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(71) Applicants:
- **HONDA GIKEN KOGYO KABUSHIKI KAISHA**
  Minato-ku Tokyo (JP)
- **Kabushiki Kaisha Honda Access**
  Niiza-shi, Saitama (JP)

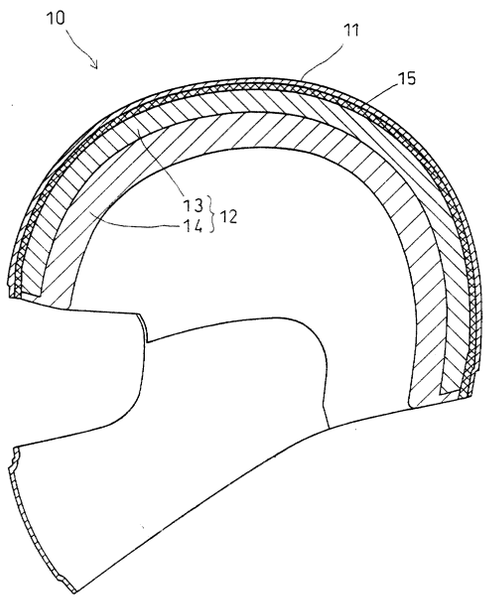
(72) Inventors:
- **Nakayama, Kengo**
  1-4-1 Chuo, Wako-shi, Saitama-ken (JP)
- **Ono, Naoto**
  Asaka-shi, Saitama (JP)
- **Itou, Tetsuya**
  Asaka-shi, Saitama (JP)
- **Oshigamo, Hiroaki**
  Asaka-shi, Saitama (JP)

(74) Representative: **Liska, Horst, Dr.-Ing. et al**
Weickmann & Weickmann
Patentanwälte
Postfach 86 08 20
81635 München (DE)

(54) A helmet

(57) When shock acts on a helmet which a driver of a motorcycle or the like wears, rotational component as well as advancing component of the shock can be absorbed effectively. In a helmet (10) with a shock absorbing liner (12) fitted on an inner side of a shell (11), a layer of elastic body (15) for absorbing shock having a component directed along an outer surface of the shell is provided between the shell (11) and the shock absorbing liner (12) or between an outer layer (13) of the shock absorbing liner (12) and an inner layer (14) of the shock absorbing liner (12).

Fig.1



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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a helmet which a driver of a vehicle such as a motorcycle or a racing car wears.

[0002] Hitherto, a helmet as shown in Japanese Laid-Open Patent Publication Hei 6-240508 has been known. In this helmet, a reinforcement cloth made of a strengthening fiber is interposed between a shell and a shock absorbing liner fitted within the shell or between two layers of the shock absorbing liner and fixed thereto, in order to obtain improved shock absorbing performance without increasing thickness of the shell.

[0003] Shock load acting on the helmet is classified roughly into a load in a direction toward an center of the helmet and a load in a tangential direction (rotational component) deviating from the center. In the customary helmet, the both loads are absorbed by deformation of the liner or the like.

SUMMARY OF THE INVENTION

[0004] The present invention proposes a helmet capable of absorbing the rotational component of shock effectively.

[0005] For this purpose, the present invention provides a helmet having a shock absorbing liner fitted on an inner side of a shell, wherein an elastic body is provided between the shell and the shock absorbing liner for absorbing shock having a component directed along an outer surface of the shell.

[0006] According to the invention, since the head of the wearer and the shell are not fixed to each other, when shock force acts on the helmet from the outside, rotational acceleration, that is, acceleration component directed along an outer surface of the shell is also absorbed, as well as advancing acceleration, that is, acceleration component directed perpendicularly to the outer surface of the shell.

[0007] According to another aspect of the present invention, there is provided a helmet having a shock absorbing liner fitted on an inner side of a shell, wherein the shock absorbing liner is slit into an outer liner and an inner liner, and a layer of elastic body is provided between the outer liner and the inner liner for absorbing shock having a component directed along an outer surface of the shell.

[0008] Also in this helmet, when shock force acts on the helmet from the outside, rotational acceleration, that is, acceleration component directed along an outer surface of the shell is absorbed, as well as advancing acceleration, that is, acceleration component directed perpendicularly to the outer surface of the shell.

[0009] The elastic body may be a gel. When shock force acts on the helmet, rotational acceleration, that is, acceleration component directed along an outer surface of the shell is absorbed effectively.

[0010] Split surfaces of the outer liner and the inner liner may be formed in spherical surfaces. Since the layer of the absorbent elastic body is provided along the spherical surface, the outer liner and the inner liner can slip relatively easily, so that degree of freedom in rotational direction becomes large and the rotational component of the shock force can be absorbed more effectively.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a vertical sectional view of a helmet according to an embodiment of the present invention;
Fig. 2 is a vertical sectional view of a helmet according to a second embodiment of the present invention;
Fig. 3 is a vertical sectional view of a helmet according to a third embodiment of the present invention;
Fig. 4 is a vertical sectional view of a helmet according to a fourth embodiment of the present invention;
Fig. 5 is a vertical sectional view of a helmet according to a fifth embodiment of the present invention;
Fig. 6 is a vertical sectional view of a helmet according to a sixth embodiment of the present invention;
Fig. 7 is a vertical sectional view of a helmet according to a seventh embodiment of the present invention;
Fig. 8 is a vertical sectional view showing a broken helmet according to the seventh embodiment;
Fig. 9 is a sectional view showing a eighth embodiment of the present invention; and
Fig. 10 is a sectional view showing a ninth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] Fig. 1 is a vertical sectional side view showing an embodiment of the present invention. A helmet 10 has a shell 11 made of FRP and a shock absorbing liner 12 of styrene form fitted on an inner side of the shell 11. The shock absorbing liner 12 is divided into an outer liner 13 and an inner liner 14 which have respective different foaming multiples and adhere to each other. In this embodiment, an absorbent elastic body 15 is provided between the shell 11 and the outer liner 13 and stuck to the shell 11 and the outer liner 13.

