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(54) **Safety helmet**

(57) A protective helmet (100) of the type comprising a shell (101) provided with a chin guard (102) and with an opening (103) for a visor, one or more shock absorbing layers (104, 107, 10), internally coupled to said shell (101) and to said chin guard (102), and to one or more paddings (105, 106) within said one or more shock absorbing layers (104, 107, 10), as well as at least one support mask (1)

for one shock absorbing layer (10) of the chin guard (102), said at least one support mask (1) comprising holding means (3, 4, 5, 2a, 2b) for said shock absorbing layer (10) of the chin guard (102), and hooking means (9a, 9b) to the chin guard and/or the shell, characterized in that said at least one support mask (1) comprises further temporary coupling means (6a, 8a, 61a, 6b, 61b, 108a) of at least said one or more paddings (106).

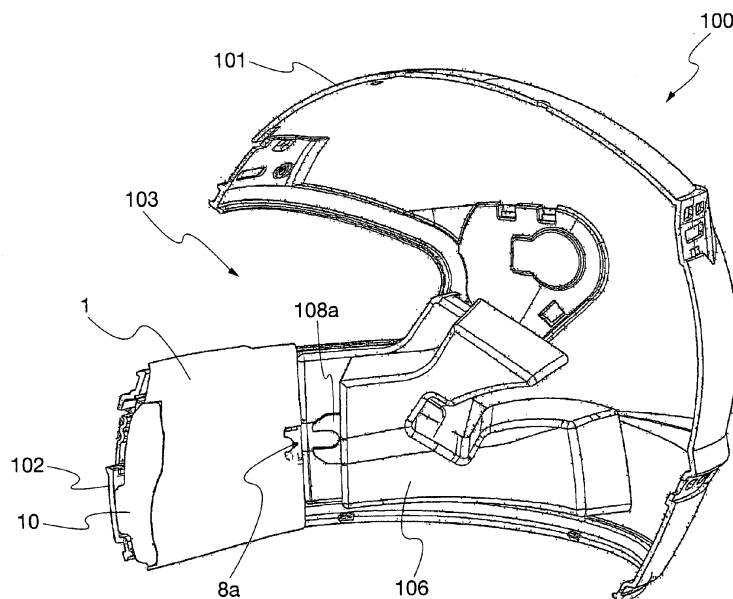


Fig. 8

## Description

### FIELD OF THE INVENTION

**[0001]** The present invention relates to a protective helmet, particularly for motorcyclists, of the type comprising a shell with a chin guard and an opening for a corresponding visor, one or more shock absorbing layers internally coupled to the shell and to the corresponding chin guard, and one or more paddings placed within said shock absorbing layers, as well as at least one support mask for the shock absorbing layer of the chin guard, wherein said internal support mask comprises holding means for the shock absorbing layer of the chin guard and mechanical hooking means to said chin guard.

### PRIOR KNOWN ART.

**[0002]** It is known art to constrain the shock absorbing layer of a protective helmet, normally made of polystyrene foam (EPS), directly to the inner surface of the helmet shell by forced restraining (shrinking), gluing, or also by mechanical supporting and clamping means, or also by way of Velcro ® strips.

**[0003]** In particular, it is frequent, in the prior known art, to make protective helmets which present within the shell various juxtaposed shock absorbing layers, presenting in particular a first hemispherical shaped layer suited to protect the user's cranial zone against impact, two opposite facing layers arranged for lateral impact protection of the side regions (cheeks) of the user's face, and optionally a shock absorbing layer for the protection of the user's chin. These different shock absorbing layers are usually permanently constrained to the outer shell of the helmet by forced restraining (i.e. by forced geometric fit).

**[0004]** Within these shock absorbing layers, also to prevent that undue mechanical actions may damage them, padding is normally placed, for example, covered in fabric, engaging the user's face, which also ensures needed comfort of use.

**[0005]** In the case of a shell comprising a portion of the chin protection, commonly referred to as chin guard, the shock absorbing layer suited to protect the user's chin, not only is usually separated from one or other shock absorbing layers, but is also without external padding, which could disturb the user's breathing and hinder the grip and hand holding of the helmet.

**[0006]** Regarding the chin guard, it is known art to cover said shock absorbing layer, particularly its portion facing the user's chin with a surface cover, for example consisting of synthetic leather (i.e. a fabric layered with polyurethane PU or a polyamide PA) or consisting of polyurethane (PU) foam, which is able to prevent or reduce the chance of accidental damage of said shock absorbing layer as well as being a layer pleasant to the user's touch.

**[0007]** This surface cover for the shock absorbing layer of the chin guard, in the common case where the latter

is produced in EPS, is usually made by overprinting (e.g. low pressure injection) of said shock absorbing layer with an appropriate coating material, such as polyurethane foam, which defines a layer of limited thickness, for example equal to a minimum of 2mm, defining the final shape of the piece to allow coupling with the rest of the components of the helmet, also guaranteeing appropriate stylistic requirements.

**[0008]** This art has however certain drawbacks.

**[0009]** As first, the surface cover layer, for both intrinsic technological limits of the process of overprinting along with the production process of the shock absorbing layer in EPS of the chin guard, leads to a final unit weight which may be excessive.

**[0010]** Secondly, the productivity of this technique is rather low, given the long time needed to perform overprinting and the further processing of burr removal. Finally, the high costs needed to achieve such a surface cover by way of overprinting material suitable for absorbing impact, usually consisting of EPS, should also be mentioned.

**[0011]** To overcome these disadvantages, it is a known art to use, mainly in helmets with a raising chin guard, a support mask and surface cover of the shock absorbing layer of the chin guard which, sandwiched between the user's face and said shock absorbing layer, is mechanically constrained to said chin guard, so that the shock absorbing layer remains positioned between said support mask and the inner wall of the chin guard.

**[0012]** This support mask, which can be opportunely shaped and fitted with ducts allowing the guided passage of an air flow from the outside to the inside of the helmet, is usually a plate-like member made out of an injection molded plastic material (such as polyethylene (PE) or polypropylene (PP), or also thermoplastic polyurethane (TPU)), including both the hooking means to the chin guard, formed for example by screws, bolts or elastic-type couplings, and also by holding means of the shock absorbing layer of the chin guard, made for example by portions and shaped strikers or elastic tabs or other elements designed to execute mechanical constraining of said shock absorbing layer.

**[0013]** The use of this support mask of the shock absorbing layer makes no longer necessary the overprinting operation of the said absorbing layer, usually in EPS, with a thin layer of a coating material, such as PU foam.

**[0014]** However, the encumbrance of a support mask of the kind described above requires careful designing of internal parts of the helmet shell, which must be shaped and constrained together in a way allowing installation and correct housing of said support mask.

**[0015]** Particularly, the layout and the conformation of the fixing means of the padding to the shock absorbing layer placed near the chin guard, and therefore of said support mask, must be carefully studied.

