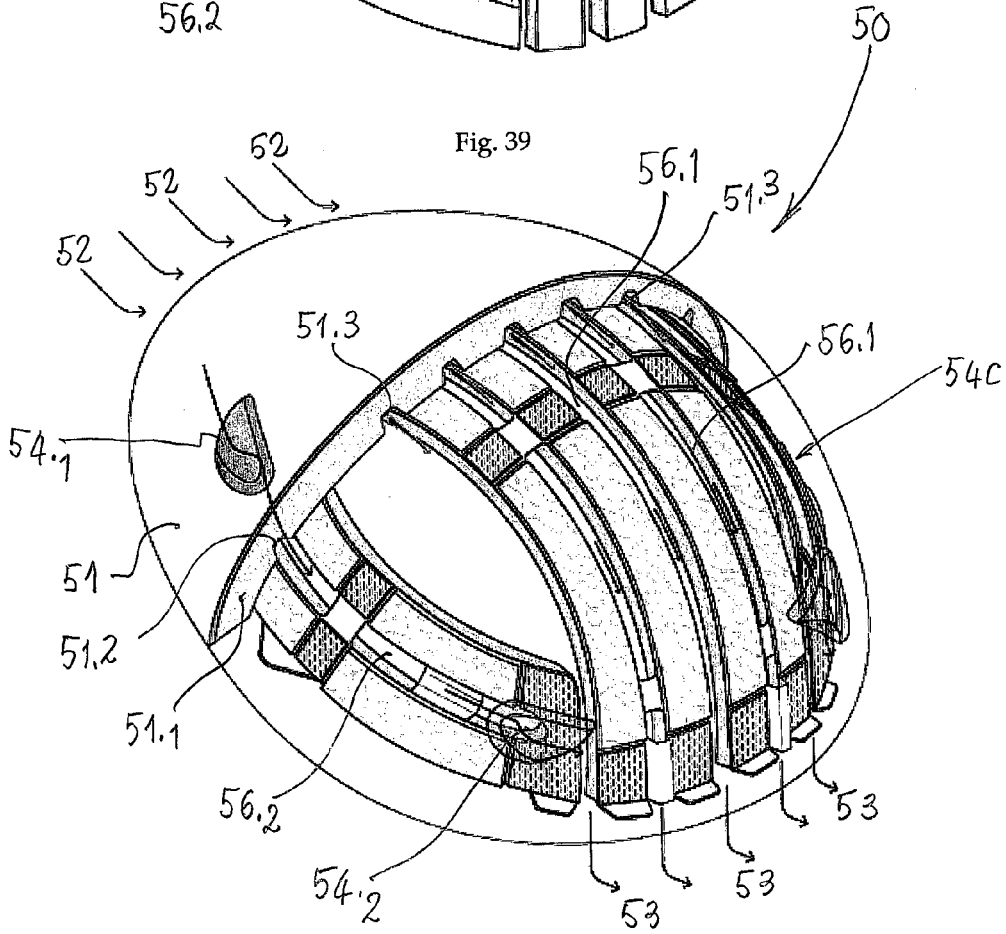
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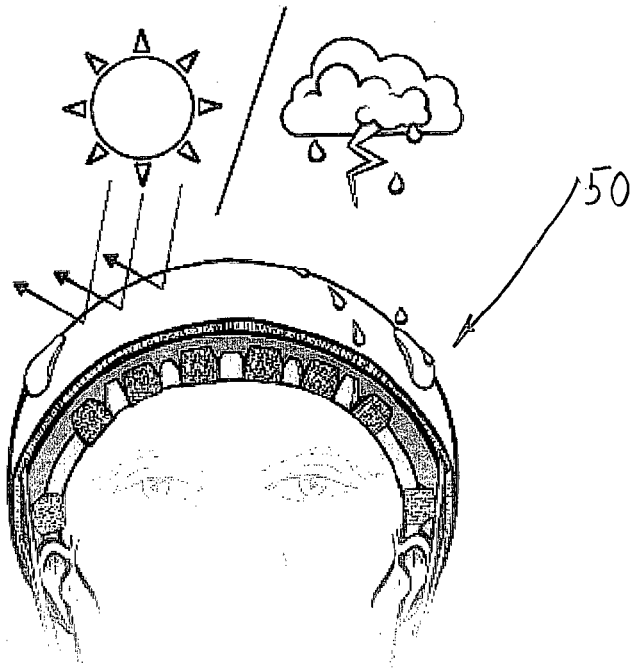
53

Fig. 40



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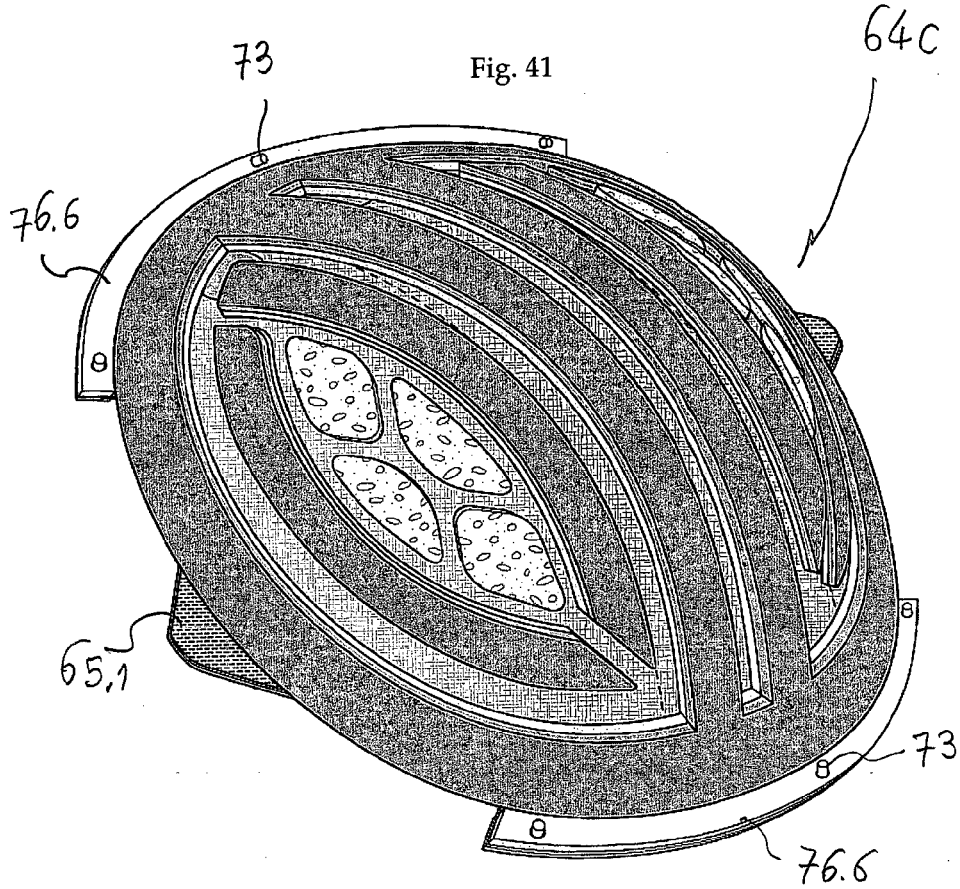

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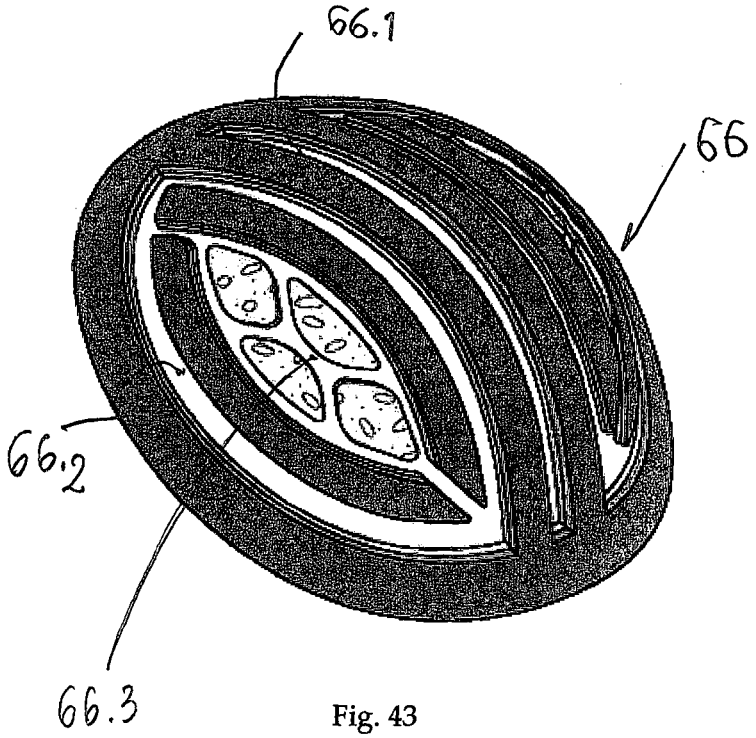

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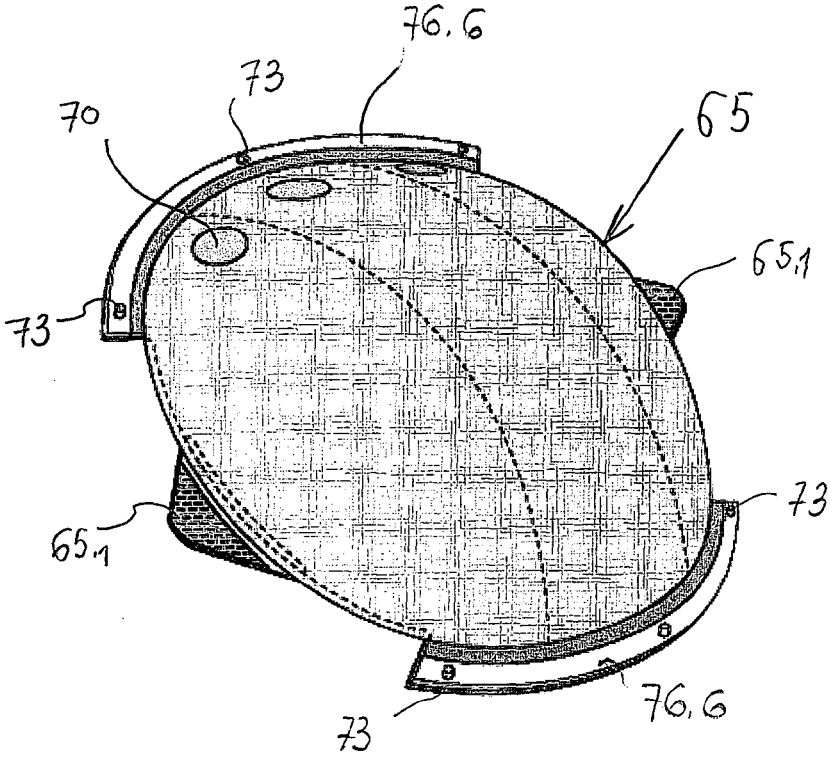
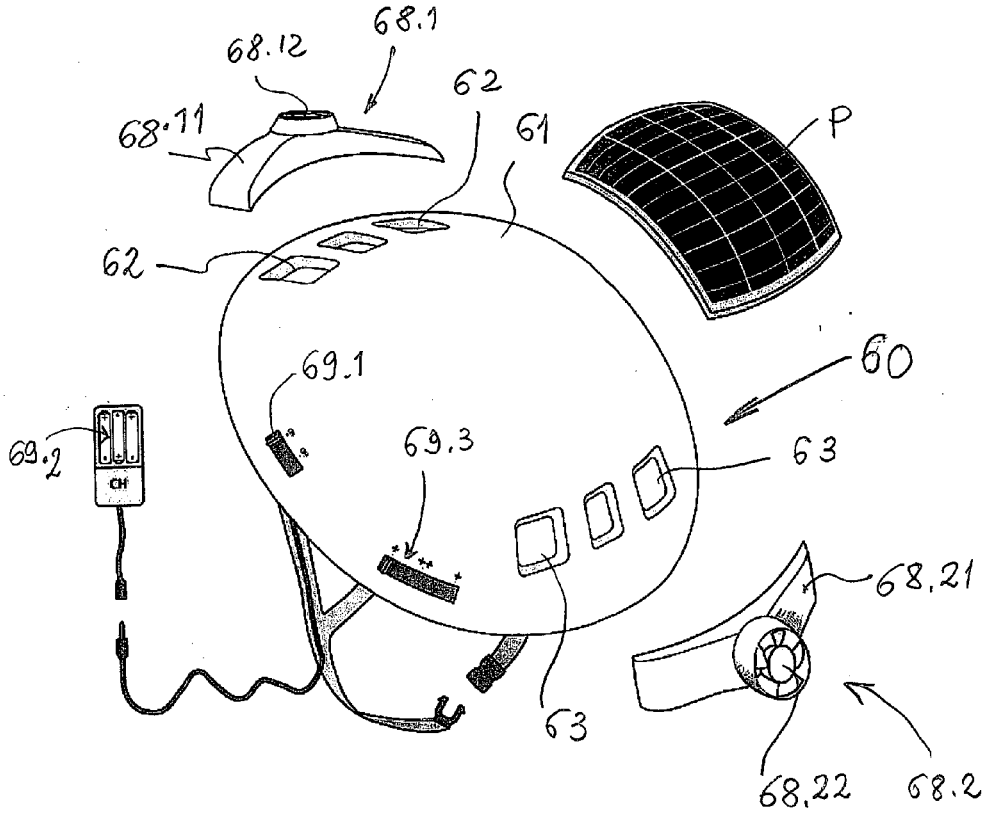


