

[54] **HEAD AND CHEST PROTECTORS, FOR EXAMPLE FOR MOTOR CYCLISTS**

[76] Inventor: **Peter William Bothwell**,
"Menocote", 116 Shipston Rd.,
Stratford-On-Avon, England

[22] Filed: **Apr. 12, 1973**

[21] Appl. No.: **350,514**

[52] U.S. Cl. 2/3 R; 2/11; 2/DIG. 8

[51] Int. Cl. **A42b 3/02**

[58] **Field of Search**..... 2/1, 2, 2.1 R, 2.1 A, 3 R,
2/4, 5, 6, 7, 8, 9, 10, 11, 202, 205;
128/142.7, 142.5

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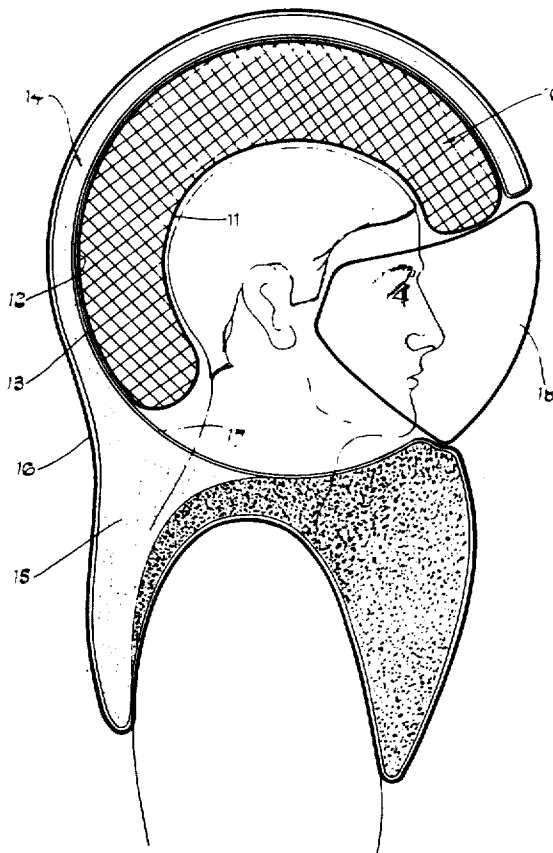
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Primary Examiner—Werner H. Schroeder
Attorney, Agent, or Firm—Merriam, Marshall, Shapiro & Klose

[57] **ABSTRACT**

A head and chest protector, for example for a motor cyclist, which comprises a helmet located within and rotatably supported by a rigid outer structure having a part which, in use, extends over the upper chest of the wearer and including means engageable with the shoulders of the wearer whereby the weight of the protector including the helmet is transmitted direct to the trunk of the wearer and not through his neck. There is a ball and socket engagement between the helmet and the outer structure, and an inertia reel which is fixed to the outer structure and has its webs connected to the helmet may be provided for controlling rotational movement of the helmet relative to the motor structure. The outer structure is shock-resisting and comprises a layer of foamed plastics material sandwiched between two layers of glass fibre, and the helmet is shock-absorbing and comprises a layer of foamed plastics material with a sheet of plastics material secured to the outer surface of said foamed material. The outer structure may embody a roll bar.

