(19) **Japanese Patent Office (JP)**

(12) **Japanese Unexamined Patent Application Publication (A)**

(11) Patent Application Laid-Open Disclosure Number: **JP 2006-16740 A (P2006-16740 A)**

(43) Publication date: **January 19, 2006 (2006.1.19)**

(51) Int. Cl.			FI		Theme code (reference)
A42B	**3/06**	**(2006.01)**	A42B	3/06	3B107
A42B	**3/08**	**(2006.01)**	A42B	3/08	

Status of examination: Not yet requested No. of claims: 2 OL (Total of 6 pages)

(21) Application number: JP 2004-198218 (P2004-198218)

(22) Date of application: July 5, 2004 (2004.7.5)

(71) Applicant: 000005326
Honda Motor Co., Ltd.
2-1-1 Minami-Aoyama, Minato-ku, Tokyo, Japan

(74) Representative: 100067356
Yoichiro SHIMODA, Patent Attorney

(74) Representative: 100094020
Hiroshi TAMIYA, Patent Attorney

(72) Inventor: Yasuhiro DOTSUKO
c/o Honda R&D Co., Ltd.
1-4-1, Chuo Wako-shi, Saitama Prefecture, Japan

F term (reference): 3B107 BA02 BA08 DA03 DA17

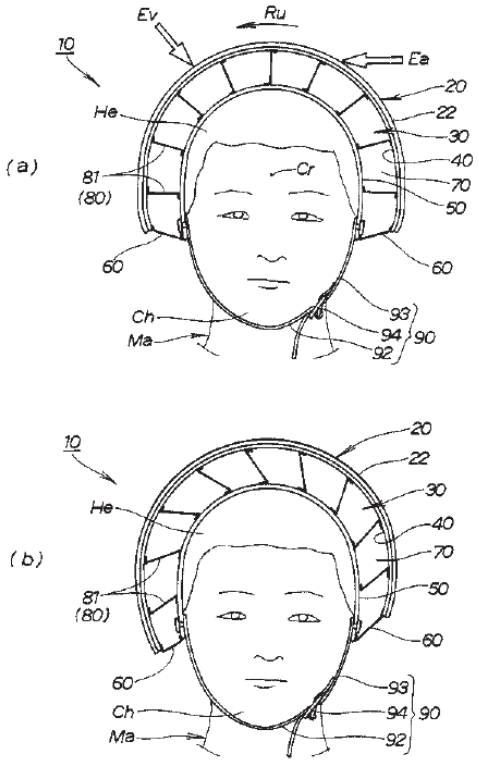
(54) [Title of the Invention] HELMET

(57) [Abstract]

[Problem] To securely mount a helmet on the head of an occupant and efficiently absorb both impact energy in a direction perpendicular to the outer surface of the shell of the helmet and impact energy in a direction along the outer surface of the shell of the helmet.

[Solution] A helmet 10 comprises an outer shell 20, a liner 30 rotatably provided relative to the shell on the inner side thereof, a chin strap 90 provided on the liner, and a stopper mechanism 80 provided between the shell and the liner to restrict the range of relative rotation their between. The helmet can be securely mounted on the head He of the occupant Ma in a stable manner using the chin strap. The shell easily and reliably rotates relative to the liner, which is mounted on the head with the chin strap, in response to impact energy Ea in a direction along the outer surface 22. As a result, impact energy can be efficiently and sufficiently absorbed.

[Selected drawing] Fig. 4



REVELYST 1041

[Claims]

[Claim 1]

A helmet comprising: a liner provided on the inner side of a shell, the liner being rotatable relative to the shell in response to impact energy in a direction along the outer surface of the shell; and a chin strap provided on the liner.

[Claim 2]

The helmet according to claim 1, wherein a stopper mechanism is provided between the shell and the liner to restrict the range of relative rotation theirbetween.

[Detailed Description of the Invention]

[Technical Field]

[0001]

The present invention relates to an improved helmet for use by the occupants of vehicles such as motorcycles and racing cars.