Fig. 44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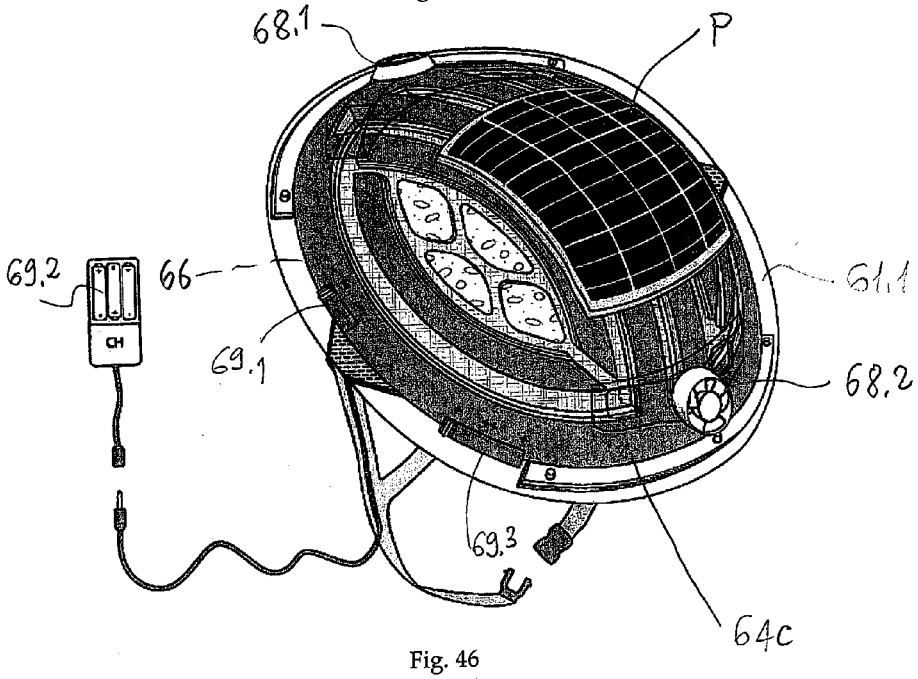
68.2