6 Claims, 10 Drawing Figures



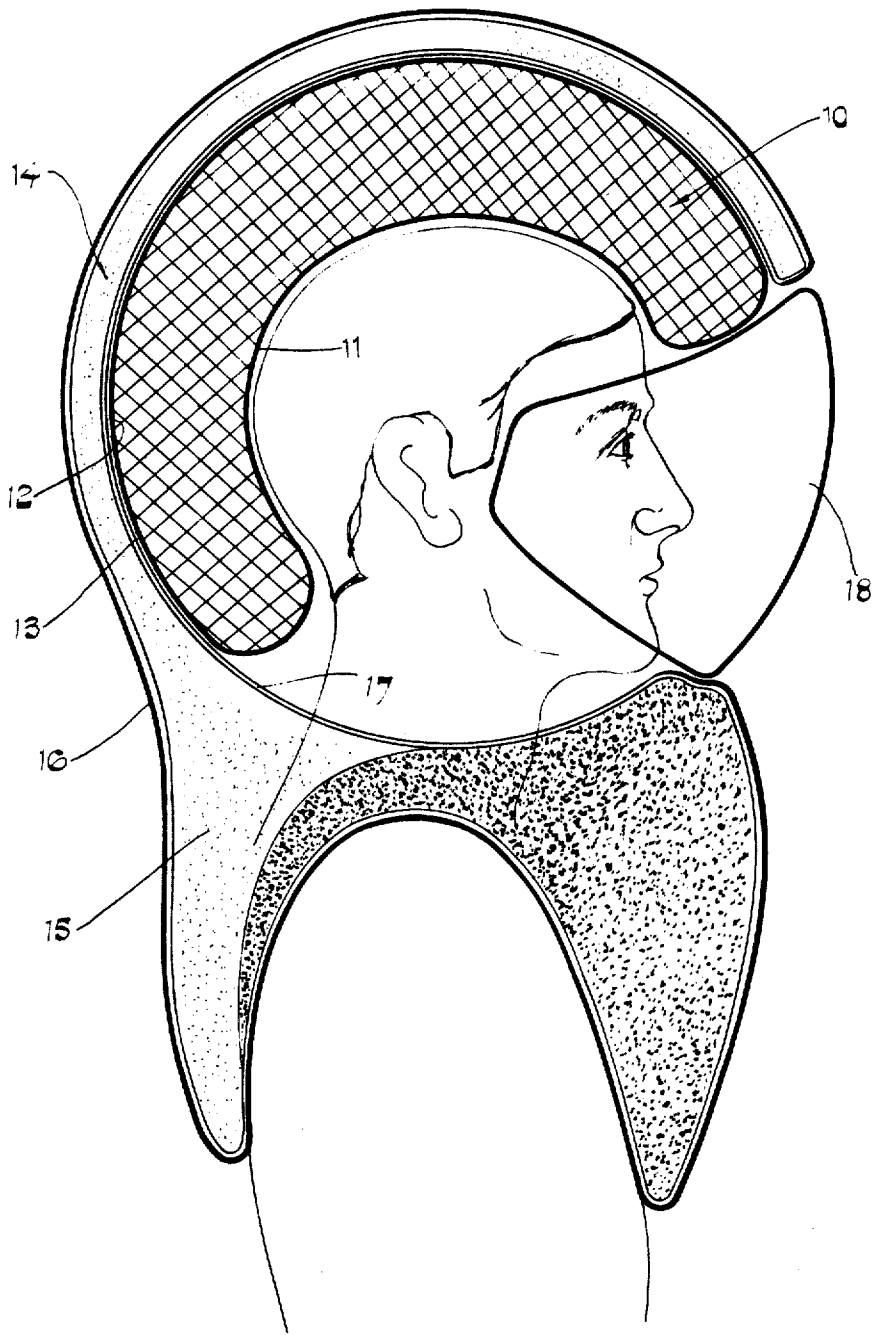


Fig. 1

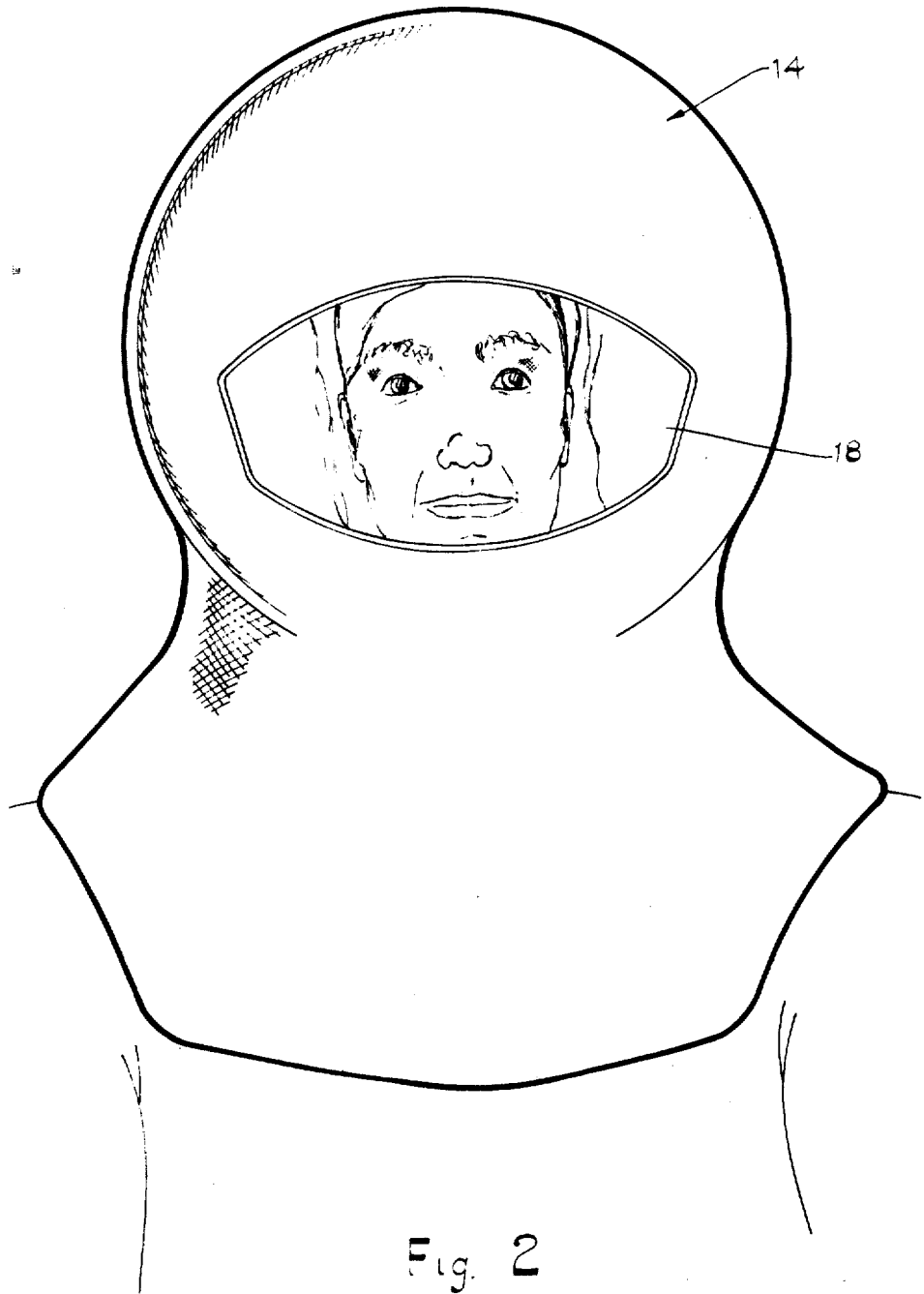


Fig. 2

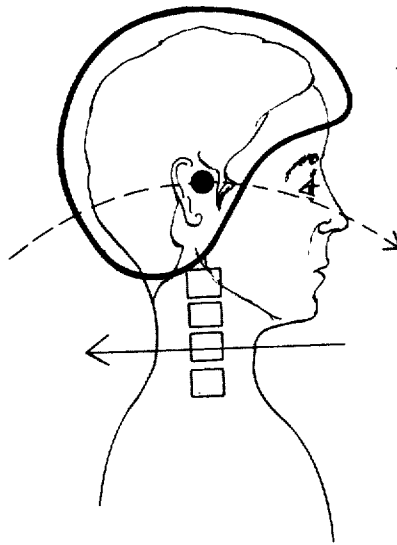


Fig. 3a

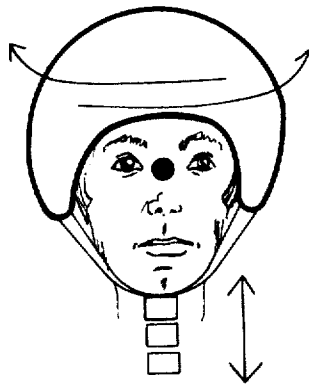


Fig. 3b

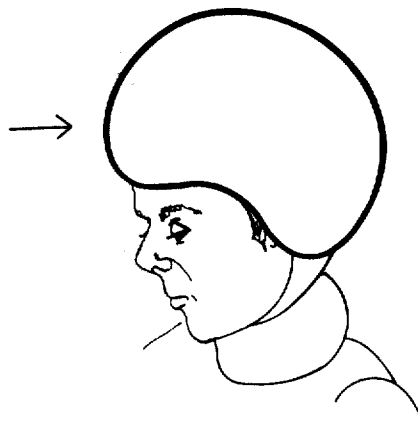


Fig. 3c

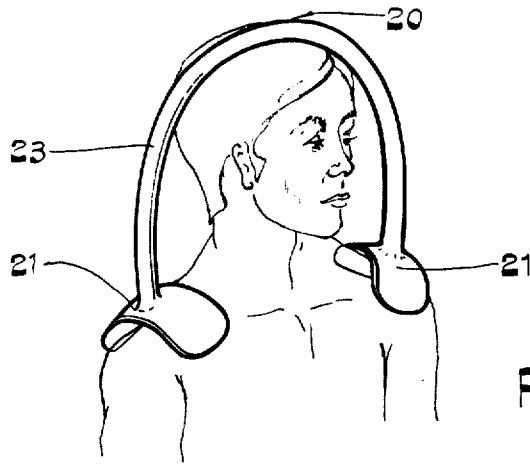


Fig. 4

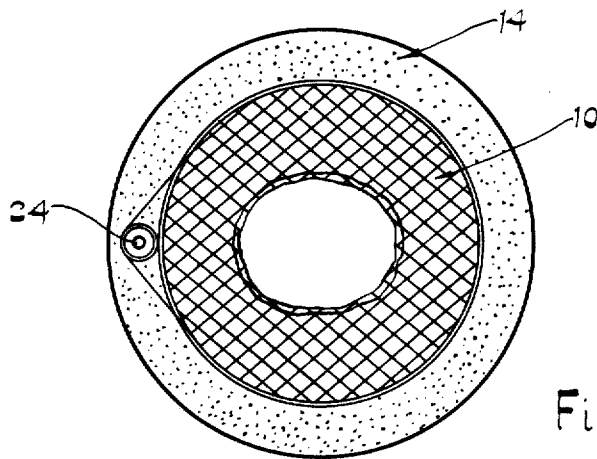


Fig. 5

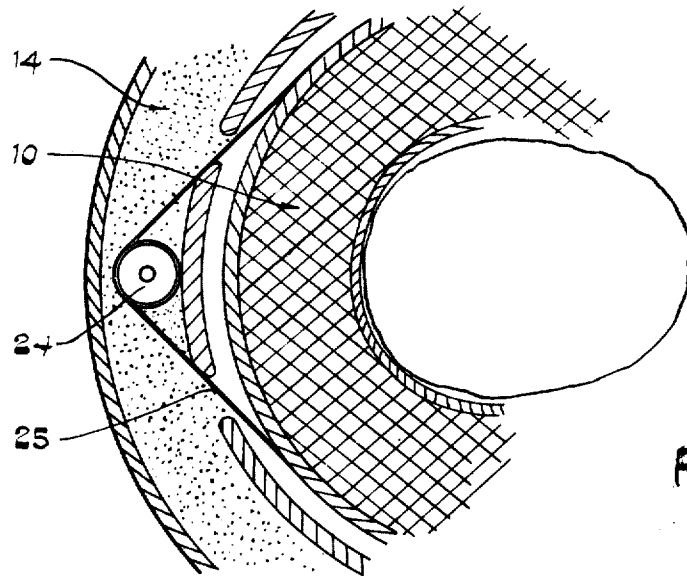


Fig. 6

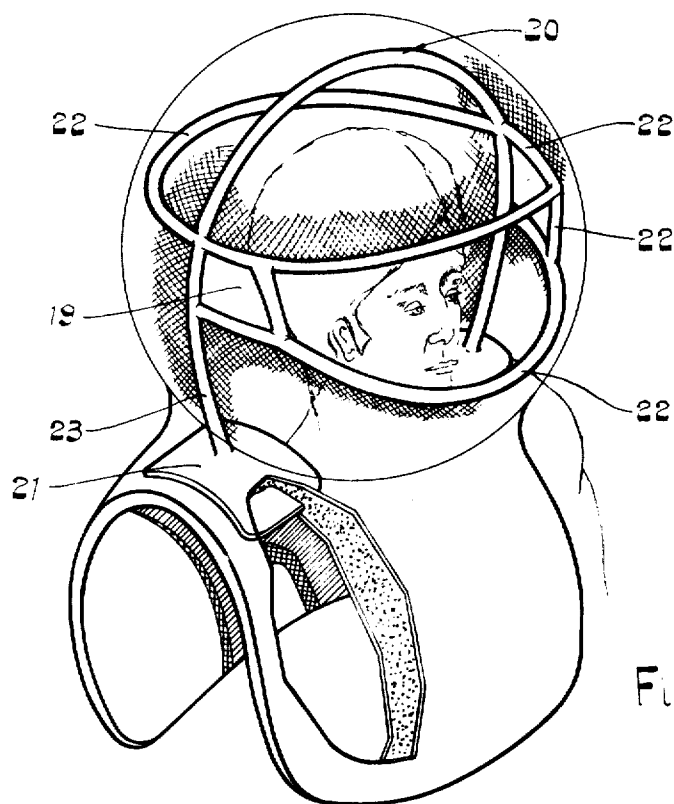


Fig. 7