**[0016]** Additionally, it should be mentioned that, in protective helmets of recent production, the padding that is sandwiched between the head and user's face and the

shock absorbing layer (EPS) is usually constrained to this last layer by temporary coupling means, to allow the user, whenever necessary, to easily detach and eventually reattach any padding from the shock absorbing layer, in order to perform cleaning or replacement of said padding.

**[0017]** More specifically, these temporary, or reversible, coupling means of the padding usually comprise fixing plates, glued to the shock absorbing layer, which bear strikers for complementary buttons or hooks built into the corresponding portions of the padding.

**[0018]** As will be clear to a person skilled in the art, the use of fixing plates glued to the shock absorbing layer, usually polystyrene foam, and corresponding snapping buttons (clips) or other types of couplings attached to the padding, as temporary coupling means still requires processing, packaging or assembly of various components either on the shock absorbing layers, or on the comfort padding, that normally prove to be very expensive, and require a degree of practicable precision to allow simple assembly, guaranteed over time.

**[0019]** It is an aim of the present invention to realize a protective helmet of the type described above which at least partially will solve the problems of the prior art expressed above.

**[0020]** It is therefore the aim of the present invention to provide a protective helmet with a support mask for the shock absorbing layer of the chin guard to allow the temporary coupling (reversible) of at least part of the inside padding of the helmet, placed closely to the chin guard, provided in an effective and simple way.

**[0021]** A further purpose of the present invention is to provide a protective helmet equipped with a chin guard by way of an economical and quick production process, providing a wide choice of finishes and shapes within the chin guard, while requiring a smaller amount of components.

## SUMMARY OF THE INVENTION

**[0022]** These and other aims are achieved by the protective helmet according to the first independent claim and the additional dependent claims.

**[0023]** The protective helmet according to the present invention comprises a shell with a chin guard and an opening for a visor, one or more shock absorbing layers, internally coupled to said shell and said chin guard, and one or more paddings inside said shock absorbing layers, as well as and at least an internal support mask for a shock absorbing layer of the chin guard. This support mask also comprises respective holding means of the shock absorbing layer of the chin guard, and hooking means to the chin guard. Advantageously, the support mask also comprises temporary coupling means of at least one of the aforesaid paddings.

**[0024]** The integration, in the support mask of the shock absorbing layer of the chin guard, of temporary coupling means of the padding, especially those set for

engaging the user's cheeks, simplifies the design of the constraints to the helmet of said padding arranged in proximity of the chin guard, providing temporary coupling means that are highly effective and stable during use - since it is not required any gluing operation to the shell to achieve these coupling means - and reduces the number of components and assembly operations of the product.

**[0025]** According to a preferred aspect of the present invention, the aforesaid temporary coupling means of the padding may be of an elastic coupling of complementary parts type, or of the type comprising a geometric fit coupling between parts belonging to the aforesaid support mask.

**[0026]** For example, said temporary coupling means can be constituted of at least one hook and one relative striker respectively integral to a padding and to said support mask.

**[0027]** It should be noted that not necessarily said temporary coupling means of at least one padding to the support mask of the shock absorbing layer of the chin guard achieve a stable mechanical fixing between these components (i.e., a constraint not easily releasable by the user), as even the loosely coupled joint (i.e. a constraint easily releasable by the user) between these latter, even joined by a traditional fixing (for example by Velcro® strips to the padding and to the corresponding shock absorbing layer), provides a solution which results in an easier and less expensive assembly of the padding in question within the shell, and a significant reduction in the number of components necessary to provide such fixing.

**[0028]** According to another aspect of the present invention, the support mask may moreover include ducts for the passage of air flow and/or constraining means for additional external accessories of the helmet, such as for example a lower windscreen or a diffuser for an upper airflow.

## BRIEF DESCRIPTION OF THE FIGURES

**[0029]** Now herein will be described, by way of example only and without limitation, a preferred embodiment of the present invention referring to the attached figures, in which:

- Figure 1A is a schematic side view in section of a protective helmet according to a particular aspect of the present invention, comprising a support mask for a shock absorbing layer of the chin guard.
- Figure 1B is a semi sectional view of the helmet in Figure 1A from which lateral comfort paddings of the cranial area of the head are removed;
- Figure 2 is a front view of the support mask for a shock absorbing layer of the chin guard of the helmet of figure 1, according to a particular aspect of the present invention, provided with said shock absorbing layer;

- Figure 3 is a front view of the mask of Figure 1, without the shock absorbing layer of the chin guard;
- Figure 4 is a rear view of the mask of Figures 1 and 2, assembled to the chin guard;
- Figure 5 is an enlarged rear view of a detail of the mask of the previous figures;
- Figure 6 is a sectional view, according to a horizontal plane, of the area of the support mask for a shock absorbing layer of the chin guard of the helmet of figure 1, according to a particular aspect of the present invention, provided with said shock absorbing layer;
- Figure 7 is a sectional view of the area of the chin guard support for a shock absorbing layer of the chin guard of the helmet of figure 1 along a plane parallel to the center line in which the air flow can be observed passing through the external intake through inner ducts to the chin guard and flowing into the helmet after ventilating the inner surface of the visor;
- Figure 8 is a side view in cross-section of the protective helmet of the previous figures, pointing out the temporary coupling means of a side padding destined to line a user's cheek (cheek pad) to the support mask of a shock absorbing layer of the chin guard, according to a particular aspect of the present invention, in which said side padding is not yet coupled to the relative support mask; and
- Figure 9 is a side view of the padding for the user's cheek in figure 8, pointing out the temporary coupling means to the aforesaid support mask.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE PRESENT INVENTION

**[0030]** With reference at first to Figure 1, the helmet 100 of the present invention comprises, as known in the art, an outer shell 101, for example, injection molded in a polycarbonate (PC), shaped so as to define an opening 103 for a visor, and provided with a protection portion of the chin, commonly called a chin guard, 102, which is located below the opening 103 and can be obtained as a whole piece, or removable or irremovably fixed to the remaining part of the shell 101.

**[0031]** The helmet 100 moreover includes one or more layers 10, 104, 107 of a material suited to absorb possible impacts (shocks), such as polystyrene foam (EPS), fixed inside the shell 101, 102, for example through forced restraining (shrinking) between parts or through gluing, and one or more paddings 105, 106, also joined inside the shell 101, and arranged to be sandwiched between the user's head and one or more shock absorbing layers 104, 107. In particular, the helmet 100 provides that, for manufacturing reasons, there is at least a first homogeneous shock absorbing layer 104, placed below said portion of the shell 101 destined to protect the user's skull, at least two side layers 107, facing the area of the user's cheeks and at least one additional shock absorbing layer 10, differing from the first layer 104 and from the two side

layers 107, and placed correspondingly to the portion of the chin guard 102.

**[0032]** The shock absorbing layer 10 of the chin guard, which can then be glued to the inner surface of the chin guard 102, is supported within said chin guard 102, according to the present invention, by a proper support mask 1, shaped so as to retain the shock absorbing layer 10 and to be easily constrained to the same chin guard 102, or to the remaining part of the shell 101.