Fig. 45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68.2
69.3
64c

Fig. 46

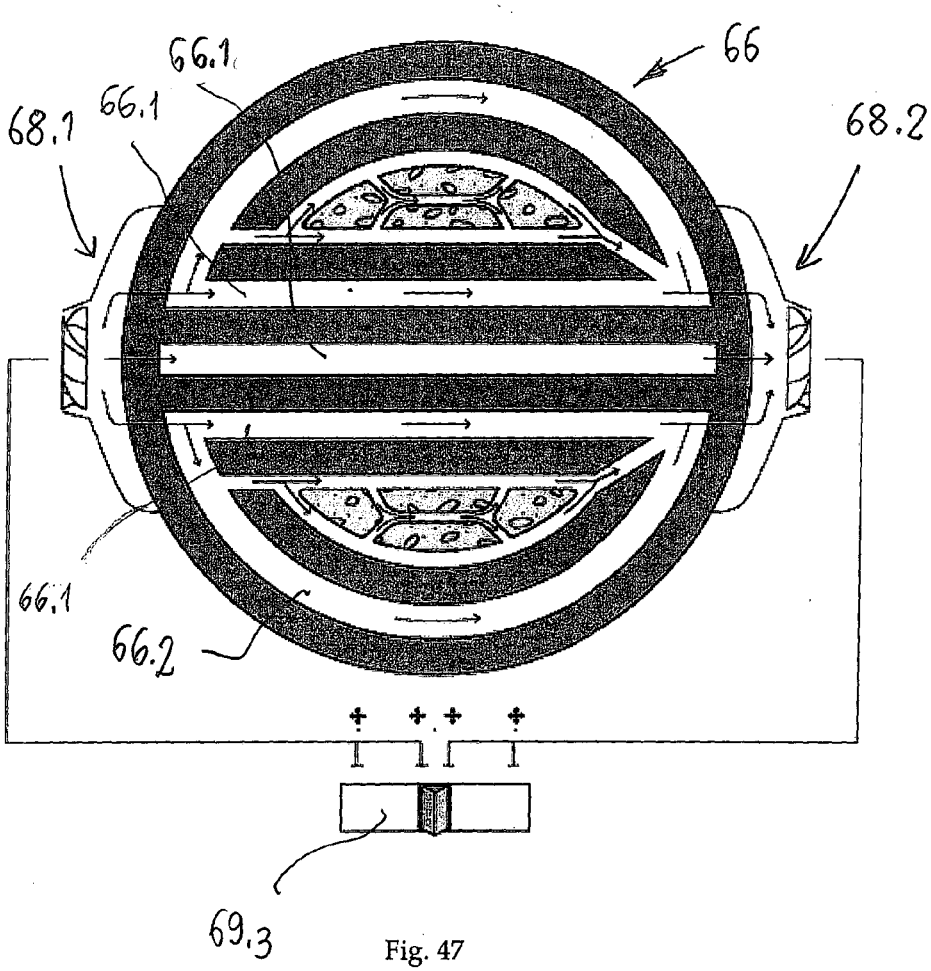

Fig. 47

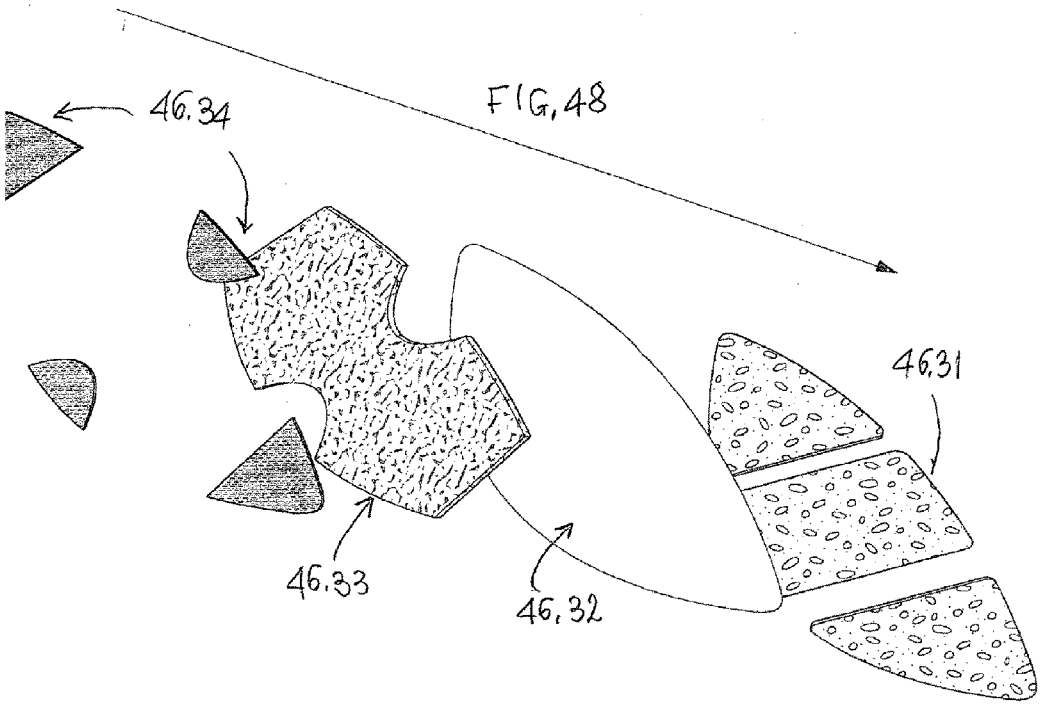

FIG. 48

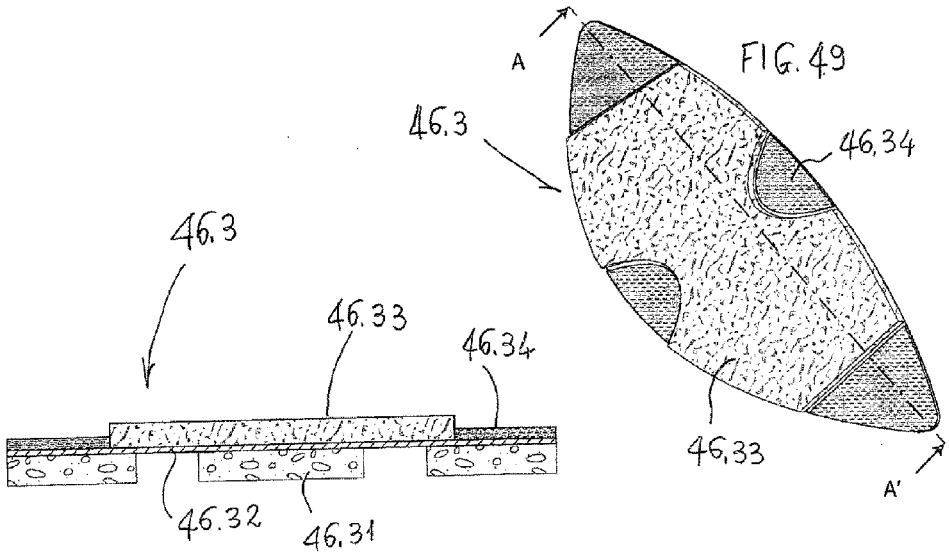

FIG. 49

FIG. 50

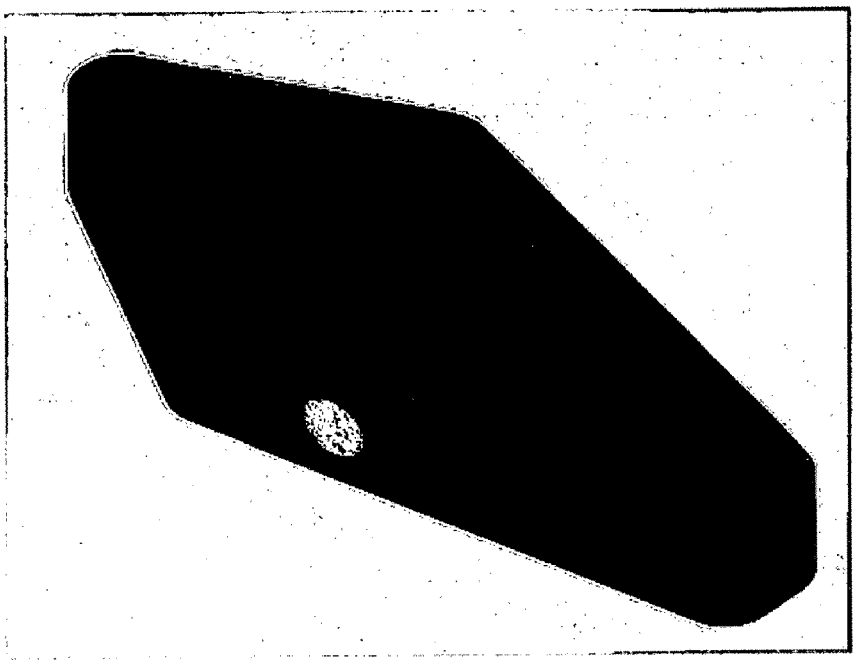

Fig. 51

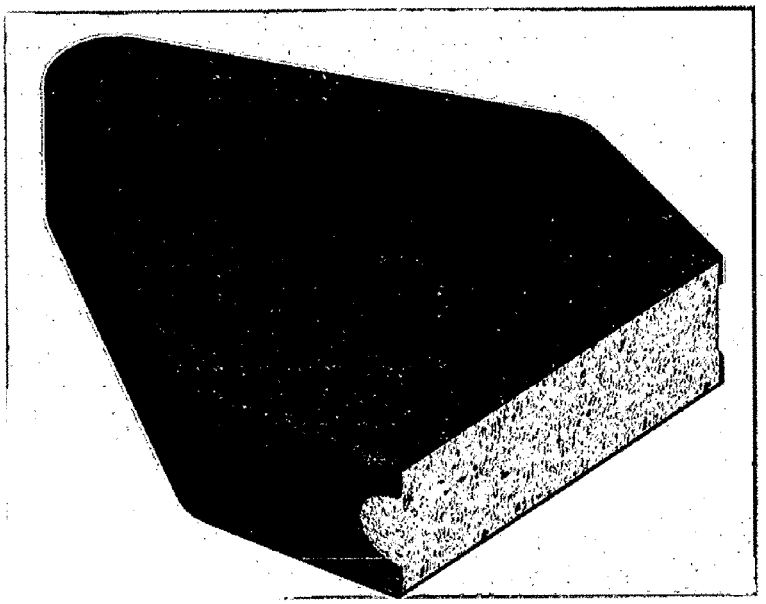

Fig. 52

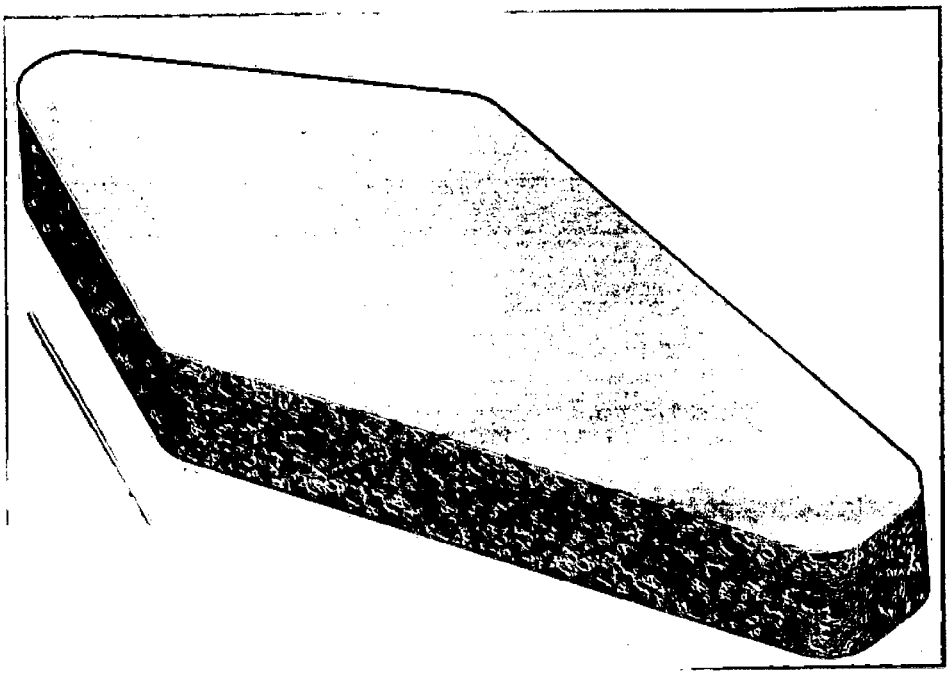

Fig. 53

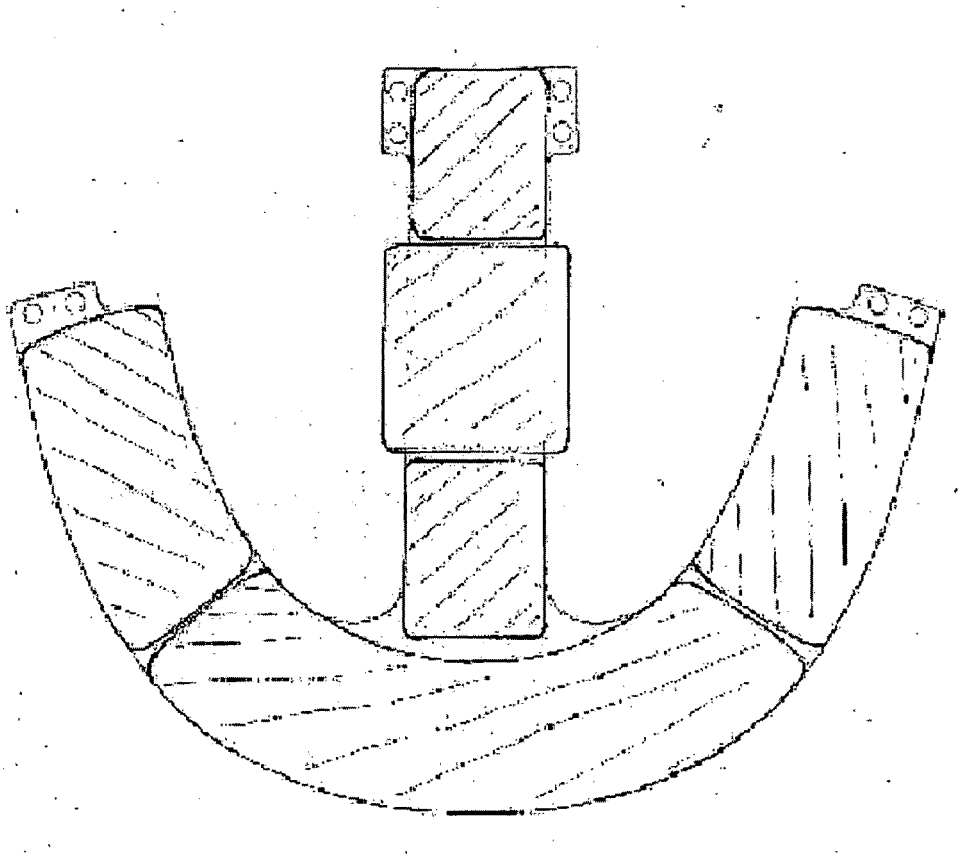

Fig. 54

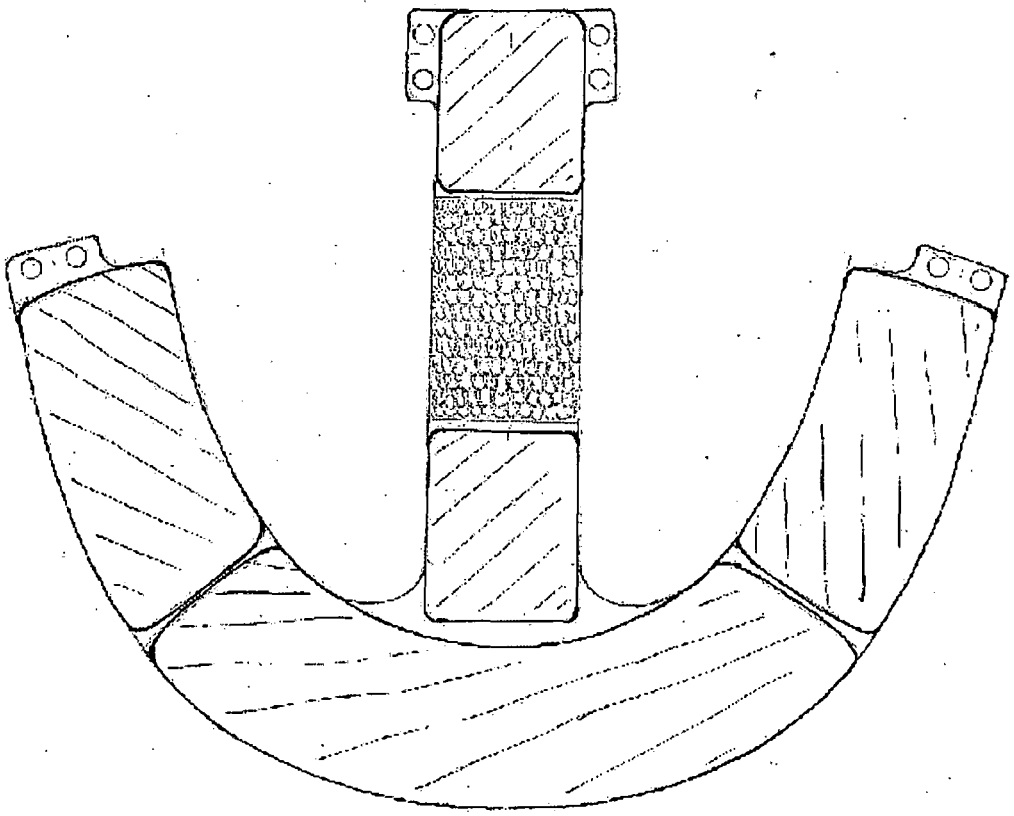

Fig. 55

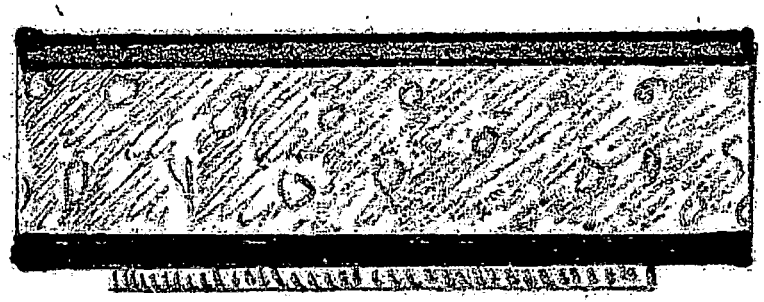

Fig. 56

SAFETY HELMET

[0001] The present invention relates to a safety helmet.

[0002] More specifically, the present invention relates to a safety helmet, such as e.g. a motorcycle helmet, a bicycle helmet, or a yard helmet, having features that allow a sensible implementation of air circulation on the inside, so as to increase the comfort level of the person wearing it.

[0003] As it is known, helmets of the type specified fulfill the important function of protecting the head from possible injuries due to impact or objects falling from above.

[0004] Normally, said known helmets consist of a rigid outer shell, of an inner part with anatomical shape for the fit, made of material (e.g. expanded polystyrene (EPS) or the like) suitable for absorbing and deadening the force of impact resulting from impact, that is from bodies falling from above, and also of a layer, made of more or less soft material depending on needs, arranged in contact with the scalp; more specifically, within the scope of modern motorcycle, bicycle and automobile helmets, the latter layer can be extracted from the helmet itself, in order to be easily washed and sanitized. It is well known that certain helmets are provided with dismountable paddings extended up to the cheek area.

[0005] As it is known, the human body takes advantage of the removal of heat given by the evaporation of the sweat for the purposes of automatically adjusting the surface temperature of the skin and scalp. An essential condition for this to occur is the exposure of the skin and of the scalp to an environment capable of absorbing the vapors generated by the changing state of the sweat from liquid to gaseous. One of the main drawbacks encountered in using helmets or other known rigid head protections lies in that it limits or prevents the natural aeration of the scalp, which is moreover one of the areas of the body provided with the greatest quantity of sweat glands, thus limiting or preventing the evaporation of the sweat.

[0006] Obviously, this largely contributes to generating a particular unpleasant condition of discomfort in the person wearing it, which is more perceptible the higher the temperatures of the environment in which the person is.

[0007] Therefore, the need is perceptibly felt to improve the overall thermal comfort of the person, particularly with reference to helmets usually used within the scope of motor racing, cycling and motorcycling.