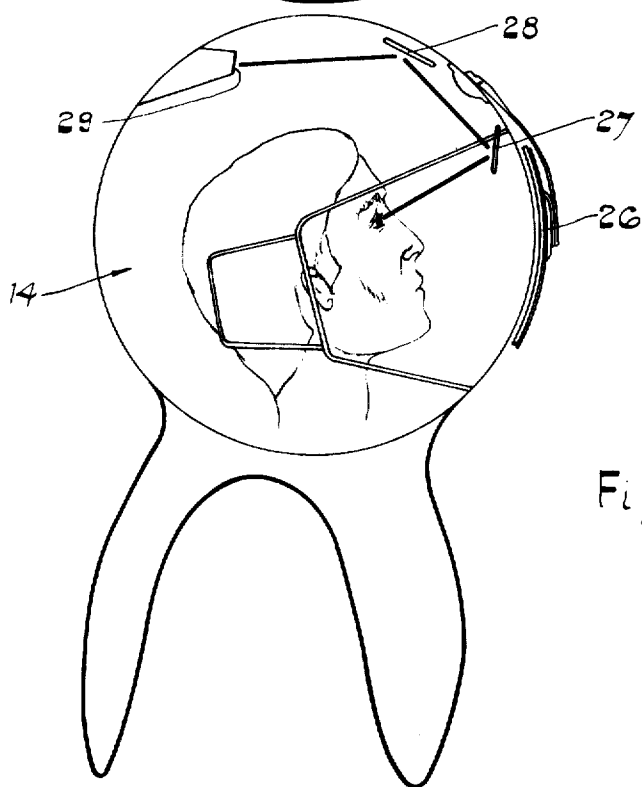


Fig. 8

HEAD AND CHEST PROTECTORS, FOR EXAMPLE FOR MOTOR CYCLISTS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to head and chest protectors, for example for protecting the head and upper chest of a motor cyclist against crash damage.

2. Description of the Prior Art

Conventional motor cycle helmets leave the wearer vulnerable in a crash to injury from forces acting to produce bending, shearing and rotational strains in the wearer's neck. An average human head weighs 11 lbs. and an average motor cycle helmet weighs between 2 and 3½ lbs. so that considerable stresses are set up in a crash during acceleration or deceleration of the motor cyclist's head relative to his body. Any attempt to improve the protective thickness of a conventional helmet increases the weight of the helmet and so increases the motor cyclist's vulnerability to the strains induced by the stress forces mentioned above. Any increase in the size of a conventional helmet will increase the aerodynamic drag and may also increase the static weight which has to be supported by the motor cyclist's neck. It is undesirable therefore to make any improvement in the efficiency of a conventional motor cyclist's helmet at the expense of increased weight.

It is accordingly an object of the present invention to provide a combined head and chest protector for a motor cyclist the construction of which is such as to overcome or reduce the disadvantages and limitations of conventional motor cyclist's helmets described above.