**[0033]** More in detail, according to a preferred aspect of the present invention, said support mask 1 of the shock absorbing layer comprises, with particular reference to Figures 2 to 4, a frontal surface 5, shaped so as to provide accommodating and supporting regions to the relative shock absorbing layer 10, an upper frame 4 and a lower region 3, operating as guides to said layer 10, as well as tabs 2a, 2b, conformed to mechanically retain said layer 10, by contrasting (overlapping) of parts, following a relative elastic deformation. The tabs 2a, 2b, the frame 4 and the lower region 3, in addition to the particular shape of the surface 5, form the appropriate retaining means of the shock absorbing layer 10 of the chin guard 102.

**[0034]** Also referring to figure 7, it is noted that the frame 4 of the mask 1 may also have, obtained as a whole piece, ducts for the passage of a direct air flow from outside the helmet, through appropriate air inlets, towards the inside of the helmet.

**[0035]** At the same time, the lower region 3 of the mask 1 can have, obtained as a whole piece, or defined by the coupling effect with the lower edge 109 of the shell, seats capable of receiving the hooking of other accessories to be optionally installed in the lower zone of the helmet such as a wind screen tab, a deflector of aerodynamic flow, or appendices aimed to reduce the noise generated by vortices which generate in this area during normal use of the helmet, especially when used with motorcycles or other locomotive means without full covered chassis. Referring particularly to Figures 4 and 5, the mask 1 also includes some lateral protuberances 9a, 9b which constitute hooking, or constraining, means, of the said mask 1 to appropriate complementary regions 91 a, 91 b, placed within the chin guard 102, formed to hold, by geometric fit coupling, the aforementioned protuberances 9a, 9b. These hooking means 9a, 9b, 91 a, 91 b of the mask 1 to the inner surface of the chin guard 102 may be alternatively, according to the known art, of the restraining type, or of the juxtaposition/contrasting type or of the elastic coupling of complementary parts type, or even of the type with screwing of screw-threaded parts.

**[0036]** Note however that, in alternative embodiments not shown here, those hooking means can also be formed by one or more layers of glue binding the mask 1 to the chin guard 102, or to the remaining part of the shell 101, directly or by the sandwiching of the shock absorbing layer 10.

**[0037]** It should also be noticed that, as already mentioned, to the mask 1 further external accessories may be attached, for example one or more diffusers for airflow

directed within the helmet, held to the mask 1 by appropriate mechanical holding means, similar to those specified for the hooking means 9a, 9b to the chin guard 102.

**[0038]** More in detail, as shown in Figure 7, the hollow space between the seal of the lower edge 109 of the chin guard portion 102 of the shell and the lower edge 3 of the mask 1 may act as a seat in which to insert, for example, a shaped tab to which can conveniently be fixed an aerodynamic appendage or a wind screen flap or any other accessories that can be housed in the lower region of the helmet.

**[0039]** As is particularly visible in figures 4 and 5, 8 and 9, further, the mask 1 comprises, corresponding to its inner wall 7, i.e. the wall destined to face the user's chin, means 6a, 8a, 61 a, 6b, 8b, 61 b destined to temporary or reversible fixing of at least one of the aforesaid paddings 105, 106.

**[0040]** These means of temporary coupling, in the embodiment shown here, are composed of a through-slot 61A, 61 b at the center of which is a flange 6a, 6b which protrudes towards the inside of the helmet, a pin, or a striker, 8a, 8b intended to engage with a complementary hook, or fork, 108a (see Figures 8 and 9) presented by at least one corresponding paddings 106.

**[0041]** As seen in detail in Figures 8 and 9, which respectively show the coupling of a side padding 106 (cheek pad) with the corresponding end of the support mask 1 and the same side padding 106, said fork 108a may consist of a plastic tab fixed at the front portion of the padding 106, which is likely to be inserted within the through-slot 61 a, to be engaged, achieving a stable mechanical fastening or in a way to achieve a loose coupling, with the corresponding pin 8a.

**[0042]** It is in fact seen that the engagement of each fork 108a with its corresponding pin 8a (or 8b) may for example be of an elastic type, so as to directly facilitate the mechanical fixing between padding 106 and support mask 1, or it can be of a loose type, such as a hook for example in which the fork 108a is extractable in a given direction.

**[0043]** In this latter case, as already mentioned, for obtaining the fixing of the padding 106 to the shell 101 of the helmet, it will be necessary to place traditional fastening means of the padding 106 to the corresponding shock absorbing layer 107, as clips or Velcro® strips.

**[0044]** It should be noted, however, that the coupling between the padding 106 and mask 1, even if loose, allow an easy assembly of said padding, as well as a significant reduction in the number of components necessary to secure the padding 106 itself.

**[0045]** Alternatively, in embodiments of the present invention not shown here, the temporary or reversible coupling means, for at least one padding 106 may be of the elastic coupling of complementary parts type, such as snap buttons, clips, etc., or be of the counterpart hooking type, such as buttons and buttonholes, or even of the type comprising male and female Velcro® strips placed respectively on mask 1 and on corresponding portions

of the padding 106.

**[0046]** Again, these coupling means can consist of guides and engaging slides within said guides, or other known types of loose coupling, i.e. with at least a certain degree of freedom, not discussed here.

**[0047]** According to a particular aspect of the present invention, the helmet 100 shown herein may include a plurality of paddings 105, 106 flanking each other, in such a way that at least a padding 106, or a pair of said paddings, is arranged so as to cover at least part of the sides of the opening 103 for the visor, substantially engaging the user's cheeks when the helmet 100 is worn, until reaching the chin guard 102, or more precisely its corresponding support mask 1 for the shock absorbing layer 10.

**[0048]** In this case, the temporary coupling means 6a, 8a, 61 a, 6b, 8b, 61 b of mask 1 to support the shock absorbing layer 10 of the chin guard 102 are designed to hold said side padding 106 suitable to engage the user's cheeks.

**[0049]** Finally, as already known in the art, the mask 1 may be made of polyethylene (PE) or polypropylene (PP), or even polyurethane (TPU) by way of injection molding.

**[0050]** After inserting the inner shock absorbing layer 104 of the user's cranial area within the outer shell 101, the assembly of the support mask 1 for a shock absorbing layer 10 of the chin guard 102, according to the particular embodiment of the present invention shown here, first provides that the shock absorbing layer 10 is supported and held onto the mask by holding means 3, 4, and in particular thanks to the tabs 2a, 2b intended to retain by contrasting parts the layer 10, and therefore mask 1, with the layer 10, is hooked to the chin guard 102, by way of the protuberances 9a, 9b coupling with the aforesaid complementary internal regions 91a, 91 b of said chin guard 102;

**[0051]** Finally, the assembly of the helmet provides that the shock absorbing layers 107 intended to protect the user's cheeks are inserted between mask 1 and the shock absorbing layer 104, by way of force fit coupling (forced restraining) achieved between the rear support surfaces, against the inner shell 101, and frontal surfaces, against the mask 1, as well as the inner shape of the shell 100, resulting in the final locking of the shock absorbing layers within the helmet.