[0008] In the state of the art, in order to promote air circulation and to generate a sensation of increased comfort and refreshment in the person, said helmets, by taking advantage of the aerodynamics generated by the speed of movement of the person wearing the helmet on a means of locomotion (e.g. cycles, motorcycles or open vehicles), may be provided with ventilation holes and, in certain variants, with canalizations made by means of top grooves arranged longitudinally and/or transversally, obtained in the related anatomically shaped inner part, which is advantageously located inside the shell. In order to better adapt the inner shape of the helmet to the shape of the user's head, which is different from one individual to the next, said padding is made with a layer of soft material such as sponge rubber or the like, which is in turn covered with fabric which, due to its increased deformability, makes the fit comfortable.

[0009] However, in the parts in which said anatomically shaped inner part has said aeration grooves, and also close to the aeration openings, when the helmet is put on, the increased level of deformability of the material with which said padding is made contributes, albeit partially, to occluding aeration channels and said openings obtained in the anatomical part of the helmet, thus limiting the passage of the air and therefore the evaporation of the sweat, combined with the resulting unpleasant sensation for the person wearing the helmet.

[0010] On the other hand, the airflow is further prevented by the presence of regular padding in the case of helmets without said channels obtained in the anatomical part.

[0011] In some known helmets an attempt has been made to allow the padding to contribute to the ventilation by means of grooves and/or canalizations obtained in the padding itself. However, in said known helmets, the compression of said paddings causes swelling of said grooves, at least partially narrowing the lateral walls of said grooves and/or canalizations, reducing the passage section of said air flows.

[0012] A further drawback has been found, in said known helmets, in the presence of openings in said paddings that allow the air flows to come into direct contact with the head of the person wearing said helmet, exposing said openings such as ventilation holes or grooves to the intrusion of hair, at least partially occluding said sections for the air flows to run through.

[0013] A further limitation of the paddings of said known helmets, made by coupling sponge rubber parts with fabric parts, using for example glues or heat sealing, lies in the fact that the characteristics of wettability and breathability of said fabric are at least partially compromised. Moreover, the use of stitching to assemble the various constituent parts of said padding at least partially prevents the diffusion of sweat and occupies a part of the passage sections of the air.

[0014] A further drawback of the paddings of said known helmets, which provide said canalizations by means of more or less soft materials and covering fabrics, is that they have a structure that is difficult to access for inspection and cleaning.

[0015] Therefore, it is apparent how the transpiration of the skin is significantly limited within the scope of said known helmets, due to the poor evaporation of the sweat, which regulates the temperature thereof.

[0016] It is further noted how said traditional paddings, in particular when they are in environments characterized by particularly hot climates, are impregnated with sweat, which becomes stagnant without the possibility to transpire for almost the entire period in which the helmet is worn by the person, in state of use, promoting the proliferation of bacterial loads.

[0017] Starting from the notion of such drawbacks, the present invention intends remedying them.

[0018] An object of the present invention is to provide a safety helmet which promotes the transpiration and the evaporation of the sweat generated on the head skin of the person wearing it.

[0019] Moreover, it is likewise an object of the present invention to provide a helmet as said, which promotes air circulation in the head area of the person wearing it, thus contributing to the perception thereby of a condition of increased comfort during use of the helmet itself, also in the presence of particularly hot weather conditions. Additionally, it is an object of the present invention to provide a helmet as indicated, which may be easily cleaned and sanitized after the related use.

[0020] Another object again of the present invention is to provide a helmet as specified, provided with front visor, and in which the visor itself may be demisted during the use of the helmet itself.

[0021] Another object of the invention is to provide a helmet provided with a dismountable padding, which allows the fit and characteristics of elastic response of the parts forming the padding to be varied.

[0022] Yet another object of the present invention is to provide a padding provided with inserts capable of partially absorbing the impact force due to accidental impacts.

[0023] On the other hand, it is an object of the present invention to provide a helmet as mentioned, which has a simple structure, is easy to maintain, and is easy to make on an industrial scale with relatively contained costs.

[0024] In view of such objects, the present invention provides a safety helmet, which essential feature is the subject-matter of the main claim, while further advantageous features of the invention are described in the dependent claims.

[0025] More specifically, said safety helmet according to the present invention, including a rigid outer shell and an inner part, made to absorb and deaden any impact endured by said helmet and having possible transverse and/or longitudinal grooves obtained in at least one portion of said inner part, possibly extending from the front zone to the rear zone of said inner part and passed through by the air introduced through at least one possible corresponding air intake opening and at least one possible corresponding air extraction opening, at least one of said longitudinal grooves forming a respective and possible intake opening and a respective and possible air extraction opening, said safety helmet being possibly provided with at least one air intake opening and at least one air extraction opening provided on the external shell for introducing and extracting air, respectively, into and from said helmet and comprising an inner padding which provides a canalization structure for conducting air:

[0026] between said at least one air intake opening and said at least one air extraction opening, and/or

[0027] between at least one front opening provided by means of at least one end of said canalization structure, and at least one air extraction opening, provided by means of at least another end of said canalization structure, which structure at least partially occupies the interspace present between the head of a person wearing the helmet and said inner part of the helmet itself,

[0028] is characterized in that it comprises a cap, which, when the helmet is worn by said person, cooperates with said padding to provide a plurality of air channels at said canalizations of said padding and covers the head of the person at least at the padding itself, while it is kept in tension on the head itself, preventing hair and organic material from occluding at least partially said air channels, and which is made of a material that absorbs moisture as a result of wettability and uniformly distributes at least part of the sweat of the head of the person, preventing it from being retained in said padding, and in that said cap is dismountably connected with respect to said padding, respectively to said helmet.

[0029] Moreover, said safety helmet according to the invention is characterized in that said padding is made of a spongy and/or elastomeric material and comprises grooves that form said canalizations for conducting air when said helmet is worn.

[0030] The aforesaid claims are intended integrally indicated herein.

[0031] The present invention will become more apparent from the detailed description hereinafter, with reference to the drawing attached hereto, by pure and simple way of example and therefore nonlimiting, in which:

[0032] the figures from **1** to **5** show, by means of respective perspective top views, a first embodiment of a safety helmet according to the present invention, without the aeration grooves obtained in the anatomically shaped part of said helmet, in which the outer shell of the helmet itself is omitted for reasons of illustrative clarity, and in which FIG. **3** shows a canalization structure of the helmet padding, made by way of example with partitions of various shapes, FIG. **2** shows a semirigid support of said padding, FIG. **4** a cap of said padding and provided with fixing elements to the helmet, FIG. **5** is a detailed view in vertical section of the rear nape zone of the padding itself, while FIG. **1** shows said canalization structure, overlapping said cap;

[0033] FIG. **6** is a perspective top view showing the aforesaid padding according to the figures from **1** to **5**, inserted inside the shell of a helmet, shown only by means of the outline and provided with air intake openings, which are made by means of said padding along the front edge (not visible but diagrammatically shown by means of stylized flow arrows), with a top middle intake opening (diagrammatically shown by means of a stylized flow arrow), with two air extraction nape openings (stylized in the figure), lower air extraction back openings (diagrammatically shown by means of stylized flow arrows), and a flexible air extraction tube, in said lower back part; said flexible tube being connected, removably, with respect to said helmet and conducting said air flows to an air aspirator device external to the helmet, and diagrammatically shown in the lower section of said FIG. **6**;

[0034] FIG. **7** is a front view, in vertical section, of the helmet according to the figures from **1** to **6**, a partial view of which shows the padding provided with said cap and with said flexible support, while the other partial view shows the canalization structure of said padding;

[0035] FIG. **8** is a detailed sectional view according to the line A-A in FIG. **7**;

[0036] the figures from **9** to **13** show, by means of respective perspective top views, a second embodiment of a safety helmet according to the present invention, provided with grooves obtained in the anatomically shaped part of the helmet itself, in which the outer shell of the helmet itself is omitted for reasons of illustrative clarity, and in which FIG. **11** shows a canalization structure of the helmet padding, FIG. **10** shows a semirigid support of said padding, FIG. **12** a cap of said padding and provided with fixing elements to the helmet, said parts forming the inner padding of the helmet shown in FIG. **13**, while FIG. **9** shows said canalization structure, overlapping said cap;

[0037] FIG. **14** is a perspective top, rear and section plane view, with exploded parts, showing the helmet according to said second embodiment of the invention, arranged for connection to an air aspiration system, shown in an exploded view;

[0038] FIG. **15** is a front view, in vertical section, of the helmet according to the figures from **9** to **14**, a partial view

of which shows the padding provided with said cap and with said flexible support, while the other partial view shows the canalization structure of said padding;

[0039] FIG. **15**A is a detailed view, on enlarged scale of the detail A of FIG. **15**;

[0040] the FIGS. **16** and from **18** to **20** show, by means of respective perspective top views, a third embodiment of a safety helmet according to the present invention, without aeration grooves obtained in the inner part thereof, in which the outer shell of the helmet itself is omitted for reasons of illustrative clarity, and in which FIG. **19** shows a canalization structure of the helmet padding, FIG. **18** shows a semirigid support of said padding, FIG. **20** a cap of said padding and provided with fixing elements to the helmet, said parts forming the inner padding of the helmet, and FIG. **16** shows said canalization structure overlapping said cap;

[0041] FIG. **17** is a diagrammatic detailed view, on enlarged scale, showing an aerodynamically shaped air flow director block positioned inside a top canalization of the helmet padding according to said third embodiment;

[0042] FIG. **21** is a detailed view, in vertical section, of the rear nape zone of the helmet padding according to said third embodiment;

[0043] FIG. **22** is a perspective top view showing the aforesaid padding according to the figures from **16** to **21**, inserted inside the shell of a helmet, shown by means of the outline alone and provided with two top air intake openings, with two air extraction nape openings, with two lower air extraction back openings, and with a forced air inlet flexible tube, connected removably and provided in said lower back part;

[0044] FIG. **23** is a front view, in vertical section, of the helmet according to the figures from **16** to **22**, a partial view of which shows the padding provided with said cap and with said flexible support, while the other partial view shows the canalization structure of said padding;

[0045] FIG. **24** is an elevated diagrammatic side view of the helmet according to said third embodiment, in which said forced air inlet flexible tube is removably connected with respect to said helmet and connects a forced air inlet device external to the helmet, and diagrammatically shown in the lower part of said FIG. **24**;

[0046] the FIGS. **25** and from **27** to **30** show, by means of respective perspective top views, a fourth embodiment of a safety helmet according to the present invention, provided with aeration grooves obtained in the anatomically shaped inner part, in which the outer shell of the helmet itself is omitted for reasons of illustrative clarity, and in which FIG. **28** shows a canalization structure of the helmet padding, FIG. **27** shows a semirigid support of said padding, FIG. **29** a cap of said padding and provided with fixing elements to the helmet, said assembled parts forming the inner padding of the helmet shown in FIG. **30**, while FIG. **25** shows said canalization structure overlapping said cap;

[0047] FIG. **26** is a diagrammatic detailed view, on enlarged scale, showing a flow selector/deviator device provided on the back of the padding, coupled in shape with an aeration groove obtained on the anatomically shaped inner part of the helmet, according to the FIGS. **27**, **26***c*, **30** and **31**;

[0048] FIGS. **26***a* and **26***b* diagrammatically show, and on different scale, different operating arrangements of said selector/deviator device;

[0049] FIG. **26***c* is a diagrammatic view, and on different scale, of the cross section of the slider positioned coupled in shape in the respective aeration groove at an air inlet opening, according to said fourth embodiment of the invention;

[0050] FIG. **31** is a diagrammatic, side elevation and partially broken view of the helmet according to said fourth embodiment;

[0051] FIGS. **32***a* and **32***b* are views, in vertical section according to line A-A', B-B', respectively, in FIG. **31**, in which the aeration grooves obtained in the anatomically shaped part of said helmet are shown;

[0052] FIG. **33** is a front view, in vertical section, of the helmet according to the figures from **25** to **32***b*, a partial view of which shows the padding provided with said cap and with said flexible support, while the other partial view shows the canalization structure of said padding;

[0053] FIG. **34** is a perspective top, rear and section plane view showing the helmet according to said fourth embodiment of the invention, diagrammatically representing a removable forced air inlet device, with related electronic functional control means of said device;