[Background Art]

[0002]

Impact energy acting on a helmet includes not only impact energy in a direction perpendicular to the outer surface of the shell, but also impact energy in a direction along the outer surface of the shell. In recent years, helmets have been developed to absorb impact energy in both directions (see, for example, Patent Document 1).

[Patent Documents 1] Japanese Unexamined Patent Application Publication No. 2001-295129 A (Fig. 1)

[0003]

A conventional helmet disclosed in Patent Document 1 will be described with reference to Fig. 5 below. Fig. 5 is a cross-sectional view of a conventional helmet, illustrating the cross-sectional configuration as seen from the left side.

A conventional helmet 100 comprises an outer shell 101 made of FRP, an inner impact-absorbing liner 102 made of expanded polystyrene, and an elastic layer 103 provided between the shell 101 and the impact-absorbing liner 102. The impact-absorbing liner 102 is a two-layer structure liner composed of an outer liner 104 and an inner liner 105, which have different expansion ratios and are bonded together. The elastic layer 103 absorbs impact energy in a direction along the outer surface of the shell 101 and is bonded to both the shell 101 and the impact-absorbing liner 102.

[0004]

In such a helmet 100, the presence of the elastic layer 103 between the shell 101 and the impact-absorbing liner 102 enables the absorption of both impact energy in a direction perpendicular to the outer surface of the shell 101 and impact energy in a direction along the outer surface of the shell 101.

[0005]

Incidentally, to securely mount the helmet 100 on the head of an occupant, it is necessary to provide a chin strap on the helmet 100. Moreover, it is required that both impact energy in a direction perpendicular to the outer surface of the shell 101 and impact energy in a direction along the outer

surface of the shell 101 be absorbed.

[Summary of Invention]

[Problems to be Solved by the Invention]

[0006]

The present invention addresses the problem of providing a technology that enables a helmet to be securely mounted on the head of an occupant and to efficiently absorb both impact energy in a direction perpendicular to the outer surface of the shell of the helmet and impact energy in a direction along the outer surface of the shell of the helmet.

[Means for Solving the Problems]

[0007]

The invention according to claim 1 is a helmet comprising: a liner provided on the inner side of a shell, the liner being rotatable relative to the shell in response to impact energy in a direction along the outer surface of the shell; and a chin strap provided on the liner.

[0008]

The invention according to claim 2 is characterized in that a stopper mechanism is provided between the shell and the liner to restrict the range of relative rotation theirbetween.

[Effects of the Invention]

[0009]

In the invention according to claim 1, since a chin strap is provided on the liner of the helmet, the helmet can be securely mounted on the head of an occupant in a stable manner using the chin strap. Moreover, rotation of the shell relative to the liner fixed to the head with the chin strap can be made even easier. Accordingly, the shell can easily and reliably rotate relative to the liner, which is securely mounted on the head with the chin strap, in response to impact energy in a direction along its outer surface. As a result, impact energy can be efficiently and sufficiently absorbed, further reducing the burden on the head.

In this way, the helmet can be securely mounted on the head of an occupant, allowing both impact energy in a direction perpendicular to the outer surface of the shell and impact energy in a direction along the outer surface of the shell to be efficiently and sufficiently absorbed.

[0010]

In the invention according to claim 2, since a stopper mechanism is provided between the shell and the liner to restrict the range of relative rotation theirbetween, it is possible to prevent the shell from excessively rotating relative to the liner.

[Description of Embodiments]

[0011]

The best mode for carrying out the present invention will be described below with reference to the attached drawings. Fig. 1 is a cross-sectional view of a helmet according to the present invention, illustrating the cross-sectional configuration as seen from the left side. Fig. 2 is an enlarged view of Part 2 in Fig. 1. Fig. 3 is a cross-sectional view taken along line 3-3 in Fig. 1, illustrating the cross-

sectional configuration of the helmet as seen from the front.