[0013] The helmet of the present embodiment is so constructed that a head of a wearer and the shell 11 is not fixed to each other. Therefore, when shock force acts on the helmet from he outside, rotational acceleration, that is, acceleration component directed along the outer surface of the shell 11 is also absorbed, as well as advancing acceleration, that is, acceleration component directed perpendicularly to the outer surface of the shell

11.

[0014] As for the absorbent elastic body 15, grease-like material or gel-like material, particularly â gel, NP gel (registered trade marks) and foam gel can be used. This is the same with respect to other embodiments to be described bellow.

[0015] Fig. 2 is a vertical sectional side view showing a second embodiment of the present invention. The helmet 20 has a shell 21 manufactured by injection molding of nylon and a shock absorbing liner 22 of styrene foam fitted and stuck on an inner side of the shell 21. The shock absorbing liner 22 is divided into an outer liner 23 and an inner liner 24 with a split surface extending along a spherical surface 26. In this embodiment, a layer of absorbent elastic body 25 is provided between the outer liner 23 and the inner liner 24 and stuck to the both shock absorbing liners 23, 24.

[0016] Also in this embodiment, since a head of a wearer of the helmet is not fixed to the shell 21, when shock force acts on the helmet from the outside, rotational component, that is, the component directed along the outer surface of the helmet is also absorbed, as well as advancing component, that is, the component directed perpendicularly to the outer surface of the shell 21. In this embodiment, since the split surface between the outer liner 23 and the inner liner 24 is spherical surface and the layer of absorbent elastic body 25 is provided along the spherical surface, the outer liner 23 and the inner liner 24 can easily slip relatively and degree of freedom in rotational direction becomes large so that rotational component of the shock force can be absorbed easily.

[0017] Fig. 3 is a vertical sectional side view showing a third embodiment of the present invention. The helmet 30 has a shell 31 manufactured by injection molding of polypropylene and a shock absorbing liner 32 of styrene foam fitted and stuck on an inner side of the shell 31. The shock absorbing liner 32 is split into two layers through a split surface extending along a spherical surface 36, and a layer of absorbent elastic body 35 is disposed between an outer liner 33 and an inner line 34 and stuck thereto. In this embodiment, at the edge of the inner liner 34 is provided a flange 34c directing outward.

[0018] The present embodiment has the same effect as the above-mentioned second embodiment. Moreover, when the outer liner 33 and the inner liner 34 rotate relatively to a limit, the flange 34c collides with an edge of the outer liner 33 to restrain an excessive rotation.

[0019] Though the flange 34c is provided at the edge of the inner liner 34 directing outward, the flange may be provided at the edge of the outer liner 33 directing inward so as to collide with the edge of the inner liner 34.

[0020] Fig. 4 is a vertical sectional side view showing a fourth embodiment of the present invention. The helmet 40 has a shell 41 and a shock absorbing liner 42 fitted and stuck on an inner side of the shell 41. The shock absorbing liner 42 is split into an outer liner 43 and an inner liner 44 through a split surface extending along a spherical surface 46. A layer of absorbent elastic body 45 is disposed between the outer liner 43 and the inner liner 44 and stuck thereto. In this embodiment, a dent 43a is provided at a portion of the outer liner 43 and a projection 44b is provided at a portion of the inner liner 44 opposite to the dent 43a so that the projection 44b is fitted into the dent 43a.

[0021] According to this embodiment, the inner liner 44 is normally fixed to the outer liner 43 to restrain unnecessary movement caused by the absorbent elastic body, but when shock force having a component directed along the outer surface of the shell 41 acts on the helmet, the projection 44b is broken to allow movement so that the component of the shock force can be absorbed. Of course, the present embodiment can achieve all effects of the above-mentioned second embodiment.

[0022] Contrary to the above, the inner liner 44 may be provided with the dent and the outer liner 43 may be provided with the projection. Plurality of pairs of the projections and the dents may be provided.

[0023] Fig. 5 is a vertical sectional view showing a fifth embodiment of the present invention. The helmet 50 has a shell 51 and a shock absorbing liner 52 fitted and stuck on an inner side of the helmet 51. The shock absorbing liner 52 is split into an outer liner 53 and an inner liner 54 through a split surface extending along a spherical surface 56. The outer liner 53 and the inner liner 54 have respective dents 53a, 54a opposite to each other. In each space formed by the corresponding dents 53a, 54a is disposed a layer of absorbent elastic body 55 stuck to the outer liner 53 and the inner liner 54. Also the outer liner 53 and the inner liner 54 are stuck to each other.

[0024] This embodiment exhibits the same effects as those of the second embodiment. In this embodiment, the layer of absorbent elastic body 55 is used in a direction of shear.

[0025] Fig. 6 is a vertical sectional view showing a sixth embodiment of the present invention. The helmet 60 comprises a shell 61 and a shock absorbing liner 62 fitted and stuck on an inner side of the shell 61. The shock absorbing liner 62 is split into an outer liner 63 and an inner liner 64 through a split surface extending along a spherical surface 66. The outer liner 63 has wide hollows 63a and narrow projections 63b, and the inner liner 64 has wide hollows 64a and narrow projections 64b. In each space formed between the outer liner 53 and the inner liner 64 is disposed a layer of absorbent elastic body 65 which is stuck to the outer liner 63 and the inner liner 64.