[0054] FIG. **34**A is an example of a diagram of said electronic control means, applied to the helmet according to FIG. **34**;

[0055] the figures from **35** to **39** show, by means of respective perspective top views, a fifth embodiment of a safety helmet according to the present invention, provided with canalizations obtained in the inner wall of said anatomically shaped part, in which the outer shell of the helmet itself is omitted for reasons of illustrative clarity, and in which FIG. **36** shows a cap made of dual elasticized fabric provided with Velcroed fixing tabbings, FIG. **39** shows a canalization structure of said padding, FIG. **38** shows a multicomponent semirigid support of said padding and provided with Velcroed tabs on the lower face (solution not shown in the drawings), corresponding to just as many tabbings arranged on the free outline of said cap, FIG. **37** shows Velcro® type fixing means, unmovably fixed) on the back of said semirigid support and intervalled by filler material of the sponge rubber type, said assembled parts forming said padding as shown in FIG. **35**, and also corresponding to said dismountable fixing means fixed on the back of said padding are just as many Velcro® type fixing means, unmovably fixed on the anatomically shaped inner part of the helmet providing to fix said padding;

[0056] FIG. **40** is a perspective top, and partial plane view of the helmet according to said fifth embodiment, provided with grooves in the inner part;

[0057] FIG. **41** is an elevated diagrammatic front view of the helmet according to said fifth embodiment of the invention, with explicative videograms;

[0058] the figures from **42** to **44** show, by means of respective perspective top views, a sixth embodiment of a safety helmet according to the present invention, in the condition in which said helmet is without said grooves obtained in the anatomically shaped part and in which the outer shell of the helmet itself is omitted for reasons of illustrative clarity, and where FIG. **42** shows a canalization structure overlapping said cap with respective fixing means with respect to the outline of the helmet, FIG. **43** shows a canalization structure of the helmet padding, FIG. **44** shows a removable cap;

[0059] FIG. **45** is a perspective top view, and with exploded parts, of the helmet according to said sixth embodiment, in which there are also diagrammatically indicated removable electric/electronic means and photovoltaic panel means with which the helmet itself is provided;

[0060] FIG. **46** is a view similar to the one in FIG. **45**, but in which the outer shell of the helmet is omitted for explicative clarity and said padding is glued to the anatomically shaped inner walls of the helmet;

[0061] FIG. **47** is a diagrammatic flat view of the canalization structure of the helmet according to said sixth embodiment, with illustrative depiction of the aerodynamic flows controlled by means of a device for selecting forced air flow generator means;

[0062] the figures from **48** to **50** show a perspective and exploded view, respectively, which are elevated and sectional according to the line A-A' in FIG. **49**, of a part of the padding of said helmet according to said sixth embodiment;

[0063] FIGS. **51** and **52** respectively show, in a perspective overall view and a perspective cross sectional view, padded cushion means made of spongy material, for producing canalizations with tortuous orientation, in the padding of the helmet according to the invention;

[0064] FIG. **53** is a perspective overall view of the fillet means made of spongy material, provided with a layer of material with low coefficient of friction on a face facing, when installed, the cap of the helmet according to the invention;

[0065] FIGS. **54** and **55** are plan views of a semirigid support of the helmet according to the invention, developed in a flat view, and provided with a part removably connected to the base of the support itself, by means of dismountable means of Velcro® type, part which is removed in FIG. **55**;

[0066] FIG. **56** is a diagrammatic cross sectional view, on enlarged scale, of said semirigid support part of FIG. **54**, shown in dismounted state and formed by a composite fillet, and provided with finishing means, for making canalizations for conducting air of the padding of the helmet according to the invention.

[0067] With reference to the drawings, the safety helmet according to the present invention is indicated with the following numerals **10** (first embodiment—FIG. **6**), **20** (second embodiment—FIG. **14**), **30** (third embodiment—FIG. **22**), **40** (fourth embodiment—FIG. **34**), **50** (fifth embodiment—FIG. **40**) and **60** (sixth embodiment—FIG. **45**), respectively.

[0068] Said safety helmet **10**, **20**, **30**, **40**, **50**, **60** comprises, in known manner, a rigid outer shell and an anatomically shaped inner part, absorbing the impact and made of expanded plastic material, e.g. such as expanded polystyrene.

[0069] By way of example, said rigid outer shell **11**, **21**, **31**, **41**, **51**, **61** has air intake openings **12.1** (FIG. **6**), **22.4** (FIGS. **13** and **14**), **32.1** (FIG. **22**), **42**, **48.3** (FIG. **34**), **54.1** (FIG. **40**), and air intake openings connectable to auxiliary air blowing means, **62** (FIG. **45**) and air extraction openings **13.1** (FIG. **6**), **23.2**, **23.3** (FIG. **14**), **33.2** (FIG. **22**), **49**, **49.1** (FIG. **34**), **54.2** (FIG. **40**), and air extraction openings connectable to auxiliary air extraction systems, **63** (FIG. **45**).

[0070] It is in particular to be noted that the air intake openings **12** in helmet **10** comprise an opening **12.1** provided in the helmet, and a plurality of front air intake openings **12.2**, provided in padding **14***c*.

[0071] Said impact absorbing anatomical inner part, which is indicated with **11.1** (FIG. **7**), **21.1** (FIG. **15**), **31.1** (FIG. **23**), **41.1** (FIG. **33**), **51.1** (FIG. **40**), **61.1** (FIG. **46**), may be provided in the top part with aeration grooves, which can possibly run through a portion of said anatomical part or possibly extend longitudinally from the front part to the nape part, **21.2**, **21.3** (FIG. **15**), **47.3**, **47.5** (FIGS. **33**, **32***a*, **32***b*), **51.3** (FIG. **40**) of said safety helmets, respectively **20**, **40**, **50**, including the respective front openings **22.1** (FIG. **13**), **75.4***s* (FIG. **29**), **52** (FIGS. **40**, **41**) and the respective back openings **23.1** (FIG. **29**), **43** (FIG. **30**), **53** (FIG. **40**).

[0072] Moreover, said anatomical inner part may be provided with aeration grooves **51.2** in the temple part of said anatomical part **51.1**, which extend longitudinally from the front zone to the nape zone, as shown in FIG. **40**.

[0073] In accordance with the invention, the aforesaid safety helmet comprises an inner padding **14***c* (FIG. **7**), **24***c* (FIG. **13**), **34***c* (FIG. **23**), **44***c* (FIG. **30**), **54***c* (FIG. **35**), **64***c* (FIG. **42**). Said inner padding comprises an air canalization structure made for example at least partially of spongy material, indicated with **16** (FIG. **3**), **26** (FIG. **11**), **36** (FIG. **19**), **46** (FIG. **28**), **50.1** (FIG. **39**), **66** (FIG. **43**).

[0074] Moreover, said inner padding comprises a cap indicated with **15** (FIG. **4**), **25** (FIG. **12**), **35** (FIG. **20**), **45** (FIG. **29**), **55** (FIG. **36**), **65** (FIG. **44**), in contact with the head of the person wearing the helmet. In particular, in the nape zone, said caps **15** and **35** have a collar **15.2**, **35.2** provided with a slot, for example slot **15.3**, for coupling with the corresponding canalization structure, indicated with **16** and **36**, respectively, and a front rigid part **15.5** and **35.4** provided with slots **12.2***s*, and openings **35.3**, respectively, the first of which provide corresponding inlet air intakes **12.2**, and the second of which provide corresponding outlet openings **35.3**, in the respective paddings.

[0075] Moreover, said caps **15**, **25**, **35**, **45**, **55**, **65**, may be provided with inserts, indicated with **70**, made of airproof fabric, for the purpose of improving the flowing of the air flows.

[0076] Said caps **15**, **25**, **35**, **45**, **55**, **65** are essentially made of fabric having high wettability.

[0077] Cap **65** is provided with fasteners **73** arranged symmetrically on two rigid rims **76.6** arranged on the front part and on the nape part, respectively, and also with side Velcroed fixing tabs **65.1** (FIGS. **42** and **44**).

[0078] Said air canalization structure is predisposed, for example, to conduct air between the first and second air intake openings and the first and second air extraction openings. Said first air intake openings **12.1** (FIG. **6**), **22.4** (FIGS. **13**, **14**), **32.1** (FIG. **22**), **42**, **48.3** (FIG. **34**), **54.1** (FIG. **40**), **62** (FIG. **45**) are obtained on the outer part of said helmet and said second air intake openings such as, for example, **12.2**, **22**, are obtained by means of connecting respective canalizations with the front part of the respective caps. On the other hand, first air extraction openings **13.1** (FIG. **6**), **23.2**, **23.3** (FIG. **14**), **33.2** (FIG. **22**), **49**, **49.1** (FIG. **34**), **54.2** (FIG. **40**), **63** (FIG. **45**) are obtained on the outer part of said safety helmet and second air extraction openings, such as those indicated with **13** and **33**, are obtained at the terminal and of said canalization structures, close to the lower rear zone of the respective helmet **10** or **30**.

[0079] Moreover, said canalization structure conducts air in combination with said aeration grooves, for example **21.2** (FIG. **15**), **51.3** (FIG. **40**), possibly provided on the anatomically shaped inner part of said safety helmet.

[0080] Moreover, said padding comprises a semirigid support **17**, **17***s* (FIG. **2**), **27**, **27***s* (FIG. **10**), **37**, **37***s* (FIG. **18**), **47**, **47***s* (FIG. **27**), (FIG. **38**), which is in contact with the inner part of said safety helmet.

[0081] Said semirigid support is made of flexible laminate, which couples in shape with respect to the inner part of said helmet. It also has communication openings with said air intake openings and with said air extraction openings.

[0082] Said semirigid support has possible longitudinal and transverse notches which take advantage of the elasticity of the structure that is useful for adapting to the inner shape of said anatomical inner part of the helmet; advantageously, said longitudinal notches are made close to the aeration grooves possibly provided in said anatomical part.

[0083] Moreover, said semirigid support has ribs which couple with possible slots of the inner part of said helmet, when present, in order to guarantee stability with respect to said inner part without modifying the passage section.

[0084] An insert of said semirigid support is specifically indicated with **17***s*, **27***s*, **37***s*, **47***s*.

[0085] Said canalization structure **16**, **26**, **36**, **46**, **50.1** is fixed on the inner face of said semirigid support **17**, **27**, **37**, **47**, **57**.

[0086] On the other hand, the canalization structure **66** is unmovably fixed with respect to said inner part of said helmet **60**, for example by means of gluing, omitting the semirigid support.

[0087] The fixing of said canalization structure with respect to said flexible support can either be unmovable, for example by means of gluing, or removable, for example by means of interlocking with tabs and/or by means of Velcro® type means.

[0088] On the other hand, the fixing of said canalization structure applied to said semirigid support, with respect to said' cap is preferably provided removable, for example by means of Velcro® means or interlocking systems.

[0089] Said padding **14***c*, **24***c*, **34***c*, **44***c* is made like a sandwich, in which said canalization structure is interposed between said cap and said semirigid support, by means of respective removable fixing elements, herein shown by means of said snap fasteners **73** and the corresponding holed tabs **74** arranged on the perimeter of said cap and of said semirigid support.

[0090] Said fixing fasteners are advantageously positioned at respective and corresponding fixing means arranged in the helmet, and fix said paddings thereto, as shown for example in FIG. **8**. Similarly, parts of the helmet may be taken advantage of such as for example, the cheekpads **11.2**, so as to enclose said fixing tabs (**15.1**, **17.1**), as shown in FIG. **7**.

[0091] Moreover, tortuous canalizations **16.3** (FIG. **3**), **26.3** (FIG. **11**), **36.3** (FIG. **16**), **46.3** (FIG. **28**) are glued to the respective semirigid supports, said tortuous canalizations are fixed to the inner surface of said anatomical part of the helmet by means of removable Velcro® type fixing means conveniently located on the back of the respective supports (**17***s*, **27***s*, **37***s*, **47***s*) and on the inner surface of the respective helmets (solution not shown).

[0092] With reference to the figures from **48** to **50**, said tortuous canalization structures comprise a layer **46.31** made of expanded or elastomeric material, and a layer of semirigid material **46.32**.