SUMMARY OF THE INVENTION

According to the present invention I provide a protector for protecting the head and upper chest of a wearer, said protector comprising a helmet located within and rotatably supported by a rigid outer structure having a part which, in use, extends over the upper chest of the wearer and including means engageable with the shoulders of the wearer whereby the weight of the protector including the helmet is transmitted direct to the trunk of the wearer and not through his neck.

The helmet may have a ball and socket engagement with the outer structure.

Preferably the outer structure is composed of a shock-resisting plastics material and, the helmet is formed of a shock-absorbing plastics material.

The outer structure may embody a roll bar and an inertia reel may be arranged operative between the outer structure and the helmet to limit rotation of the helmet relative to the outer structure.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of example with reference to the accompanying drawings, in which:

FIG. 1 is a vertical sectional view of one form of head and chest protector for a motor cyclist,

FIG. 2 is a front view of the protector shown in FIG. 1,

FIGS. 3a, 3b and 3c illustrate disadvantages of conventional motor cycle helmets,

FIG. 4 illustrates a roll bar incorporated in the outer structure of the protector shown in FIGS. 1, and 2,

FIG. 5 is a horizontal sectional view of the protector,

FIG. 6 is an enlarged detail view of part of FIG. 5, FIG. 7 is a part-sectioned perspective view of a protector including tubular reinforcement elements, and FIG. 8 is a diagrammatic side view of a protector which includes a mirror system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the embodiment shown in FIGS. 1 and 2, the head and upper chest protector to protect a motor cyclist in a crash comprises a helmet 10 having an inner surface 11 contoured to fit the motor cyclist's head and an outer surface 12 of part-spherical form. The helmet 10 is composed of foamed polystyrene some 6 inches thick and is provided on its outer surface with a layer 13 of polytetrafluoroethylene. The helmet 10 is freely rotatable within a part-spherical cavity in an outer structure 14 which extends over the motor cyclist's head and also over his shoulders and the top of his chest and back. The outer structure 14 may terminate short of the motor cyclist's arms as shown in FIG. 2 or the lower portion of the outer structure 14 may be extended with holes provided in said lower portion to allow passage of the motor cyclist's arms. If desired the lower portion of the outer structure may be incorporated in the fabric of a suit or jacket so that the protector is firmly positioned on the wearer.

The outer structure 14 is formed of polyurethane foam 15 sandwiched between an outer layer 16 and an inner layer 17 of glass fibres bonded together by a polyester resin. The outer structure 14 is about 1½ inches thick in its lower part where it is shaped to follow the contours of the motor cyclist's body and the whole outer surface is shaped to give the best streamline effect to reduce wind drag to a minimum. In order to allow the motor cyclist to see, the outer structure 14 is provided with a central aperture corresponding with the motor cyclist's face, the aperture being covered with laminated glass 18 providing a visor. A single visor 40 may be provided as shown in FIG. 2, but in an alternative embodiment, as illustrated in FIG. 7, there is a main visor and extensions 19 which allow the motor cyclist to see when his head is rotated through an angle approaching 90°, the extensions 19 being provided at eye level on each side of the main visor.

To strengthen the outer structure 14, a roll-bar of steel or titanium can be incorporated in the outer structure, said roll bar not being shown in FIG. 1 but having the general configuration shown in FIG. 4. The roll bar 20 will extend through the top of the outer structure 14 between a pair of spreader plates 21 which are embedded in the outer structure 14 above the motor cyclist's shoulders. As shown in FIG. 7 additional tubular reinforcements can extend around the central visor area and around each of the extensions 19, these additional reinforcements being indicated at 22 in FIG. 7. The tubular roll bar 20 has legs 23 which can optionally include telescopic shock-absorbers.

As shown in FIGS. 5 and 6, an inertia reel 24 can be incorporated in the outer structure 14 at a position at the back of the motor cyclist's head, the webbing 25 of the inertia reel 24 being attached to the helmet 10 to control rotational movement of the helmet 10 relative to the outer structure 14. The reel 24 can be shock-damped to reduce rotational acceleration and deceleration of the helmet 10 relative to the outer structure 14 to a minimum.