[0026] The present embodiment exhibits the same effects as those of the fifth embodiment, but the layer of absorbent elastic body 65 is used in a direction of compression.

[0027] Fig. 7 is a vertical sectional side view showing a seventh embodiment of the present invention and Fig. 8 is a vertical sectional view showing a state of the helmet after shock is absorbed.

[0028] In Fig. 7, the helmet 70 comprises a shell 71 and a shock absorbing liner 72 fitted and stuck on an inner side of the shell 71. The shock absorbing liner 72 is split into an outer liner 73 and an inner liner 74, and a layer of absorbent elastic body 75 is disposed between the outer liner 73 and the inner liner 74 and stuck to the outer liner 73 and the inner liner 74. In this embodiment, the split surfaces of the outer liner 73 and the inner liner 74 are not spherical surfaces.

[0029] When shock force having rotational component acts on the helmet 70 from the outside to rotate the outer liner 73 and the inner liner 74 relatively, the layer of absorbent elastic body 75 is deformed so that a part thereof is compressed to collapse and another part is expanded to produce a cavity. Thus an excessive rotation is restrained.

[0030] Fig. 9 is a sectional view showing an eighth embodiment of the present invention. Similarly to the second to seventh embodiments, a layer of absorbent elastic body 85 is disposed between an outer liner 83 and an inner liner 84 and stuck to the both liners 83, 84. However, in this embodiment, a gel having air rooms 85d therein is used as the layer of absorbent elastic body 85. The air room 85d may be a bubble.

[0031] According to this embodiment, air in the air room 85d improves cushion effect and contributes to reduce weight of the helmet.

[0032] Fig. 10 is a sectional view showing a ninth embodiment of the present invention. According to this embodiment, between an outer liner 93 and an inner liner 94 are disposed some layers of absorbent elastic body 95 so as to form a suitable number of spaces as air rooms 97. The layer of absorbent elastic body 95 is stuck to the outer liner 93 and the inner liner 94. This embodiment exhibits the same effects as those of the eighth embodiment.

[0033] In the above-mentioned embodiments, it is also possible to partly connect inside of the liner with outside of the shell for ventilation, within a limit not departing from the above-mentioned effects.

[0034] When shock acts on a helmet which a driver of a motorcycle or the like wears, rotational component as well as advancing component of the shock can be absorbed effectively. In a helmet with a shock absorbing liner fitted on an inner side of a shell, a layer of elastic body for absorbing shock having a component directed along an outer surface of the shell is provided between the shall and the shock absorbing liner or between an outer layer of the shock absorbing liner and an inner layer of the shock absorbing liner.

Claims

1. A helmet having a shock absorbing liner fitted on an inner side of a shell, wherein an elastic body is provided between said shell and said shock absorbing liner for absorbing shock having a component directed along an outer surface of said shell.

2. A helmet having a shock absorbing liner fitted on an inner side of a shell, wherein said shock absorbing liner is split into an outer liner and an inner liner, and a layer of elastic body is provided between said outer liner and said inner liner for absorbing shock having a component directed along an outer surface of said shell.

3. A helmet as claimed in claim 1 or 2, wherein said elastic body is a gel.

4. A helmet as claimed in claim 2, wherein split surfaces of said outer liner and said inner liner are formed in spherical surfaces.