[0012]

As illustrated in Fig. 1 to Fig. 3, the helmet 10 comprises an outermost shell 20, a liner 30 rotatably provided relative to the shell 20 on the inner side thereof, a stopper mechanism 80 provided between the shell 20 and the liner 30 to restrict the range of relative rotation theirbetween, and a chin strap 90 provided on the liner 30.

The shell 20 is a hard outer casing made of a resin molded product such as FRP (fiber-reinforced plastic).

[0013]

The liner 30 is a lining member stretched over nearly the entire inner circumferential surface 21 of the shell 20 and has a certain degree of elasticity to exhibit impact-absorbing properties. Such a liner 30 comprises an outer liner 40 adhered or otherwise attached to substantially the entire inner circumferential surface 21 of the shell 20, an inner liner 50 stretched inside the outer liner 40 so as to define an internal space Sp, a cover 60 that connects the peripheral edge 41 of the outer liner 40 and the peripheral edge 51 of the inner liner 50 to seal the internal space Sp, and an elastic body 70 that is filled in the internal space Sp.

[0014]

The outer liner 40 is an outer skin member, while the inner liner 50 is an inner skin member. The outer liner 40 and the inner liner 50 are resin products made of, for example, a hard resin or a soft resin. The overall shape of the inner liner 50 is such that it can cover part or all of the head of the occupant (wearer) when fitted onto the head. The shell 20 and the outer liner 40 can rotate relative to the inner liner 50 about a rotation center Cr. The rotation center Cr is, for example, the center of gravity of the shell 20.

[0015]

The cover 60 is an elastic membrane (film) made of, for example, a coated fabric or a rubber film. Since such a cover 60 has certain elongation properties, it can accommodate a certain degree of relative rotation of the outer liner 40 with respect to the inner liner 50.

[0016]

The elastic body 70 is a material that can deform within the filled internal space Sp in accordance with the magnitude of external impact energy and
is composed of, for example, resin powder, a grease-like substance, or a gel-like substance.

[0017]

The stopper mechanism 80 restricts the shell 20 from excessively rotating relative to the liner 30 and, for example, is configured such that multiple straps 81... connect the inner circumferential surface 42 of the outer liner 40 and the outer circumferential surface 52 of the inner liner 50. These multiple straps 81... are arranged at substantially regular intervals across the entire surface between the inner circumferential surface 42 of the outer liner 40 and the outer circumferential surface 52 of the inner liner 50 and are made of an elastic material such as rubber. As these straps 81... have certain elongation properties, they allow a certain degree of relative rotation of the shell 20 and the outer liner 40 with

respect to the inner liner 50, while preventing excessive relative rotation beyond this range.

[0018]

As illustrated in Fig. 1 and 3, the chin strap 90 is fastened under the chin once the helmet 10 is placed on the head of the occupant and comprises left and right belt members 92 and 93, which are attached to the lower portions on the left and right sides of the inner liner 50 via fixing members 91 such as rivets, with the belt members 92 and 93 connected to each other via a fastening member 94 such as a buckle.

[0019]

Next, the operation of the helmet 10 having the above configuration will be described. Fig. 4(a) and 4(b) are operational diagrams of the helmet according to the present invention.

As illustrated in Fig. 4(a), after placing the helmet 10 on the head He of the occupant Ma, tightening the chin strap 90 under the chin Ch allows the helmet 10 to be securely mounted on the head He in a stable condition using the chin strap 90.

[0020]

When the liner 30 is mounted on the head He with the chin strap 90 and impact energy Ev in a direction perpendicular to the outer surface 22 of the shell 20 acts on the shell 20, the elastic body 70 deforms in accordance with the magnitude of the impact energy Ev. As a result, the shell 20 is displaced inward, enabling efficient and sufficient absorption of the impact energy Ev.