**[0052]** At this point the constraining of the padding 105 of the cranial area of the shell 101 to the corresponding shock absorbing layers 104, 107 can be made, and then successively the positioning and hooking of the side padding 106 to the same mask 1 can be made, thanks to the temporary coupling means 6a, 8a, 61 a, 6b, 8b, 61 b, 108a, thus obtaining the complete assembly of the inner parts of the helmet.

**[0053]** As previously underlined, in the case of loose temporary coupling means, i.e. not defining a complete mechanical fastening of the side padding 106 to mask 101, such a solution facilitates in any case the installation

of said padding 106 and reduces the number of traditional fixing elements, such as elastic clips or Velcro® strips between the shock absorbing layer 107 and the inner walls of the padding 106.

[0054] However if the hooking of the padding 106 directly to the mask 1 also accomplishes the mechanical fixing of said padding 106 to the mask 1, i.e. by way of elastic coupling, this solution eliminates the necessity to create more hooking means for said padding directly on the inner walls of the shell, making the building of the helmet cheaper, and simplifying construction and assembly.

## Claims

1. A protective helmet (100) of the type comprising a shell (101) provided with a chin guard (102) and an opening (103) for a visor, one or more shock absorbing layers (104, 107, 10), internally coupled to said shell (101) and to said chin guard (102), and one or more paddings (105, 106) placed inside said one or more shock absorbing layers (104, 107, 10), and at least one support mask (1) for a shock absorbing layer (10) of the chin guard (102), said at least one support mask (1) including retaining means (3, 4, 5, 2a, 2b) of said shock absorbing layer (10) of the chin guard (102), and hooking means (9a, 9b) to the chin guard and/or to the shell, **characterized in that** said at least one support mask (1) also includes temporary coupling means (6a, 8a, 61 a, 6b, 8b, 61 b, 108a) for at least one (106) of said one or more paddings (105, 106).
2. The protective helmet according to claim 1, **characterized in that** said temporary coupling means (6a, 8a, 61 a, 6b, 8b, 61 b, 108a) are of a loose type.
3. The protective helmet according to claim 1, **characterized in that** said temporary coupling means (6a, 8a, 61 a, 6b, 8b, 61 b, 108a) achieve mechanical fastening of said one or more paddings to said at least one support mask (1).
4. The protective helmet according to claim 3, **characterized in that** said temporary coupling means (6a, 8a, 61 a, 6b, 8b, 61 b, 108a) are of the elastic coupling of complementary parts type, or of the counterpart hooking type, or of the type comprising male and female strips of Velcro®.
5. The protective helmet according to any of the preceding claims, **characterized in that** said temporary coupling means (6a, 8a, 61 a, 6b, 8b, 61 b) comprise one or more engaging strikers (8a, 8b) to complementary hooking means (108a) integral with said one or more paddings (105, 106).
6. The protective helmet according to any of the preceding claims, **characterized in that** said one or more paddings (106) temporarily fixed to said at least one support mask (1) are paddings placed to the side of said opening (103) engaging the user's cheeks.
7. The protective helmet according to any of the preceding claims, **characterized in that** said hooking means (9a, 9b) to the chin guard of said at least one support mask (1) are of the restraining type or of the juxtaposition type or of the type comprising elastic coupling of complementary parts (91 a, 91b), made as a one piece and/or made integral within the shell (101) and/or the chin guard (102).
8. The protective helmet according to any of the preceding claims, **characterized in that** said retaining means (3, 4, 5, 2a, 2b) for retaining said shock absorbing layer (10) of the chin guard comprise one or more shaped support regions (3, 4, 5) for said shock absorbing layer (10) of the chin guard, and also one or more retaining elements (2a, 2b), by contrasting parts, of said shock absorbing layer of the chin guard.
9. The protective helmet according to any of the preceding claims, **characterized in that** said at least one support mask (1) includes ducts (4) for the passage of an air flow.
10. The protective helmet according to any of the preceding claims, **characterized in that** said at least one support mask includes holding means for additional external accessories of said helmet.
11. The protective helmet according to any of the preceding claims, **characterized in that** said at least one support mask is made of injection molded plastic material (PE or PP or TPU).
12. The protective helmet according to any of the preceding claims, **characterized in that** said chin guard (102) is made as a whole with the shell (101).