Fig.1

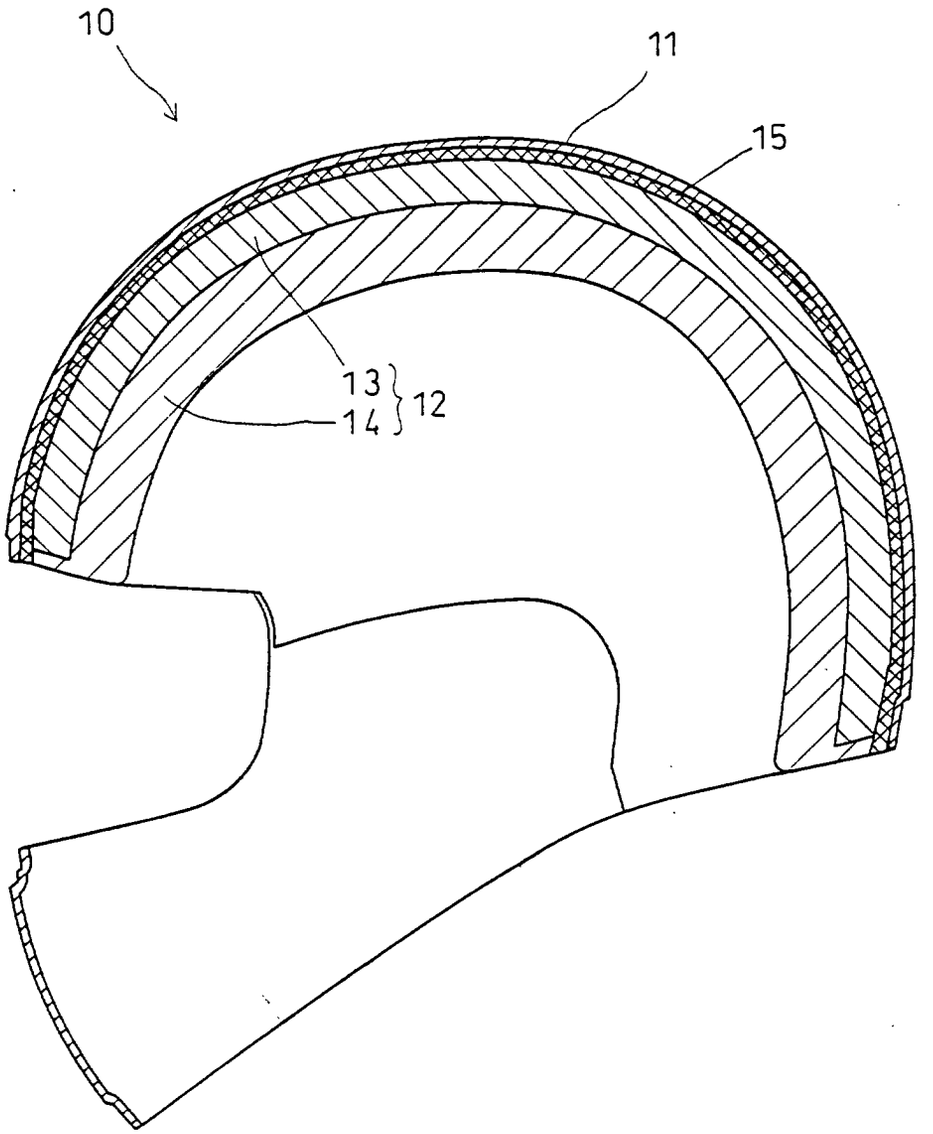


Fig.2

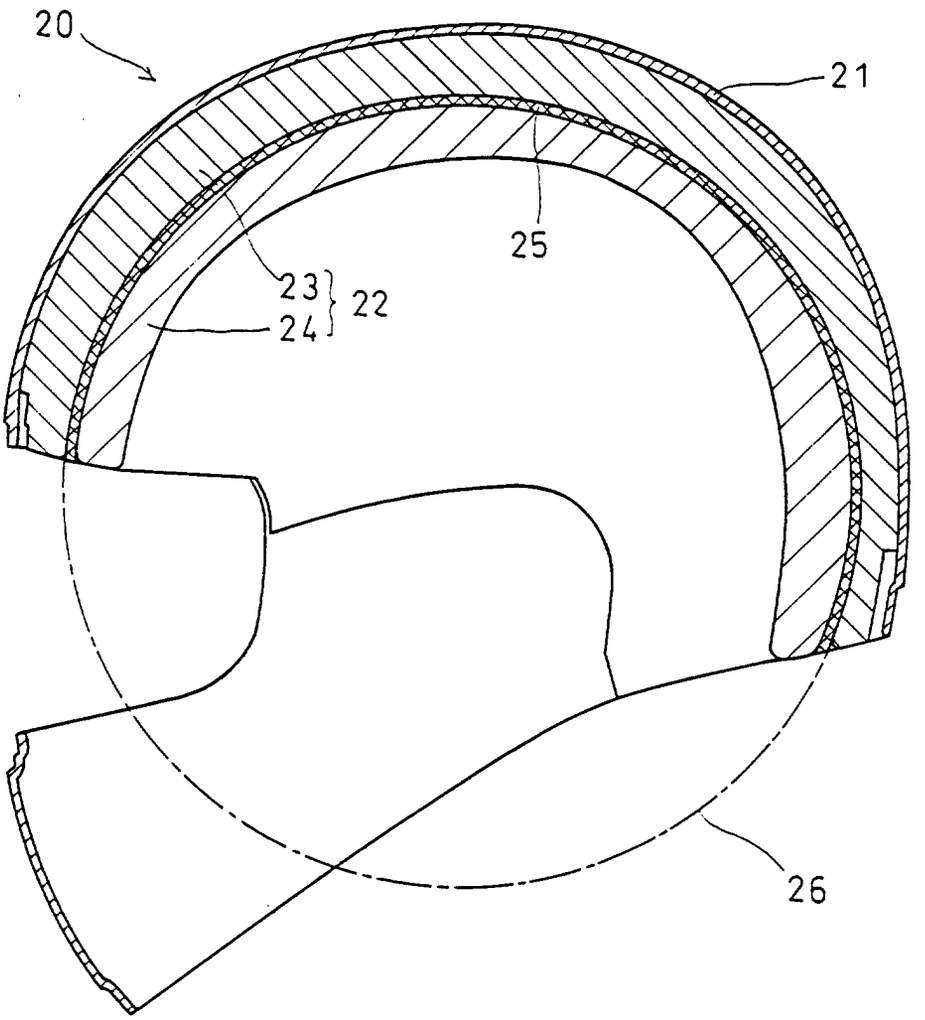


Fig.3

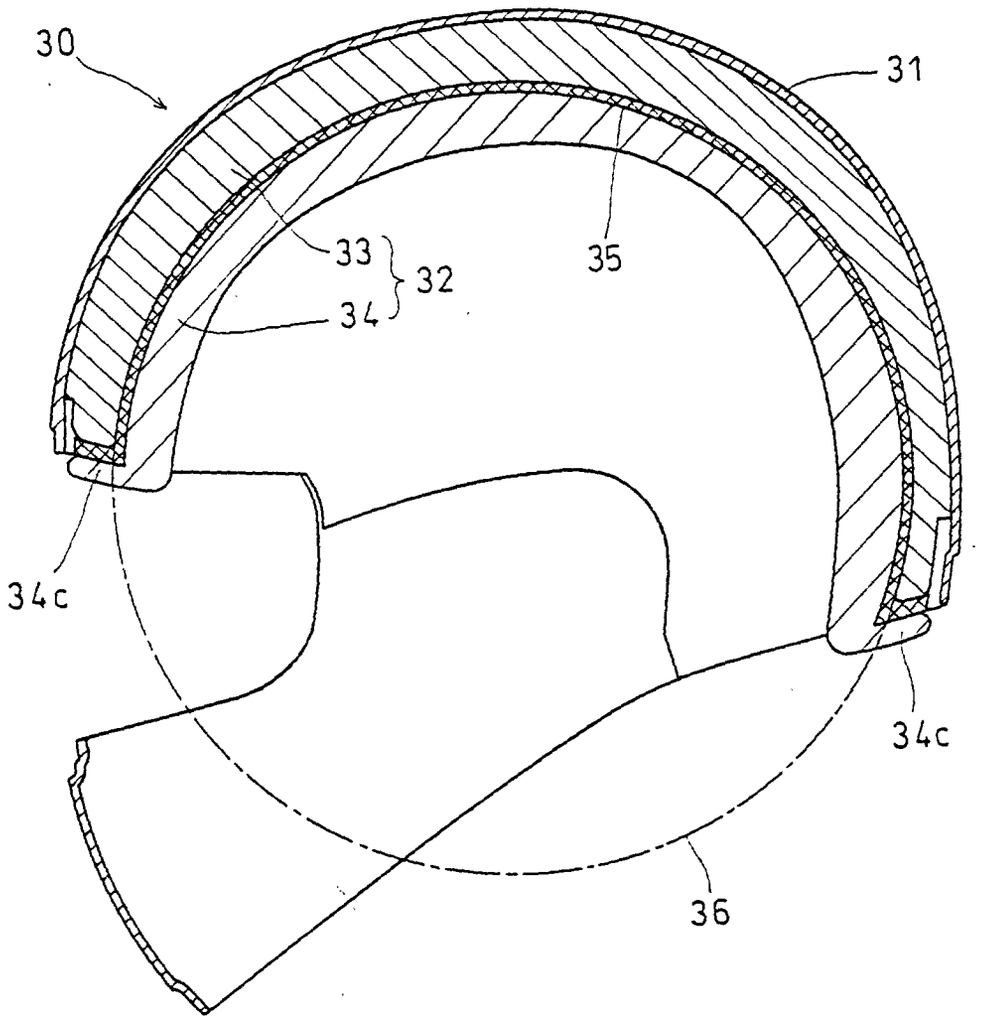


Fig.4

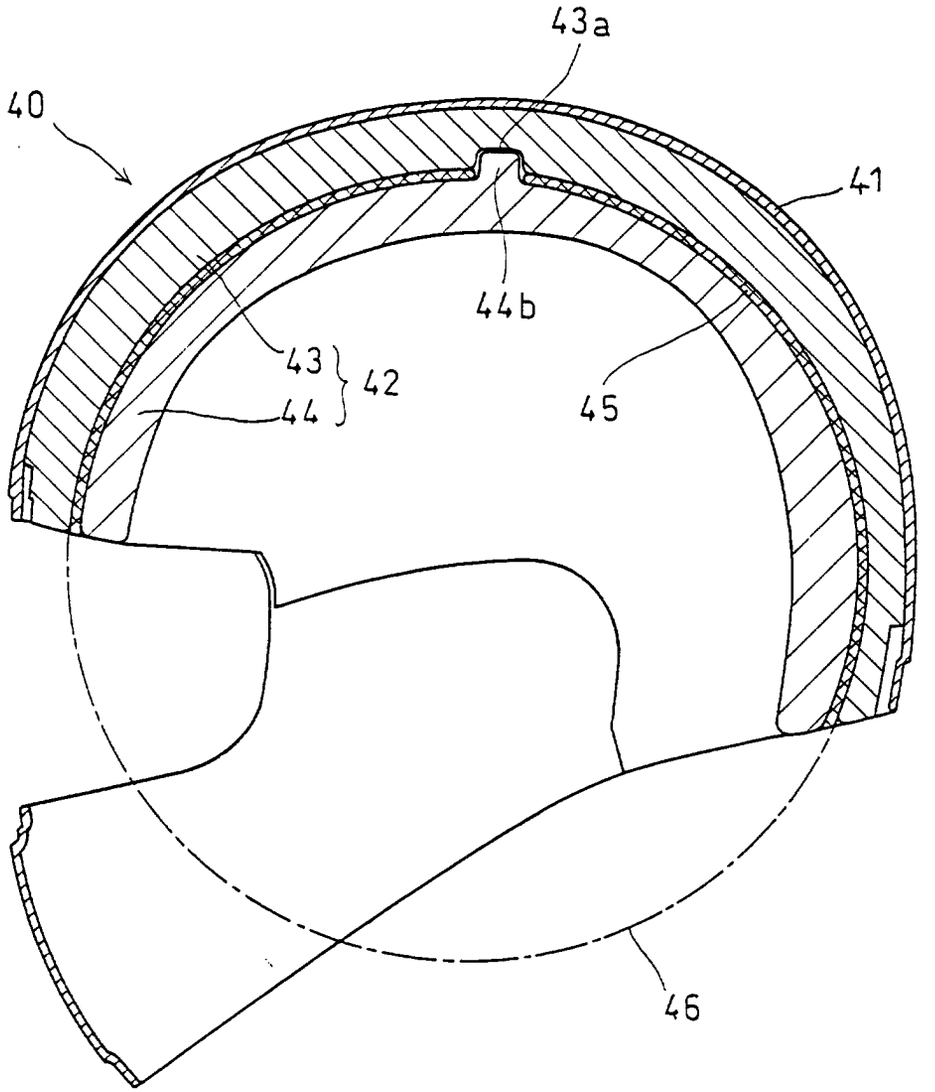


Fig.5

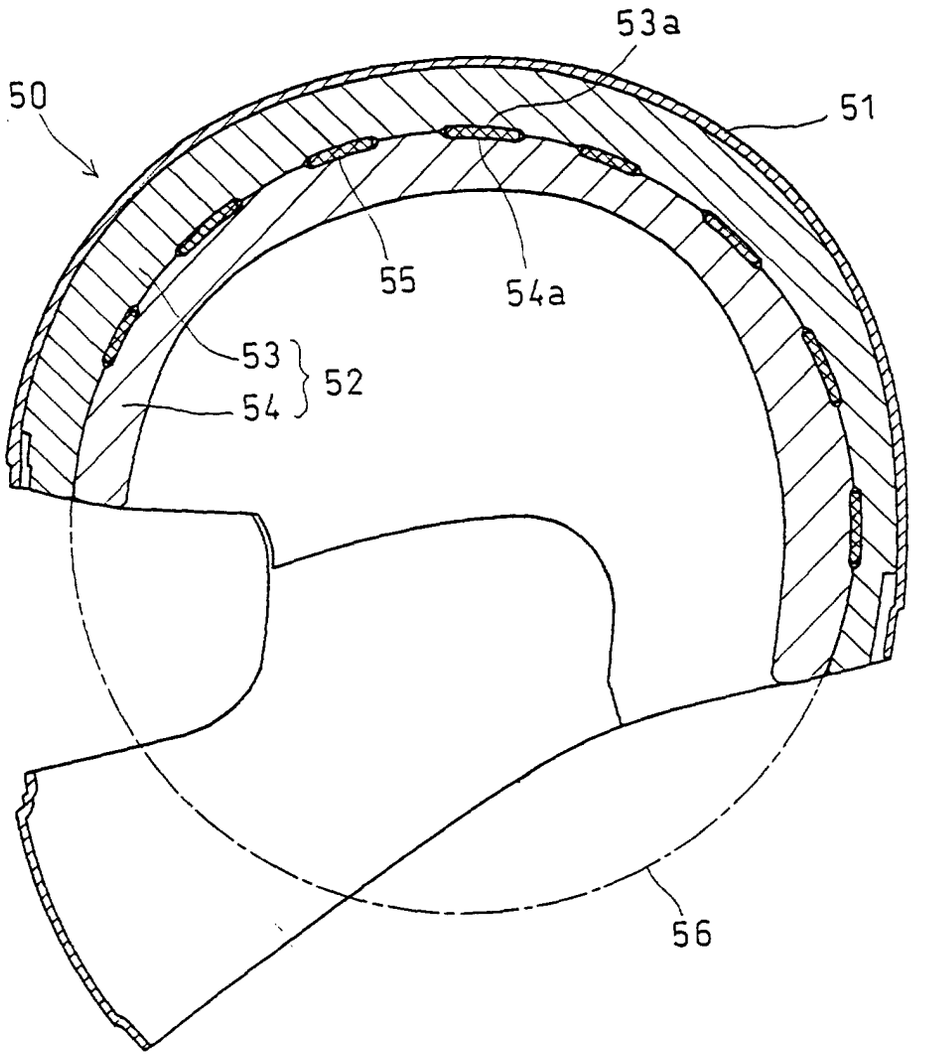


Fig.6