[0021]

In contrast, when the liner 30 is mounted on the head He with the chin strap 90 and impact energy Ea in a direction along the outer surface 22 of the shell 20 acts on the shell 20, the elastic body 70 displaces in the direction of the force (arrow Ru direction) in accordance with the magnitude of the impact energy Ea. Accordingly, the shell 20 relatively rotates with respect to the liner 30 about the rotation center Cr in the direction of the force (see Fig. 4(b)). As a result, the impact energy Ea can be efficiently and sufficiently absorbed.

[0022]

According to the present invention, since the chin strap 90 is attached to the liner 30, it becomes easier for the shell 20 to rotate relative to the liner 30 (that is, the inner liner 50), which is fixed to the head He by the chin strap 90. When impact energy Ea acts on the shell 20, the liner 30 (i.e., the inner liner 50) remains in place while the shell 20 alone relatively rotates in the direction of the force, thereby absorbing the impact energy Ea. Accordingly, the burden on the head He can be further reduced compared to the case in which the chin strap 90 is attached to the shell 20.

[0023]

In this way, the helmet 10 can be securely mounted on the head He and both impact energy Ev in a direction perpendicular to the outer surface 22 of the shell 20 and impact energy Ea in a direction along the outer surface 22 of the shell 20 can be efficiently and sufficiently absorbed.

[0024]

Furthermore, since a stopper mechanism 80 is provided between the shell 20 and the liner 30 to restrict the range of relative rotation theirbetween, it is possible to prevent the shell 20 from

excessively rotating relative to the liner 30, as illustrated in Fig. 4(b).

[0025]

Note that in the embodiment of the present invention, the presence or absence of the outer liner 30 is optional, with the shell 20 also capable of serving as the outer liner 30.

Moreover, the stopper mechanism 80 is not limited to multiple elastic straps 81..., and may, for example, be configured such that when the outer liner 40 and the inner liner 50 relatively rotate to a certain extent, their respective ends 41 and 51 interfere with each other.

[Industrial Applicability]

[0026]

The helmet 10 of the present invention is suitable for use by occupants of vehicles such as motorcycles and racing cars.

[Brief Description of the Drawings]

[0027]

Fig. 1 is a cross-sectional view of a helmet according to the present invention.

Fig. 2 is an enlarged view of Part 2 in Fig. 1.

Fig. 3 is a cross-sectional view taken along line 3-3 in Fig. 1.

Fig. 4 is an operational diagram of the helmet according to the present invention.

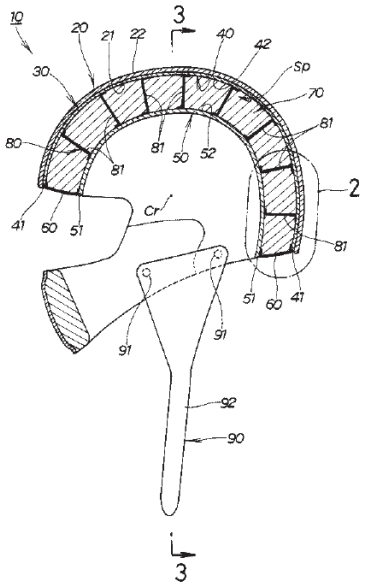
Fig. 5 is a cross-sectional view of a conventional helmet.

[Reference Signs List]

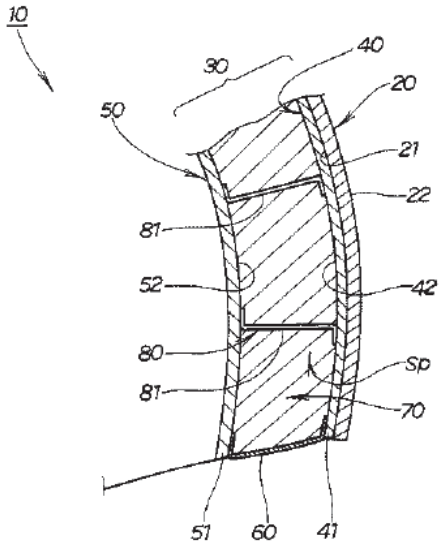
[0028]