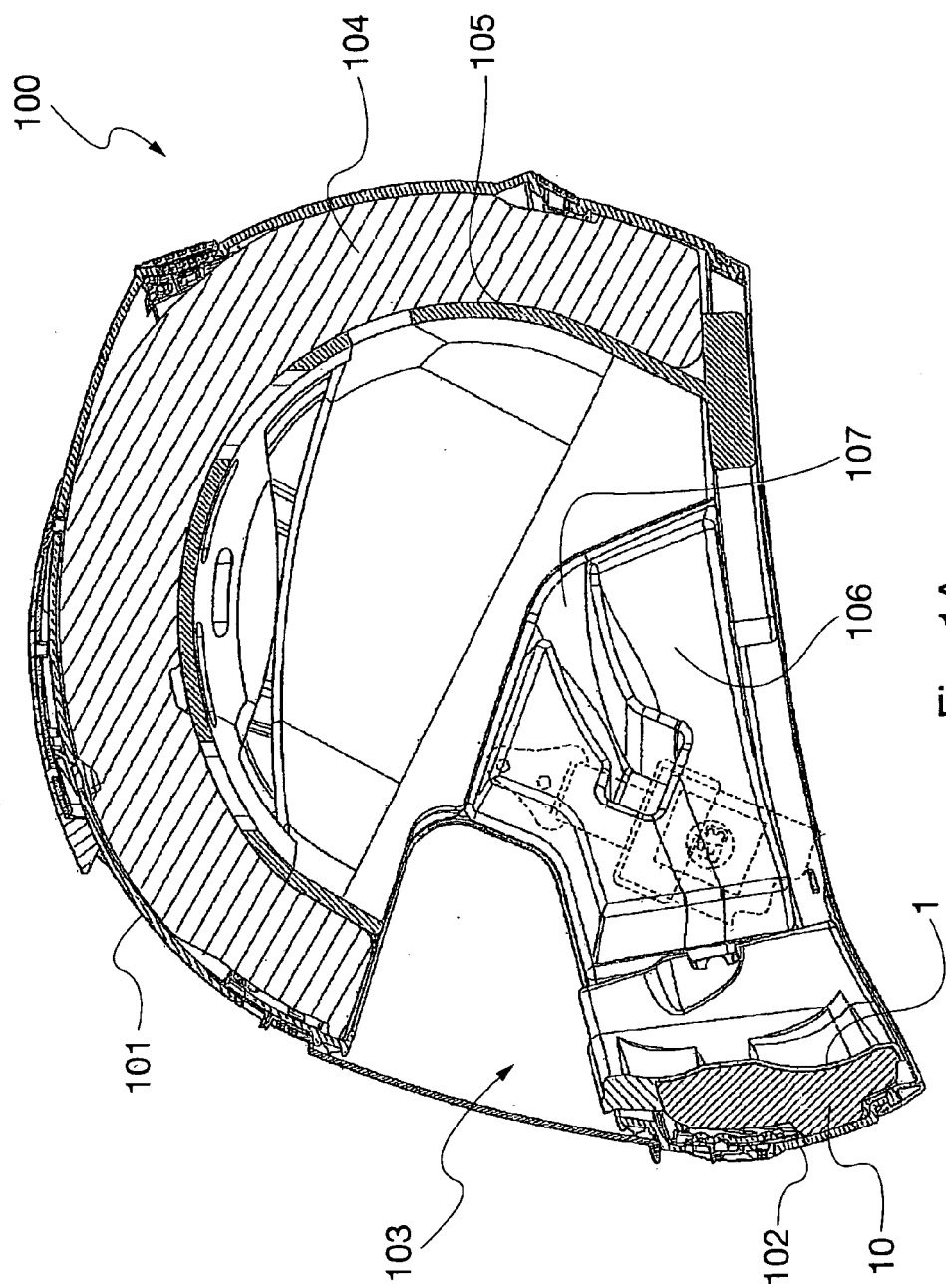


Fig. 1A

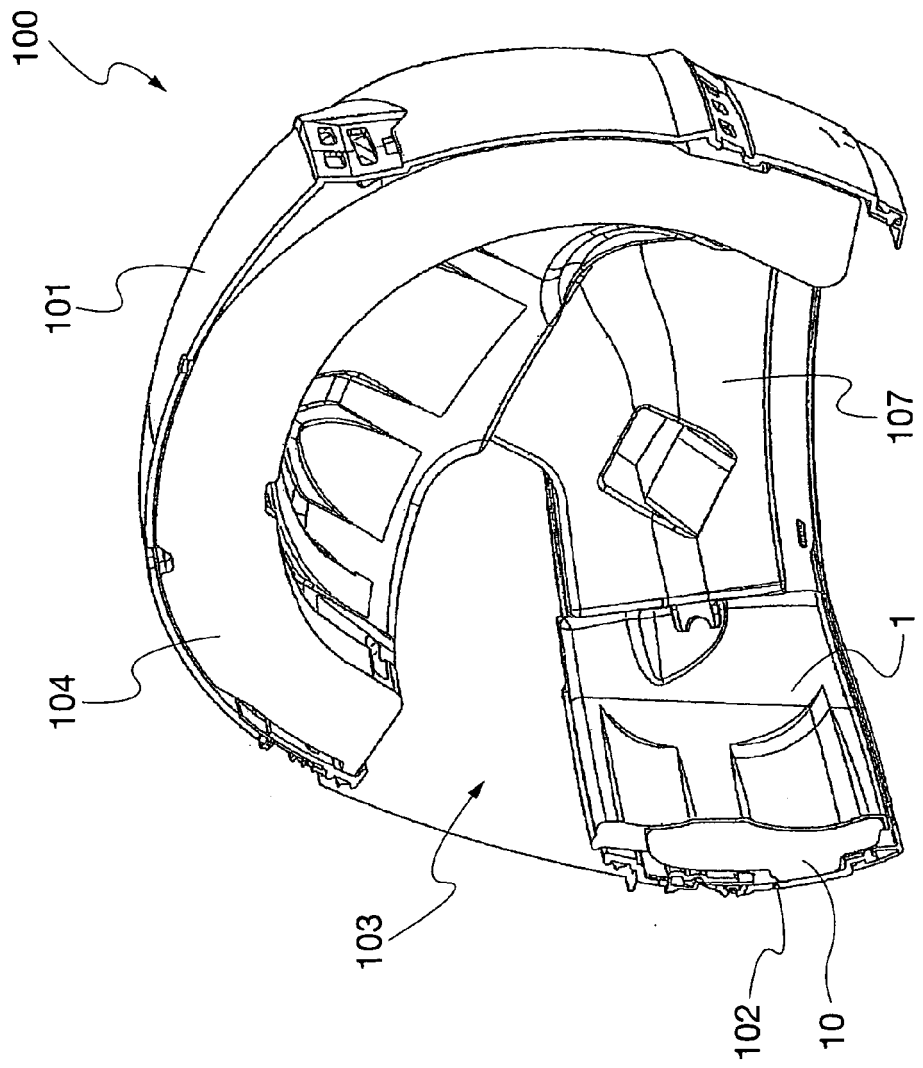


Fig. 1B

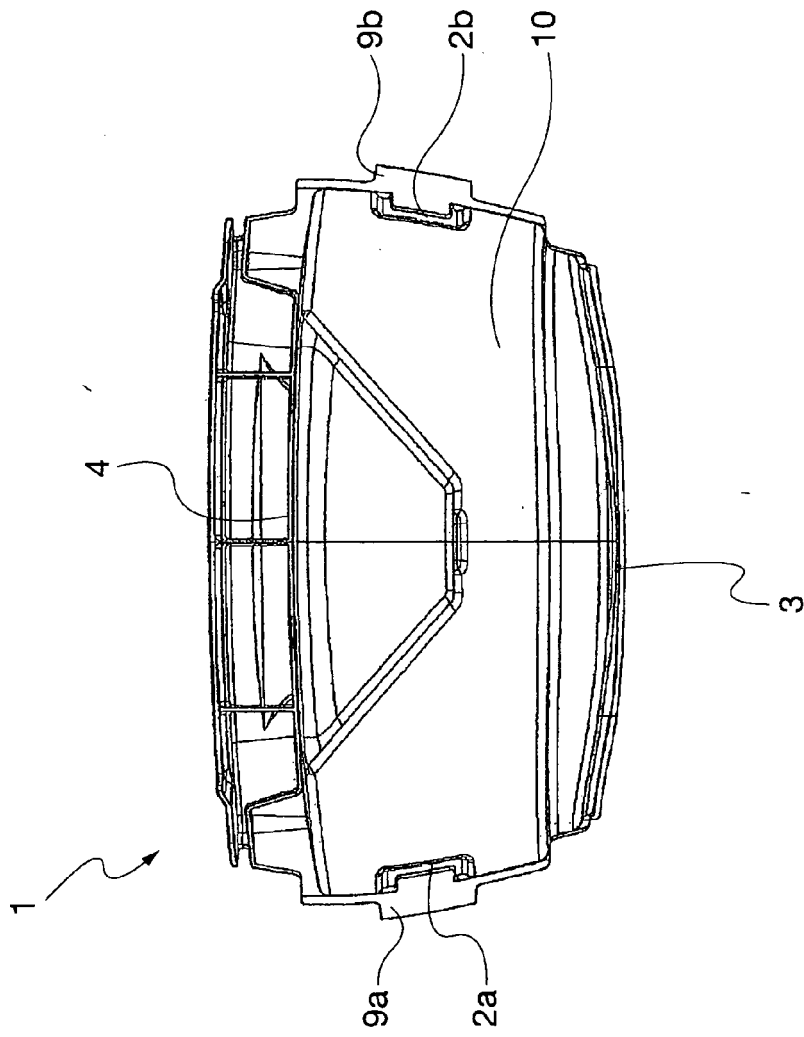


Fig. 2

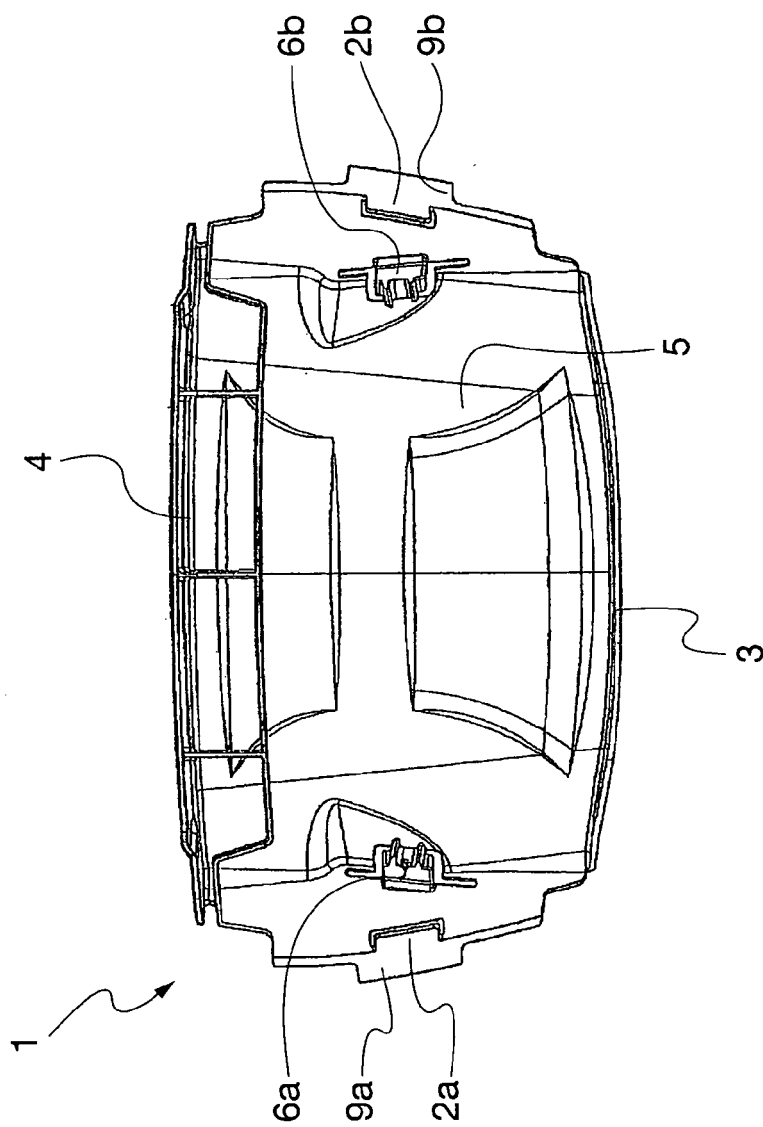


Fig. 3

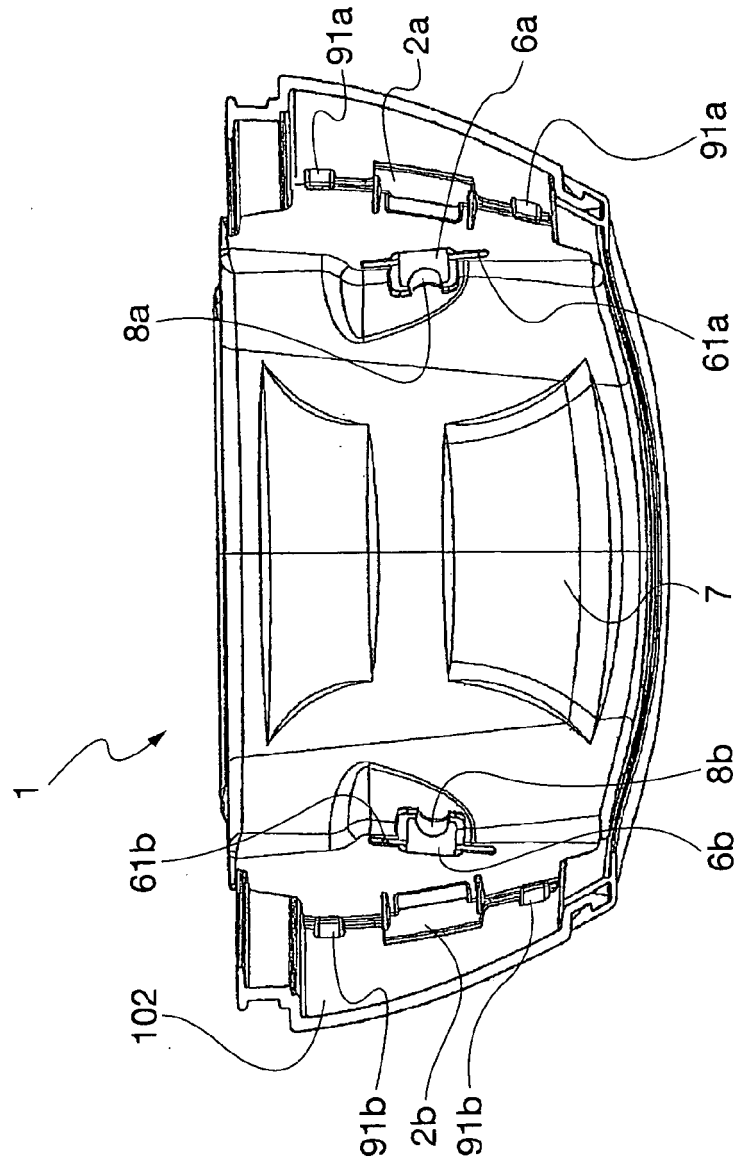


Fig. 4

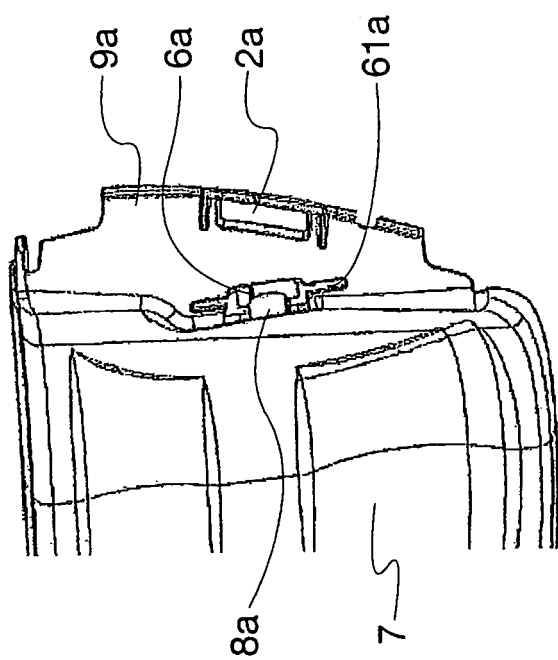


Fig. 5

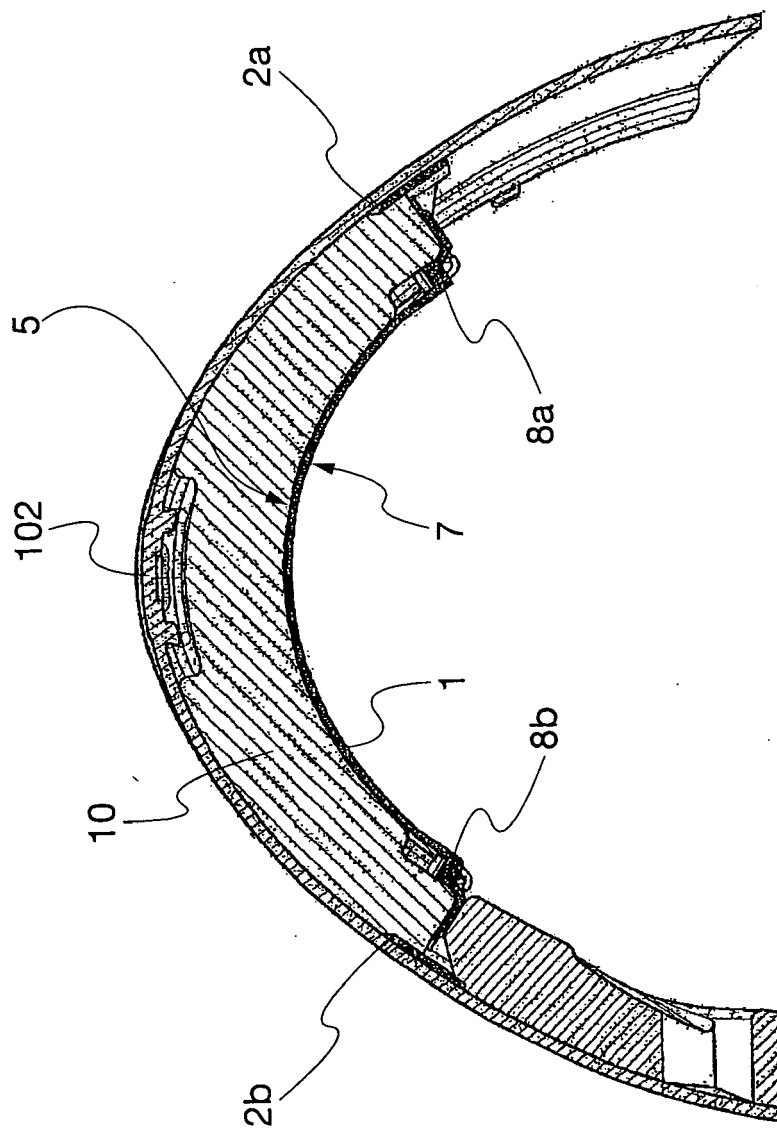


Fig. 6