FIGS. 3a, 3b and 3c illustrate disadvantages of conventional helmets and, as can be seen from FIG. 3a, the conventional helmet does nothing to control or reduce bending stressed or shearing stresses transmitted to the motor cyclist's neck. By mounting the helmet 10 for rotation within the outer structure 14 and by mounting the outer structure 14 so as to be supported by the shoulders and the upper chest and back of the motor cyclist, bending stresses and shearing stresses transmitted to the neck are substantially avoided.

FIG. 3b illustrates that the neck of the motor cyclist is subject to torque upon rotational acceleration or deceleration of his head relative to his body and the neck also has to support the weight of the head and the helmet so that any increase in weight of the helmet increases the load which has to be supported by the neck.

By providing an inertia reel mechanism between the helmet 10 and the outer structure 14, torque transmitted to the motor cyclist's neck as a result of rotational acceleration or deceleration is avoided and, as the helmet is supported in the outer structure as opposed to being mounted on the motor cyclist's head, the weight of the helmet is transmitted mainly to the motor cyclists shoulders and to his upper chest and back and not through his neck.

FIG. 3c illustrates that the aerodynamic drag forces acting on the helmet have to be supported by the motor cyclists neck. As the bulk of the helmet increases so does the drag and with the arrangement of the present invention, the drag on the outer structure is reduced by streamlining and the drag is not borne by the motor cyclist's head and neck, the drag forces being transmitted direct to the motor cyclist's body. Further advantages of the combined head and chest protector are that the motor cyclist is provided with his own personal roll bar and that his head is protected by two layers of a protective material which have a combined thickness and order of magnitude greater than that of a conventional helmet.

Various refinements can be incorporated in the protector, for example, the outer structure 14 can include a ventilation system (not shown). The visor and any extensions 19 thereof can be provided, as shown in FIG. 8, with an external wiper system 26, and an internal demisting system may be provided. As shown in FIG. 8, a periscopic mirror system may be provided, said mirror system comprising a first mirror 27 fixed above the level of the motor cyclist's eyes and a second mirror 28 in the top of the outer structure 14 to reflect light entering the outer structure through a transparent panel 29 in the top rear of the outer structure 14. To provide additional comfort for the motor cyclist the lower portion of the outer structure is padded internally as shown

in FIG. 7 where required and the protector can be held in place by safety harness fasteners.

The outer structure 14 may be of one-piece construction as shown or may be made in two parts, an upper part which fits over the helmet 10 and a lower part which fits over the motorcyclist's chest with a releasable locking mechanism fitting round the motorcyclist's neck to secure the two parts together.

The roll bar structure 20 will then be formed also in two parts incorporating tubes which fit and lock together.

I claim:

1. A protector for protecting the head, neck and upper chest of a wearer, said protector comprising a rigid outer shell which comprises a head section formed wholly to enclose the head of the wearer and having a transparent part at the front thereof, a neck section rigidly connected to the head section and formed to surround the neck of the wearer and a chest section rigidly connected to the neck section and formed to extend over the upper chest of the wearer, and a helmet for fitting on the head of the wearer which is located within and supported by the head section of the outer shell, the helmet being provided with a part-spherical outer surface and the head section being provided with a part-spherical cavity which is engaged by the said surface of the helmet so that the helmet has a ball and socket-type engagement with the head section and is capable of universal turning movement relative thereto, the chest section of the outer shell being formed to rest on the shoulders of the wearer whereby, in use, the weight of the protector is transmitted direct to the trunk of the wearer and not through his neck.

2. A protector as claimed in claim 1 in which the outer shell comprises a layer of foamed plastics material sandwiched between and bonded to two layers of glass fibre to form a shock-resisting structure.

3. A protector as claimed in claim 2 in which the helmet comprises a layer of foamed plastics material with a sheet of plastics material secured to the outer surface of said foamed material to form a shock-absorbing structure.

4. A protector as claimed in claim 1 in which means are provided for controlling turning movement of the helmet relative to the head section of the outer shell.

5. A protector as claimed in claim 4 in which said means comprises an inertia reel mounted on and within the outer shell and having webs attached to it, the webs being attached to the helmet.

6. A protector as claimed in claim 1 in which the outer shell is provided internally with a periscopic mirror system.

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