[0093] On the back of said semirigid support there are unmovably fixed parts of dismountable Velcro® type fixing material **46.34** intervalled by spongy filler material **46.33**, said parts cooperating with corresponding fixing means which are fixed with respect to the helmet.

[0094] Said padding **54***c* (FIG. **35**) is assembled like a sandwich, in which said canalization structure **50.1** is interposed between said cap **55** and said semirigid support **57**, by means of respective tabs **55.1** arranged on the free outline of said cap **55**, **57.1**, which are arranged on the free outline of said flexible support, which are provided with removable Velcro® type fixing means.

[0095] On the other hand, unmovably overlapping said flexible support **57** is a further fixing structure **56** (FIG. **37**) provided with removable Velcro® type fixing means **56***.a* alternated with filler material of sponge type **56***.b;* said fixing structure is fixed in direct contact with the inner part of said helmet **50** conveniently provided with corresponding Velcroing (solution not depicted).

[0096] Said paddings **14***c*, **24***c*, **34***c*, **44***c*, **54***c* are made removable and are coupled in shape and/or in force with respect to said inner part of the corresponding helmet **10**, **20**, **30**, **40**, **50**.

[0097] Said air canalization structure **16**, **26**, **36**, **46**, **50.1**, **66** has a shape that wraps around the corresponding cap **15**, **25**, **35**, **45**, **55**, **65** with an arrangement, with respect to the head of the person wearing the helmet:

- **[0098]** of first top channels **16.1***a*, **16.1***b*, **26.4**, **36.1***a*, **36.1***b*, **46.1***a*, **46.1***b*, **56.1**, **66.1**, extending from the front to the nape, with substantially linear orientation;
- **[0099]** of second side channels **16.2***a*, **16.2***b*, **26.2**, **36.2**, **46.2**, **56.2**, **66.2**, extending along the temple zones with substantially curvilinear orientation, and
- **[0100]** of intermediate canalized areas **16.3**, **26.3**, **36.3**, **46.3**, **66.3** between said first and second channels, by means of arrangements of tortuous passages.

[0101] With reference for example to FIG. **6**, said canalization structure **16** provides three levels of distinct flows, that is:

- **[0102]** first air flows passing through said first air channels **16.1***b* and intermediate areas **16.3**, said first channels receive respective air flows through the corresponding openings **12.2** and evacuate said air flows through the corresponding top back extraction mouths **13.1**;
- **[0103]** second air flows which pass through said second air channels **16.2***b*, which receive respective air flows inlet through the corresponding front air intake openings **12.2** and evacuate said air flows through the corresponding rear back air extraction openings **13**;
- **[0104]** third air flows passing through said air channels **16.1***a* and **16.2***a*, which receive respective air flows inlet through the corresponding front air intake openings **12.1**, **12.2** and converging into the lower back part in the tubular manifold **16.4**.

[0105] Moreover, said air channels **16.1***a*, **16.2***a* are put into depression through said tubular manifold **16.4** which can be connected, respectively disconnected by pressure in the lower nape part of helmet **10** and seal connected, by means of a corresponding flexible suction tube **16.5**, with an AS air aspirator device external to helmet **10** and provided with autonomous means for supplying power and controlling CPU operation. Such an arrangement causes a forced air flow to run through the aforesaid channels.

[0106] The arrows show the consistent orientation of the air flows from the front toward the nape of the person wearing the helmet. Such air flows lap the zones of the cap

15 corresponding to said channels, removing with continuity the moisture therefrom which accumulates therein, and providing a widespread aeration of the person's head; to this end, said cap **15** is advantageously made of dual elasticized breathable fabric to contain the user's hair and organic material to preserve the functionality of the padding.

[0107] Said forced air flows, generated by means of electric/electronic devices, may be enabled and disabled according to parameters managed by means of a CPU (see FIG. **6**).

[0108] More specifically, operation of said devices can be controlled based on control signals transmitted to said CPU by an air flow sensor positioned in a stretch of the canalization between a respective air intake and a respective air outlet.

[0109] Moreover, said first top channels **16.1***a*, **16.1***b* are preferably shaped by means of flexible material strips **18** having differentiated elastic deformability, that is:

[0110] with increased elastic deformability in the lower part in contact with the corresponding cap **15**, in which said strips **18** are made of high compressibility elastic material **18.1** (FIG. **5**), and

[0111] with decreased elastic deformability in the top part, in which said strips **18** are in contact with the flexible support **17** and are made of low compressibility elastic material **18.2** (FIG. **5**).

[0112] It is noted how, according to the present invention, in the case of a helmet without grooves obtained in the anatomically shaped inner part, the outflow of air is guaranteed by the low compressibility layer **18.2** of the padding, which guarantees the maintenance of a section sufficient for the passage of air in said canalizations. Said solution of differentiated elastic deformability canalization structure may also be used to make other canalization structures, such as the temple ones and with tortuous orientation. Said padding **14***c* is shaped for removable coupling with respect to the inner part **11.1** of helmet **10**, which is illustratively shown smooth, that is without aeration grooves obtained in said inner part.

[0113] FIG. **13** shows a similar arrangement to the one in FIG. **6**, and therefore not further described for the parts already explained in detail with reference to the first embodiment shown in the figures from **1** to **8**, from which it differs due to the presence of top and nape projections **28.1**, **28.2** in the canalization structure **26**, and also **27.3** and **27.4**, in the flexible support **27** coupled thereto, which are in turn coupled in shape and/or by force within corresponding grooves, such as the top grooves **21.2** provided on the inner part **21.1** of said helmet **20**.

[0114] In addition to absolving a structural function of connecting said support **27**, said projections **27.3** and **27.4** house blocks of spongy material forming said projections **28.1**, **28.2**, in which the first block **28.1**, positioned close to said front air intake **22.4**, has a connector surface between said air intake and said aeration groove **21.2** to facilitate the outflow of air along the top aeration groove in direction of the second block **28.2**, which is located close to the air extraction mouth **23.3** arranged in the nape zone, said second block **28.2** being conveniently shaped to facilitate the outflow of the air toward said extraction mouth **23.3**.

[0115] Said aeration groove **21.2** extended from the front part to the back part of said helmet **20** is put into depression in the nape stretch between the respective block **28.2** and the air extraction opening connected to the suction device **29**, diagrammatically shown in FIGS. **13** and **14**. Said stretch of aeration groove **21.2** is put into communication with the channels **26.4** and **26.2** through a slit **27.5** provided in the semirigid support **27**, generating an artificially sucked air flow in said channels.

[0116] Said FIG. **13** shows an orientation of the air flows similar to that described with reference to FIG. **6**, from which it differs however for the presence of said aeration grooves **21.2** and **21.3** obtained on the inner part **21.1** of helmet **20**, which are advantageously exploited for matching said second aeration channels of the padding **24***c* connected to said forced suction system **29**.

[0117] ON/OFF functional control means of said aspirator device **29** are indicated with **29.1** and are provided on a side wall of helmet **20** itself.

[0118] It will be noted that said suction device **29**, with respective electric/electronic circuit and power supply means, is removably fixed with respect to said back part of said helmet **20**, by means of interlocking tabs.

[0119] With reference to FIGS. **16** and **22**, first top channels **36.1***a* and **36.1***b* and second side temple channels **36.2** are provided in said canalization structure **36**, while **36.3** indicates intermediate areas with tortuous passages of the structure itself.

[0120] Numeral **32** (FIG. **22**) indicates a forced air introduction mouth; introduced through said mouth **32** is forced air which runs through at least one of said top channels **36.1***a* and **36.1***b*, from the nape toward the front part of helmet **30**, and also said side temple channels **36.2** in recirculation with extraction through the lower rear openings **33**.

[0121] Said air flow forced through the top channel **36.1***a* comes out of the openings **35.3** (FIG. **20**) provided at the front part of said cap **35**, inside helmet **30**, at the inner surface of visor **30.1** of the helmet itself, with the function of continuously demisting and ventilating the surface itself and the user's face.

[0122] A forced air generator device is indicated with **37** in FIG. **24**. Said device **37** feeds said mouth **32** through a dismountable flexible conduit **37.1**, through dismountable coupling connection means.

[0123] Numeral **36.4** (FIG. **17**) indicates two flow directors positioned inside said canalizations **36.1***b* close to said dynamic front air intakes **32.1**. Said directors provide the dynamically emitted air flows with a conveniently shaped surface in order to direct said flows toward the openings **35.3** arranged at the front part of said cap **35**, while a second portion of air flows from incisions **36.4***a* made in the walls of one of said flow directors **36.4** in direction of the corresponding aeration channels **36.3** and **36.1***b*.

[0124] Said channels converge in the nape zone close to the extraction mouths **33.2** put into aerodynamic depression (Venturi effect) by the movement of the vehicle. FIG. **17** diagrammatically shows the air flows apportioned by said director **36.4**.

[0125] It is noted how padding **34***c* allows matching said first forced air flows, apportioned in part toward said visor **30.1** and in part in recirculation in the temple zone, and said second flows (obtained by aerodynamics with the vehicle in movement) apportioned in part toward said visor **30.1** and in part in opposite direction.

[0126] With reference to the fourth embodiment of the invention, related to the safety helmet **40**, the general structure of the related padding **44***c* is similar to the one of the embodiments of the invention illustrated above. However, in the middle aeration groove **47.3** (FIG. **32***a*) provided

in the anatomically shaped part **41.1** of said helmet **40**, at the front dynamic air intake **48.3** (FIG. **31**), there is mounted a flow selector/deviator device **48** (FIG. **26**) fixed on the back of said flexible support **47** (see also FIGS. **26***a*, **26***b*, **26***c*, **27**, **30**, **31**, **33**).

[0127] Said selector/deviator device comprises a sliding guide **48.1**, unmovably fixed on the back of said flexible support **47**, a manually operated slider **48.2** slidingly mounted longitudinally by coupling in shape within said guide **48.1**.

[0128] Said slider **48.2** is bell-shaped (FIGS. **26***a*, **26***b*) in section according to a longitudinal vertical plane parallel to said groove **47.3** (FIG. **31**).

[0129] When padding **44***c* is dismountably mounted on helmet **40** coupled in shape with respect to the inner part thereof, the related air flow inlet from the air intake **48.3** laps said bell-shaped profile of slider **48.2**.

[0130] The flexible support **47** has, at said slider **48.2**, a graduated scale **47.4** (FIG. **26**) with respect to which there is counterposed a fixed index provided on said slider **48.2**.

[0131] The graduations of scale **47.4** are arranged so that at the ends of the scale itself correspond a respective stop position of tab **48.2**, in which the air flow inlet through opening **48.3** is almost totally deviated in a direction along a part of said groove **47.3** (in FIGS. **31**, **32***a*), to which corresponds, for example, in said padding, the longitudinal top channel **46.1***a* (FIG. **28**) of the related canalization structure **46**.

[0132] On the other hand, in the intermediate positions of slider **48.2** corresponding to the intermediate graduations of scale **47.4**, said inlet flow is proportionately apportioned in the two directions corresponding to said groove **47.3** and related channel **46.1***a* of the canalization structure **46**.

[0133] Numeral **49** in FIG. **31** indicates an air extraction opening, provided in the rear top part of the outer shell of helmet **40**, at said aeration groove **47.3**.

[0134] At said opening **49**, in a nape projection **49.2** of said semirigid support **47**, there is fixed-mounted a block **49.3** (FIG. **28**) for deviating the air flow running through said channel **46.1***a*, and which forces the flow itself to flow toward said opening **49**.

[0135] As diagrammatically shown in FIG. **31**, the flow selector/deviator device allows the air flow inlet through opening **48.3** to be selectively regulated to flow away at least partially toward the front zone of helmet **40**, and to flow on the inner surface of the corresponding visor of the helmet itself, with the function of demisting the surface itself and ventilating the user's face. Moreover, numeral **42** indicates air intakes of helmet **40** corresponding to the channels **46.1***b* of padding **44***c*.