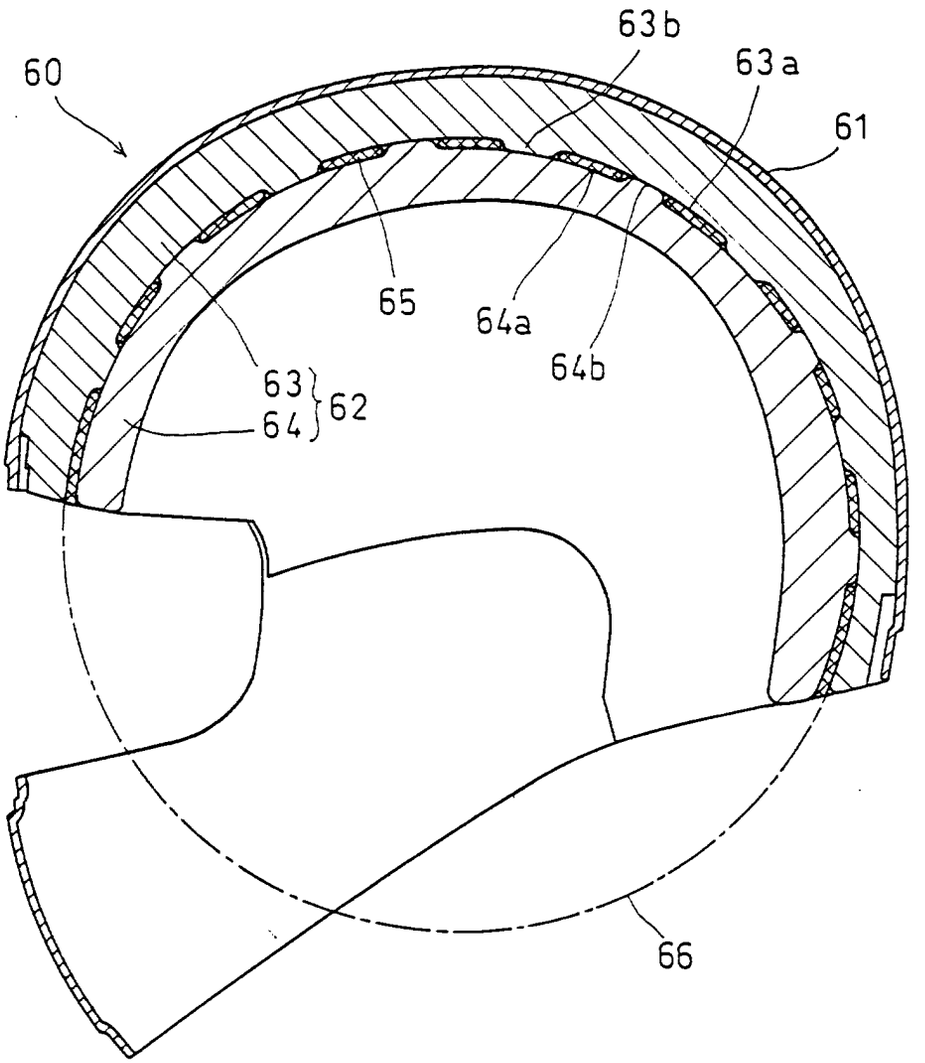


Fig.7

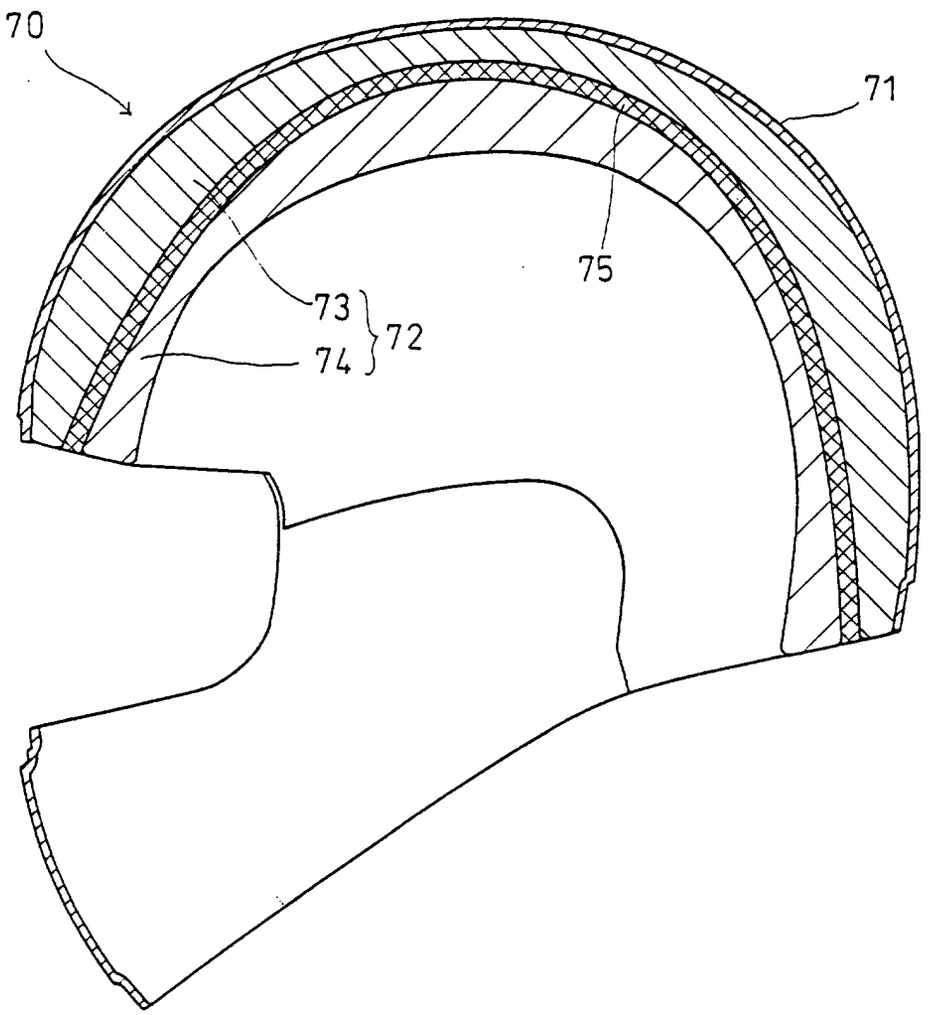


Fig.8

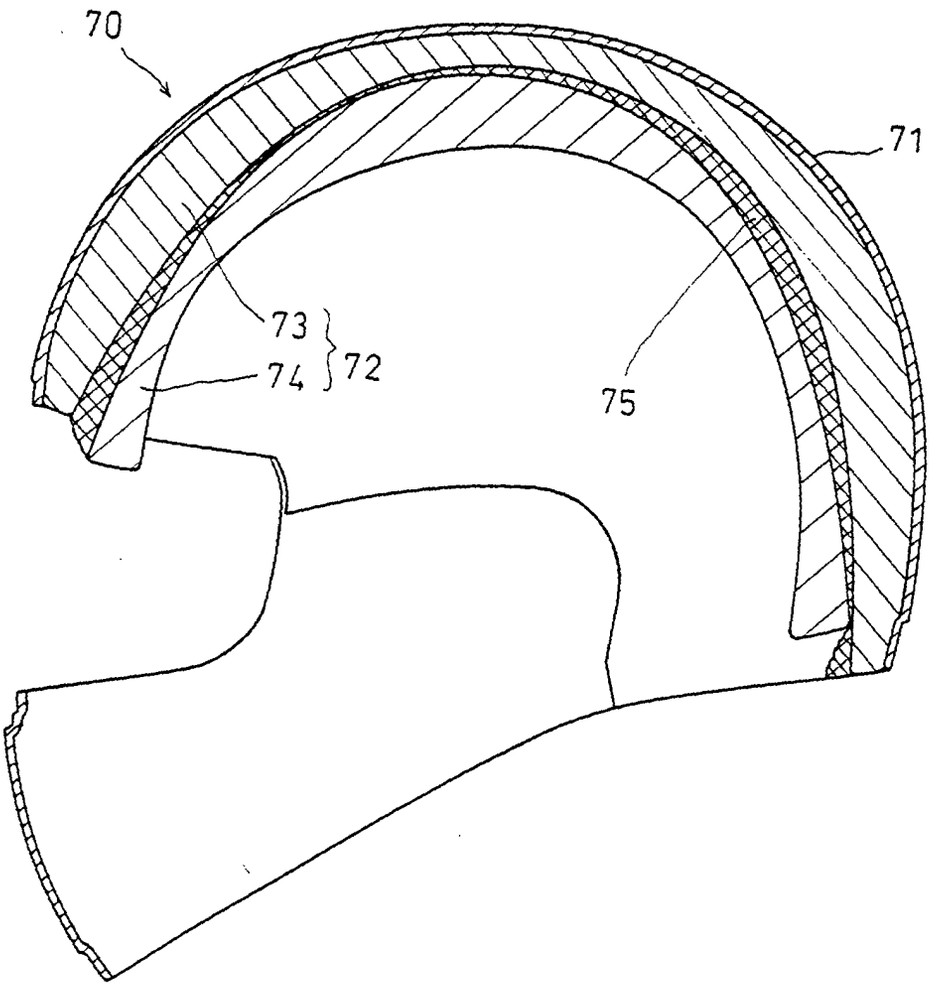


Fig.9

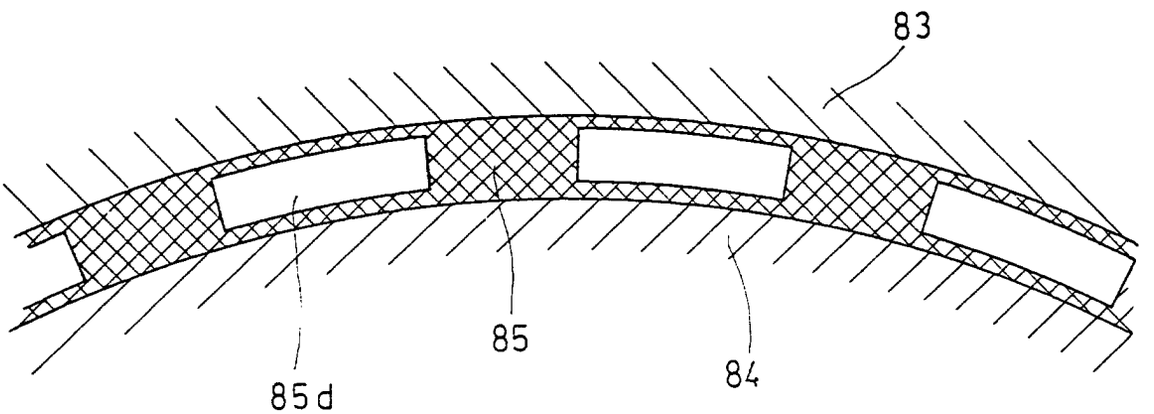
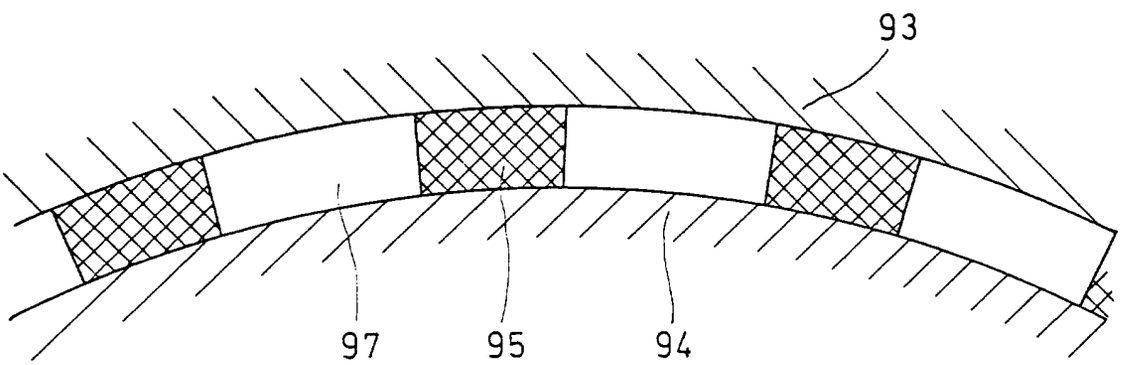


Fig.10



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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 8073

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 92 08 406 U (K. GYÖRY) 3 December 1992 (1992-12-03) * page 2, last paragraph * * page 3 * * claim; figures *	1,2,4	A42B3/12
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X	US 4 064 565 A (W. S. GRIFFITHS) 27 December 1977 (1977-12-27) * column 3, line 60 - column 4, line 40 * * claim 1; figure 6 *	2-4	
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A	WO 96 14768 A (K. D. PHILLIPS) 23 May 1996 (1996-05-23)		
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 July 2001	Bourseau, A-M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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