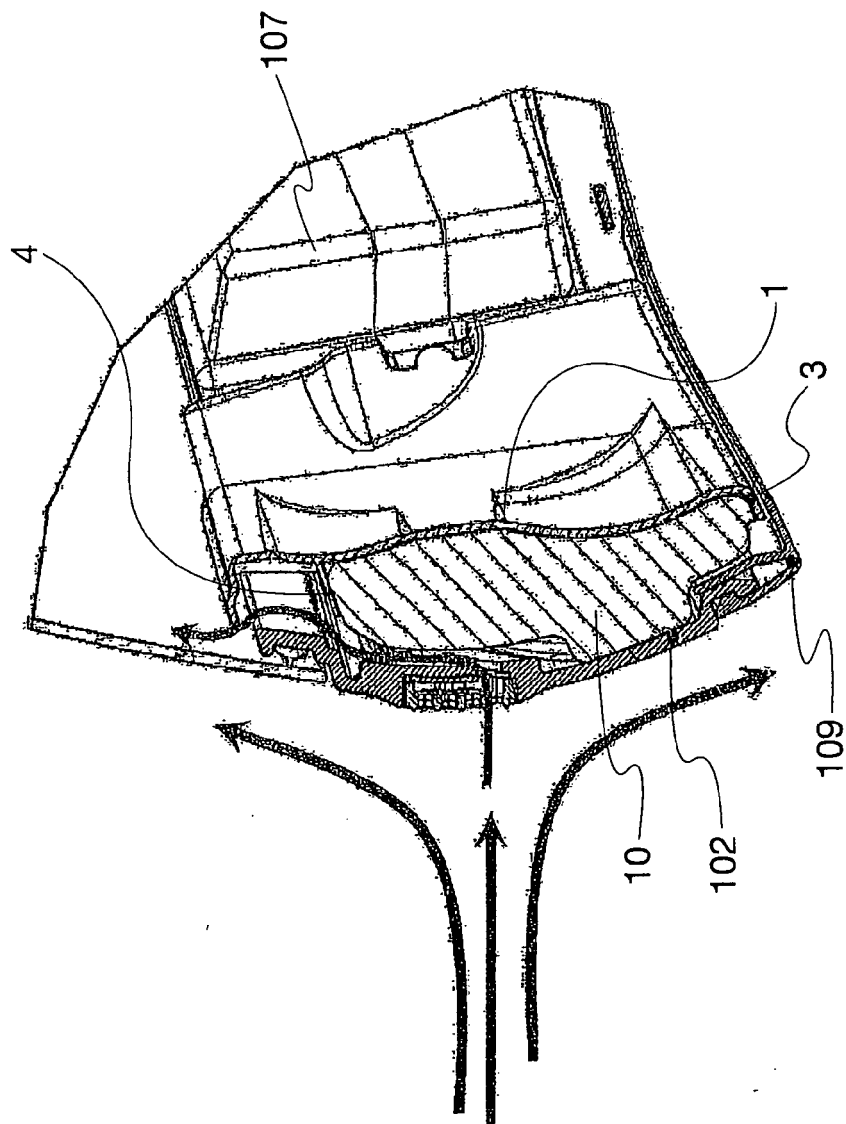


Fig. 7

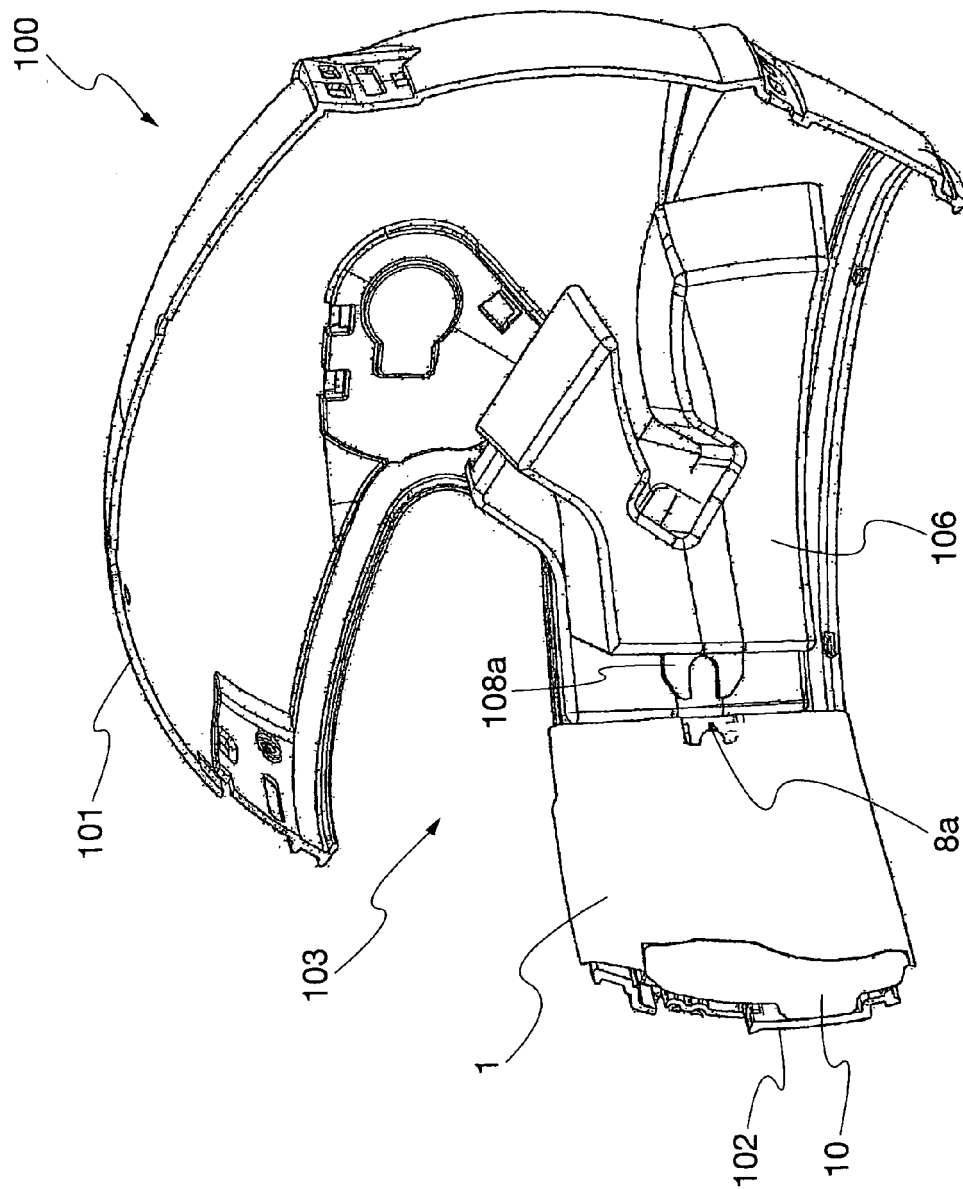


Fig. 8

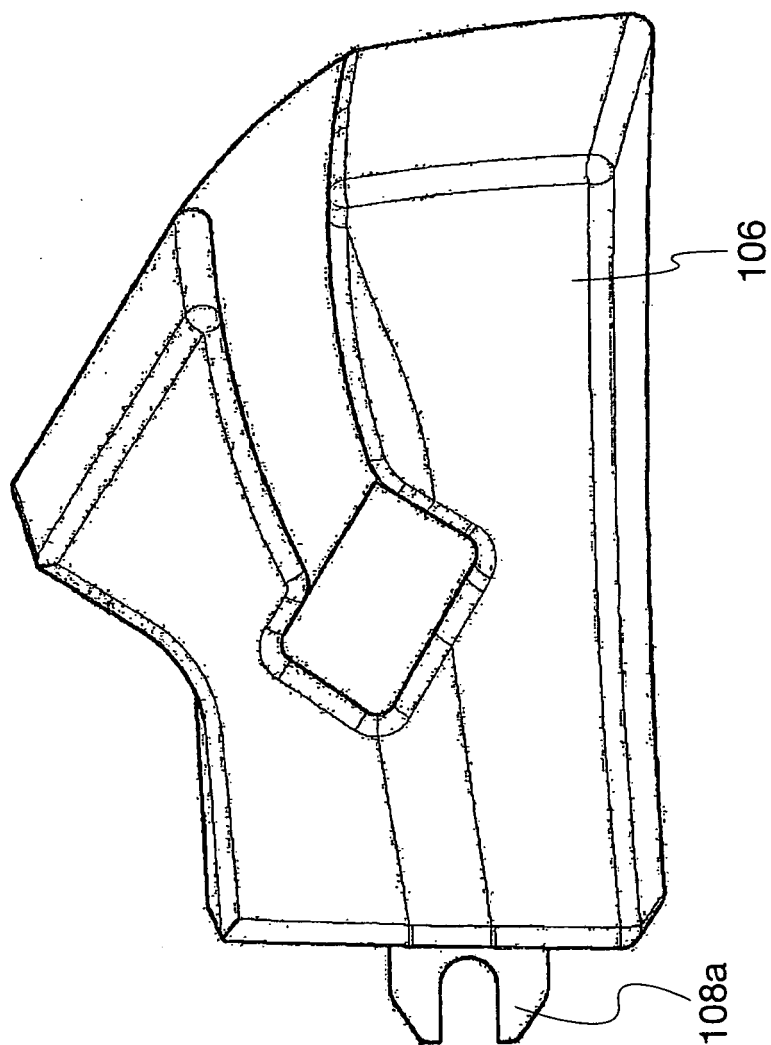


Fig. 9



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 42 5314

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 186 194 A (SMITH DEREK) 12 August 1987 (1987-08-12) * page 1, line 20 - line 24 * * page 3, line 18 - line 60 * * page 3, line 97 - line 110 * * figures 1-4 *	1-12	INV. A42B3/12
A	DE 31 44 872 A1 (SCHEFFCZYK WERNER) 15 September 1983 (1983-09-15) * page 12, line 12 - page 14, line 12 * * figures 2,3 *	1-12	
A	JP H01 153340 U (.) 23 October 1989 (1989-10-23) * figure 3 *	1-12	
A	EP 0 346 608 A2 (ARAI MICHIO) 20 December 1989 (1989-12-20) * column 2, line 11 - column 3, line 30 * * figures 1,4,5 *	1-12	
A	JP H04 69418 U (.) 19 June 1992 (1992-06-19) * figures 1,3 *	1-12	TECHNICAL FIELDS SEARCHED (IPC) A42B
A	JP H03 63531 U (.) 20 June 1991 (1991-06-20) * figure 8 *	1-12	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 April 2011	Examiner Guisan, Thierry
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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