[0136] FIG. **30** diagrammatically shows the different air flows running through said padding **44***c*, that is the air flows that run through the padding itself, starting from the air intakes **42** and **48.3**, in the channels **46.1***a* and **46.1***b*, respectively, or tortuous zones **46.3**, in the direction toward the nape of the person. On the other hand, and starting from said opening **48.3**, a partial flow is directed into channel **46.1***a* toward the visor of helmet **40**. Moreover, in the remaining channels of padding **44***c* also, the air flows countercurrent toward the helmet visor, through the air outlet openings **75.4***s* (FIG. **29**) of said padding, because it is forced by the electric fan **42**. Said air flows respectively flow through the air extraction openings **49** and **49.1**, respectively (FIG. **34**), and also from the front stretch of said groove **47.3** which is fed through said selector/deviator device **48** with a flow facing the front visor part of the helmet.

[0137] Said removable forced air generator device diagrammatically shown in **42**, pressurizes the channels **46.1***b* and **46.2** in the direction already described, that is, similar to what happens in helmet **30**, that is, toward the front openings of said cap **45** to lap the respective visor and also the user's face.

[0138] Said forced air flows, generated by means of electric/electronic devices, may be enabled and disabled according to parameters managed by means of sensor means managed by a CPU, such as physiological values of the user, room temperature (FIG. **41**) and vehicle speed, which is calculated for example by an integrated GPS system.

[0139] More specifically, operation of said devices may be controlled'based on control signals transmitted to said CPU by an air flow sensor positioned in a stretch of the canalization between a respective air intake and a respective air outlet. FIGS. **34** and **34**A show in detail the arrangement of a CPU for controlling a helmet according to the invention, which, as shown in detail in the diagram of FIG. **34**A, receives signals of air flow intensity, detected by a flow sensor F, and processes them according to a predetermined program, correspondingly driving the electric/electronic devices for forced air generation present in the helmet itself. As shown in said FIG. **34**A, the aforesaid CPU is controlled by means of ON/OFF control means connected by wire, or in wireless mode.

[0140] It is noted how, according to this fourth embodiment, air flows with opposite directions may coexist, in part generated by means of electric forced air generator devices, which are electrically enabled when wanted, and in part due to the aerodynamics caused by the movement of the vehicle.

[0141] With reference to the fifth embodiment, FIG. **40** diagrammatically shows the air flow lines running through said padding **54***c* starting from the front air intake openings **52** up to the back air extraction openings **53** obtained in the anatomical part **51.1** of helmet **50**, and also starting from the side air intake openings **54.1** up to the back air extraction openings **54.2** obtained in the outer shell of helmet **50**. Said last flows run through the temple channels obtained also in the anatomical part of helmet **50**.

[0142] It is noted how in the present embodiment of helmet **50** according to the invention, the canalization structure **50.1** and the respective multicomponent flexible support **57** are independent from each other, so as to facilitate assembly with helmet **50**, thus allowing a consistent padding to be obtained capable of absorbing and dissipating sweat along the side walls of said canalizations, at cap **55**, shown in FIG. **36**, which is made of dual elastic hydrophile material capable of distributing the secretions in a uniform manner, thus promoting the evaporation of the sweat through the fabric and the walls of the canalizations lapped by said air flows. Moreover, said cap **55** contains the hair and the organic material thus keeping the passage section of the aeration channels free and clean.

[0143] In one variant, said helmet **50**, having an evaporation section, may be provided with an outer shell without top openings, thus preventing rain and sun rays from filtering through them, an advantageous condition for bicycle helmets (FIG. **41**).

[0144] Moreover, it is noted how in said helmet **50** and in the preceding examples, respectively **20** and **40**, the arrange-

ment of the canalizations is substantially parallel with respect to said aeration grooves, so as to guarantee a passage section of the air flows also in the case of a total compression of said parts forming said padding.

[0145] With reference to the figures from **42** to **46**, there is illustrated the sixth embodiment of the helmet according to the invention, indicated with numeral **60**, and which padding **64***c* is without semirigid support, and is not removably fixed with respect to the inner part, for example by gluing. Said cap **65** of said helmet **60** is fixed thereto by means of removable fixing means, such as snap fasteners **73** arranged on the rigid ends **76.6** of said cap **65** and tabs provided with Velcro® type fixing **65.1**, and also respective fixing means arranged on the perimeter of said safety helmet **60** (solution not shown).

[0146] In the outer shell **61** of helmet **60**, there are provided front air intake openings **62** and back air expulsion openings **63**, which correspond to the top channels **66.1** and to the side channels **66.2** of said canalization structure **66**.

[0147] Respective front **68.1** and back **68.2** forced air ventilation devices are removably applied, coupled in shape and/or in force, on the shell **61** of the helmet **60**, at said front **62** and back **63** openings. Said ventilation devices **68.1** and **68.2** comprise a respective manifold portion **68.11**, **68.21**, sealingly fixed on shell **61** at respective openings **62**, **63**, as well as electric fan means **68.12**, **68.22** electrically connected, in electric circuit, with respect to means for controlling the power supply **69.1**, which are supported by shell **61** and which are in turn electrically connected with respect to a power supply battery **69.2**, external to helmet **60**, as well as to the means **69.3** for selecting the polarity of said electric fan means **68.12**, **68.22**.

[0148] Thereby, by acting on said selector means **69.3**, the user of helmet **60** may selectively determine the rotation of the electric fan means **68.12**, **68.22**, comprising a plurality of fans, which may rotate individually or simultaneously, that is the air flows may be generated by a single blowing **68.12** or suction **68.22** fan, or by both simultaneously, generating the air flows running through the canalization structure **66** of padding **64**, as shown diagrammatically in FIG. **47**.

[0149] It is noted how in the case of disabling of one or both the forced ventilation devices produced by means of an axial fan, the air flows can still pass through said electric fan means, guaranteeing ventilation even when the means are disabled, that by aerodynamics.

[0150] Moreover, on the outer surface of shell **61** of helmet **60** there is fixed a photovoltaic cell solar panel P which, through a corresponding electric circuit, feeds, when enabled, power to the battery of accumulators **69.2**, which to this end is provided rechargeable.

[0151] In one variant with respect to what is described and illustrated, said canalization structure without said semirigid support is made removable with respect to said inner part of said helmet, using, as means for fixing thereto said canalizations conveniently disassembled into separate fillets, Velcro® type means, respectively fixed on the anatomically shaped inner part and on the corresponding surface of said padding.

[0152] Moreover, in a further variant, in which said safety helmet does not have air intake openings in the rigid outer shell and/or by means of the initial parts of said aeration grooves provided in the anatomically shaped part, said padding provides at least one air intake opening between said helmet and the head of the person wearing it.

[0153] On the other hand, in another variant, in which said safety helmet does not have air outlet openings in the rigid outer shell and/or by means of the terminal parts of said aeration grooves provided in the anatomical part, said padding provides at least one air extraction opening between said helmet and the head of the person wearing it.

[0154] A further of said padding comprises a plurality of partitions made of material of different nature (FIG. **1**), for example of spongy, elastomeric and/or expanded elastomeric type, in turn fixed at least partially removably with respect to said inner part of said helmet or to said inner part of said semirigid support, so as to allow one or more of said partitions to be replaced in order to modify the user's subjective feeling of comfort. Said partitions can have variations of the related elastic characteristics, of thickness, of density and of spacing.

[0155] The thickness of said possible inserts made of a non-expanded elastomeric material is preferably less than the thickness of said inserts made of an expanded material, that is, equal to the interspace present between said inner part of said helmet and the head of the person wearing it.

[0156] It is worth noting that said cap **15**, **25**, **35**, **45**, **55**, **65** and at least one part of said padding **16**, **26**, **36**, **46**, **50.1**, **66** collect the sweat of the person's head due to the imbibing effect, so that air flows running through said canalizations determine a thermal conditioning and at least a partial extraction of moisture, at said cap **15**, **25**, **35**, **45**, **55**, **65** and in part at the side walls of said padding **16**, **26**, **36**, **46**, **50.1**, **66**.

[0157] More specifically, said cap, due to the intrinsic wettability of the fabric, transfers part of the sweat collected in the areas of contact with said padding to the areas where said cap is exposed to said flows running through said air channels. The sweat exposed to said air flows, evaporating, changes its state from liquid to gaseous, dissipating the heat retained by it. Moreover, once said cap is impregnated with sweat, its thermal conductivity increases, promoting a sensation of coolness partially extended toward said areas in which said cap is not lapped by said flows. In order to promote the wettability of said cap, it is preferable to use a hydrophile fabric, for example made of textile fibers of plant origin or synthetic fibers made hydrophilic on the surface with physical plasma treatments (ion and photon bombardment).

[0158] In a further embodiment, said fabric of said cap is at least partially made of drawn metal filaments, such as bekinox® yarns or yarns containing metallic synthetic fibers such as lurex® yarns, said materials, having intrinsic characteristics of improved thermal conductivity with respect to normal textile fibers, allowing at least partial dissipation of the heat otherwise retained in the areas where said cap is in contact with said padding, even when only a small amount of sweat is present.

[0159] Moreover, said canalization structure **16**, **26**, **36**, **46**, **50.1**, **66** may advantageously comprise channels provided for the forced air suction and/or blowing flow by means of said electric/electronic means for generating forced air flows and/or channels provided for the outflow of non-forced air introduced and expelled by aerodynamics from the movement of the vehicle on which the user of said helmet (**10**, **20**, **30**, **40**, **50**, **60**) is travelling.

[0160] It is also important to note how said padding **14***c*, **34***c* and **64***c* provides canalizations with differentiated deformability capable of opposing compression, to guaran-

tee spacing between said cap **15**, **35**, **65** and the inner part of said helmet guaranteeing a passage section of the air flows.

[0161] It is also important to note how even in the partial presence of grooves obtained in the inner wall of said helmet, the arrangement of said canalizations substantially parallel to said grooves does not occlude the passage of air even in the condition in which said padding **24***c*, **44***c*, **54***c* is completely compressed. This condition is clearly shown in FIG. **15** and, in particular, in the detail of FIG. **15**A.

[0162] In order to obtain a compression of said fillets of said paddings (**14***c*, **24***c*, **34***c*, **44***c*, **54***c*, **64***c*), mainly without lateral yield, said fillets made of an expanded polymer material are preferably obtained by punching or water cutting, so as to provide lateral walls of said grooves in which said expanded material is directly exposed to said air flows.

[0163] More specifically, the typical elastic properties of expanded polymeric materials, such as open-cell expanded polyurethane, endure said deformation without substantial variations in shape in plan view, that is, when said helmet is worn and the head of the person compresses said paddings.

[0164] To this end, it is preferable not to cover said side walls with materials of different kinds, such as fabrics or stretches of stitching that would otherwise modify said behavior of said expanded materials.

[0165] Said fillets with differentiated deformability (**18**) are fixed by unmovable coupling, for example by gluing or heat sealing of at least two materials having different elastic properties.

[0166] On the other hand, said part of said padding has been described as formed by a plurality of fillets. However, it must be understood that it could also be made in one piece, of expanded material, possibly unmovably fixed with respect to said semirigid support, for example by gluing.

[0167] With reference to FIGS. **51** and **52**, these show a padded cushion, used only by way of example at tortuous canalizations of the padding of the helmet according to the invention, which cushion includes a padding made of a spongy material sealingly covered by means of a waterproof covering having at least one hole for the passage of air, calibrated to pneumatically control phenomena of compression, respectively decompression, of said spongy material, which can occur in the case of significant impact forces acting on the helmet itself.

[0168] Moreover, said fillets and said cushion inserts of said padding can be coupled on the surface in contact of said cap with materials with low coefficient of friction, such as synthetic fabrics or thin polymer films, so as to promote sliding of said cap with respect to said surfaces of said fillets. FIG. **53** shows an example of fillet covered on one of its faces with a sheet of synthetic material with low coefficient of friction.

[0169] Advantageously, the security helmet according to the present invention may be provided with means for detecting the speed of the person wearing the helmet on a means of locomotion, which control means for selectively electrically enabling/disabling said electric means for generating forced air flows.

[0170] Moreover, said safety helmet may be provided, according to the invention, with means for detecting the physiological data of the person wearing it, such as for example means for detecting heartbeat and/or body temperature, which control, by means of corresponding electric circuit means and electronic microcontroller means for digitally processing the corresponding signals detected, the enabling or disabling of the electric/electronic means for generating forced air flows conveyed into the canalization structure of the padding of the helmet itself, and also any variation in intensity of the flows themselves.