10...Helmet, 20...Shell, 22...Outer surface of the shell, 30...Liner, 40...outer liner, 50...Liner inner, 60...Cover, 70...Elastic body, 80...Stopper mechanism, 81...Strap, 90...Chin strap, Ch...Chin, Ea...Impact energy in a direction along the outer surface of the shell, Ev...Impact energy in a direction perpendicular to the outer surface of the shell, He...Head, Ma...Occupant

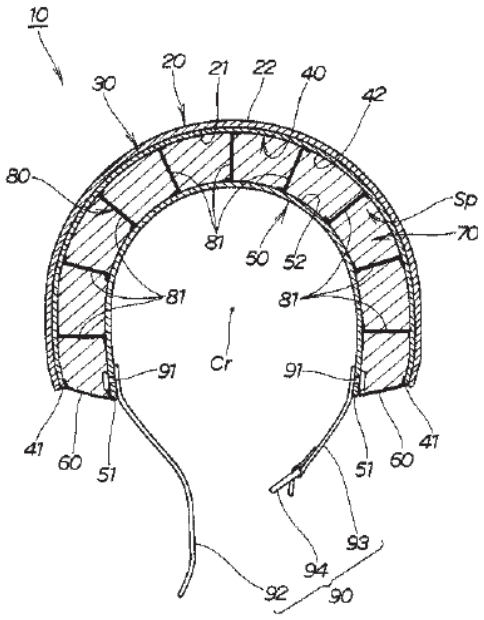
[Fig. 1]



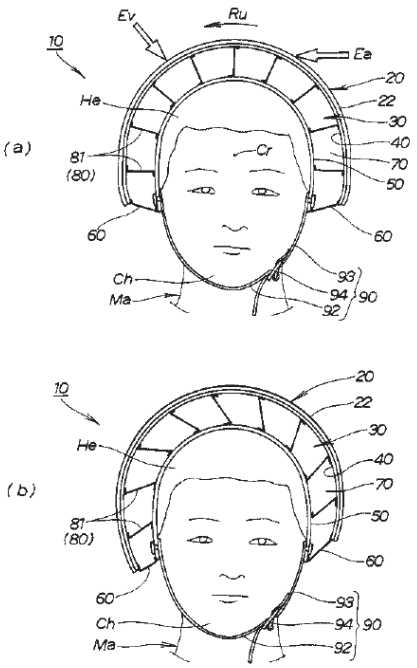
[Fig. 2]



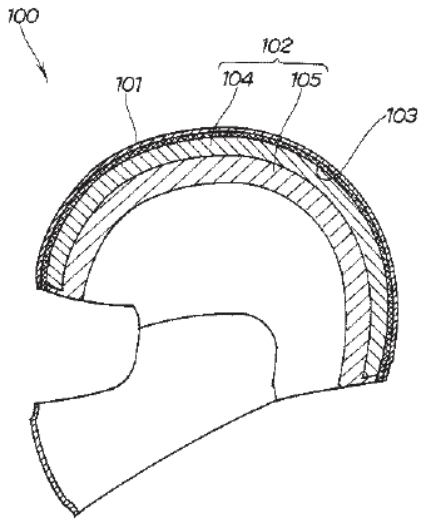
[Fig. 3]



[Fig. 4]



[Fig. 5]



MORNINGSIDE
A Questel Company

TRANSLATION CERTIFICATION

Date: June 16, 2025

To whom it may concern:

This is to certify that the attached translation is an accurate representation of the documents received by this office. The translation was completed from:

- Japanese

To:

- English

The documents are designated as:

- JP2006016740A_en-US.docx

Renzo Nunez, Project Manager in this company, attests to the following:

"To the best of my knowledge, the aforementioned documents are a true, full and accurate translation of the specified documents."

Signature of Renzo Nunez