[0171] Moreover, said helmet can be provided with means for detecting air flows, such as resistance flow meters (flow measuring devices), positioned in the intake parts of said flows, and which transmit signals processed by means of microcontroller means, to control the operation of said electric forced ventilation means (FIGS. **34** and **34**A).

[0172] Moreover, said helmet can be provided with control means positioned separately with respect to it and put in communication with said electric/electronic forced ventilation devices by means of connections by radio or by electrical wire (FIGS. **34** and **34**A).

[0173] On the other hand, although electric/electronic means for generating forced air flows have been described, they may also be formed by arrangements of electronic circuits.

[0174] Figures from **54** to **56** show a semirigid support having a plurality of fillets applied on the support itself. In particular, one of said fillets (the one provided in the center of the intermediate rectilinear branch), is removably connected with respect to said semirigid support. To this end, as can be seen in FIG. **56**, said fillet is provided with male hook Velcro® means, suitable to cooperate with corresponding female loop Velcro® means, with which said support is provided, as shown in FIG. **55**. It will be noted that said fillet, besides said male Velcro®, comprises a sandwich structure, including a semirigid band (connected to said Velcro®), an intermediate body made of a spongy material and an anti-friction surface film.

[0175] As apparent from that described hereto, said safety helmet according to the present invention promotes the transpiration of the sweat generated on the head skin of the person wearing it.

[0176] Moreover, as introduced, said helmet promotes air circulation in the head area of the person wearing it, thus contributing to the perception thereby of a condition of increased comfort during use of the helmet itself, also in the presence of particularly hot weather conditions.

[0177] Additionally, as indicated, said helmet may be easily cleaned and sanitized by the person after the related use.

[0178] In addition, a further advantage of the invention lies in the fact that the visor of said helmet, provided with front visor, may be demisted during the use of the helmet itself, and the same flows provide a ventilation of the face and a correct oxygenation of the user.

[0179] Moreover, as mentioned, said helmet has a simple structure, is easy to maintain, and is easy to make on an industrial scale with relatively contained costs.

[0180] Moreover, as mentioned, said helmet allows the safety structure to be implemented with a padding which provides absorbing and dissipating the sweat generated by the user and allows a combined management of the air flows which is otherwise only obtainable by means of costly and invasive interventions on the safety structure itself.

[0181] On the other hand, as indicated, said helmet comprises paddings having a removable structure, which are interchangeable with the normal known paddings and allow said safety helmets with the solutions herein described to be implemented without compromising the safety structure.

[0182] On the other hand, said helmet as specified, can be integrated with auxiliary forced ventilation means without compromising its protective structure.

[0183] As is apparent from the above, the present invention allows the objects detailed in the introduction to be obtained in a simple an advantageous manner.

1. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) including a rigid outer shell (**11**, **21**, **31**, **41**, **51**, **61**) possibly provided with at least one external air intake opening (**12.1**, **22.4**, **32.1**, **42**, **48.3**, **54.1**, **62**), and/or at least one external air extraction opening (**13.1**, **23.2**, **23.3**, **33.2**, **49**, **49.1**, **54.2**, **63**) provided on the external shell for introducing and extracting air, respectively, into and from said helmet, said helmet including an inner part (**11.1**, **21.1**, **31.1**, **41.1**, **51.1**, **61.1**) made to absorb and deaden any impact endured by said helmet and having possible transverse and/or longitudinal grooves obtained in at least one portion of said inner part, possibly extending from the front zone to the rear zone of said inner part and passed through by the air introduced through at least one possible corresponding external air intake opening (**22.4**, **54.1**) and at least one possible corresponding external air extraction opening (**23.3**, **54.2**), at least one of said longitudinal grooves (**21.2**, **21.3**, **47.3**, **47.5**, **51.2**, **51.3**) forming a respective and possible frontal air intake opening (**22.1**, **52**) and a respective and possible back air extraction opening (**23.1**, **53**), and comprising an inner padding (**14***c*, **24***c*, **34***c*, **44***c*, **54***c*, **64***c*) which provides by means of a plurality of canalizations a canalization structure (**16**, **26**, **36**, **46**, **50.1**, **66**) for conducting air:

- between said at least one frontal air intake opening (**22.1**, **52**) and/or at least one external air intake opening (**12.1**, **22.4**, **32.1**, **42**, **48.3**, **54.1**, **62**) and said at least one back air extraction opening (**23.1**, **43**, **53**), and/or at least one external air extraction opening (**13.1**, **23.2**, **23.3**, **33.2**, **49**, **49.1**, **54.2**, **63**) and/or
- between at least one front air opening (**12.2**, **22**, **35.3**, **75.4***s*) provided by means of at least one end of said canalizations of said canalization structure, and at least one back air extraction opening (**13**, **33**), provided by means of at least another end of said canalizations of said canalization structure, which structure at least partially occupies the interspace present between the head of a person wearing the helmet and said inner part (**11.1**, **21.1**, **31.1**, **35 41.1**, **51.1**, **61.1**) of the helmet itself,

characterized in that it comprises a cap (**15**, **25**, **35**, **45**, **55**, **65**), which, when the helmet is worn by said person, cooperates with said padding to provide a plurality of air channels at said canalizations of said padding and covers the head of the person at least at the padding itself, while it is kept in tension on the head itself, preventing hair and organic material from occluding at least partially said air channels, and which is made of material that imbibes due to wettability and uniformly distributes at least part of the sweat of the head of the person, preventing it from being retained in said padding;

in that said cap (**15**, **25**, **35**, **45**, **55**, **65**) is dismountably connected with respect to said padding, respectively to said helmet,

so that when removed, said cap allows inspection and cleaning of said air channels through which said air flow pass, and said air flows running through said channels determine a thermal conditioning and at least a partial extraction of moisture, at said cap (**15**, **25**, **35**, **45**, **55**, **65**).

2. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) according to claim **1**, characterized in that said padding is made of a spongy and/or elastomeric material and comprises either grooves that form said canalizations, or a plurality of fillets that form between them said canalizations, for conducting air when said helmet is worn.

3. (canceled)

4. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) according to claim **1**, characterized in that said cap is dismountably fixed with respect to said helmet along its substantially circumferentially outer outline so that, when the helmet is worn, said cap is elastically deformed, unloading the forces applied in the fixing points along said circumferential outline.

5. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) according to claim **1**, characterized in that said canalization structure of said inner padding is made of a spongy material and has, when the helmet is worn, elastic yield limited in the transverse direction of the canalizations themselves, so as to maintain more or less constant the distance between the opposite walls of said canalizations.

6. A safety helmet (**10**, **20**, **30**, **40**, **50**) according to claim **1**, characterized in that it comprises a semirigid support (**17**, **17***s*, **27**, **27***s*, **37**, **37***s*, **47**, **47***s*, **57**) which receives, at least partially, said padding (**16**, **26**, **36**, **46**, **50.1**) and is arranged in contact with the inner part (**11.1**, **21.1**, **31.1**, **41.1**, **51.1**) of said helmet.

7. A safety helmet (**10**, **20**, **30**, **40**, **50**) according to claim **2**, characterized in that said fillets, forming between them said canalizations for conducting air, are fixed at least partially removably with respect to said semirigid support or with respect to said inner part of said helmet.

8. (canceled)

9. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) according to claim **1**, characterized in that said cap comprises a fabric including, at least in part, either metal fibers having good thermal conductivity, or textile fibers coated in a metal having good thermal conductivity.

10. A safety helmet (**10**) according to claim **1**, characterized in that said padding (**16**) comprises a first part placed in contact with said cap (**15**) made of a high compressibility elastic material (**18.1**) and a second part, corresponding to a top zone (**16.1***a*, **16.1***b*), and proximal to said inner part of said helmet, which is made of a low compressibility elastic material (**18.2**), to maintain, with the helmet worn, said air channels open.

11. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) according to claim **1**, characterized in that said canalization structure for conducting air (**16**, **26**, **36**, **46**, **50.1**, **66**) comprises canalizations having substantially rectilinear orientation (**16.1***a*, **16.1***b*, **26.4**, **36.1***a*, **36.1***b*, **46.1***a*, **46.1***b*, **56.1**, **66.1**), canalizations having substantially curvilinear orientation (**16.2***a*, **10 16.2***b*, **26.2**, **36.2**, **46.2**, **56.2**, **66.2**) and/or canalizations having tortuous orientation (**16.3**, **26.3**, **36.3**, **46.3**, **66.3**).

12. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) according to claim **1**, characterized in that said cap (**15**, **25**, **35**, **45**, **55**, **65**) is provided with at least one insert (**70**) made of airproof fabric, to improve the running and distribution of the air flows within said air channels, and said cap (**15**, **25**, **35**, **45**, **55**, **65**) is made at least partially of hydrophile material.

13. (canceled)

14. A safety helmet (**40**) according to claim **1** and including a visor and an external air intake opening (**48.3**) obtained on the outer shell of said helmet (**40**), characterized in that

it comprises directing, regulating means (**48**), respectively air flow separators, provided in said canalization structure (**46**) and which selectively determine a flow of air through said air channels, which outflows at least partially toward the front zone of the helmet and runs on the inner surface of said visor, while the remaining part of the air flow entering from said intake (**48.3**) runs toward the rear area of said helmet.

15. A safety helmet according to claim **1**, characterized in that it comprises electric/electronic means (AS, **29**, **37**, **42**, **68.1**, **68.2**) for generating air, forced, blown or sucked through said air channels, which means are arranged removable with respect to said helmet.

16. A safety helmet (**60**) according to claim **15**, characterized in that said cap with said canalization structure (**66**), when the helmet is worn, provides air channels for the flow of the air generated by means of said electric/electronic means for generating forced, blown or sucked air, in which channels the air introduced by aerodynamics through the movement of the vehicle on which the user of said helmet (**60**) is traveling can flow when said electric/electronic means are switched off.

17. A safety helmet (**30**, **40**) according to claim **16**, characterized in that said air channels (**34***c*, **44***c*) distribute at least a part of the air forced, respectively blown, by means of said electric/electronic means for generating forced, respectively blown, air flows toward the front part of said helmet (**35.3**, **75.4***s*), so as to at least partially provide ventilation of the inner part of the front visor of said helmet itself.

18. A safety helmet according to claim **1**, characterized in that said padding comprises padded cushion means, including spongy material sealingly covered by means of a waterproof covering having at least one hole for the passage of air, calibrated to pneumatically control possible phenomena of compression, respectively decompression of said spongy material that can occur in the case of significant impact forces acting on the helmet itself.

19. A safety helmet (**10**, **20**, **30**, **40**, **50**, **60**) according to claim **1**, characterized in that said padding is covered, at least partially, by means of a covering in a material with low coefficient of friction, on the surface facing said cap, so as to facilitate sliding between said padding and said cap when said helmet is worn.

20. A safety helmet according to claim **15**, characterized in that, said electric/electronic means (AS, **29**, **37**, **42**, **68.1**, **68.2**) for generating forced, blown or sucked air comprise electric/electronic means for detecting air flow, which detect the intensity of the air flow passing through at least one of said air channels, and electric/electronic means for regulating the flow of forced, blown or sucked air, as a function of the flow intensity detected.

21. A safety helmet according to claim **15**, characterized in that it comprises control means external to said helmet and including signal emitting/receiving means by radio, respectively by wire, which control activation/deactivation of said electric/electronic means (AS, **29**, **37**, **42**, **68.1**, **68.2**) for generating forced, blown or sucked air.

22. A safety helmet (**40**) according to claim **14**, characterized in that said canalization structure (**46**) and said cap (**45**), when the helmet is worn, convey different air flows in different directions, first air flows that pass through said channels (**47.5**, **46.3**, **46.1***a* in part), in one direction, and second air flows that pass through other channels (**46.1***b*, **46.2**, **46.1***a* remaining part), in another direction with respect to said first air flows.

23. A safety helmet according to claim **1**, characterized in that said padding is unmovably fixed with respect to said semirigid support.

24. (canceled)

25. (canceled)

26. (canceled)

27. (canceled)

28. (canceled)

29. (canceled)

30. (canceled)

31. (canceled)

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