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(71) Applicant(s):  
**Charles Owen & Co (Bow) Ltd**  
**(Incorporated in the United Kingdom)**  
**Royal Works, Croesfoel Industrial Park,**  
**WREXHAM, LL14 4BJ, United Kingdom**

(72) Inventor(s):  
**Roy Burek**  
**Geoffrey King**

(74) Agent and/or Address for Service:  
**Marks & Clerk**  
**Sussex House, 83-85 Mosley Street,**  
**MANCHESTER, M2 3LG, United Kingdom**

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(56) Documents Cited:  
**WO 1997/037553 A1** **US 6735786 B2**  
**US 2846683 A**

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INT CL<sup>7</sup> **A42B**  
Other:

(54) Abstract Title: **Helmet securing strap arrangement**

(57) A helmet 7 includes a helmet body having an outer shell 1, a strap 9 secured to the helmet body and to a flexible piece of material attached to the helmet body and lying between the helmet and the head of a wearer, the attachment point between the securing strap and piece of material being movable relative to the helmet body and being distal from the exterior of the helmet, such that the securing strap is disposed close to the side of the wearer's head. The piece of material may be a headband 15 which may be coupled to the helmet by a flexible hinge 16 and the attachment 14 may be a tab of elastic material which may extend through an aperture on the piece of material and may be releasably attached to the piece of material by means of hook and loop material 13 which may release under a load of 15 kg or lower. The helmet body may also include an inner lining 3. The strap may be made up of two half straps 11.

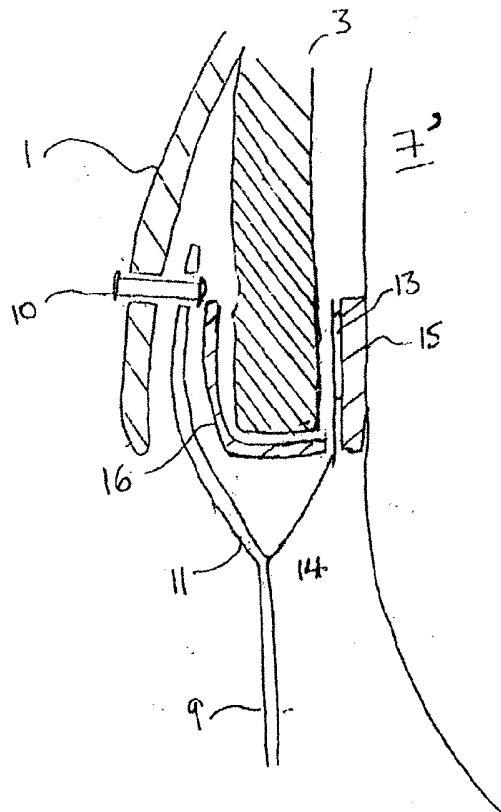
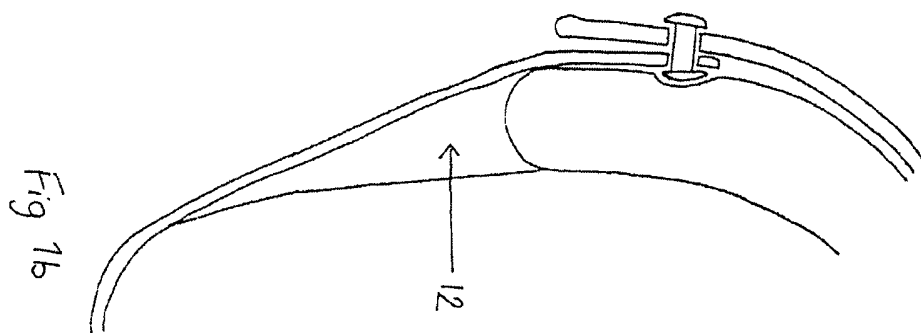
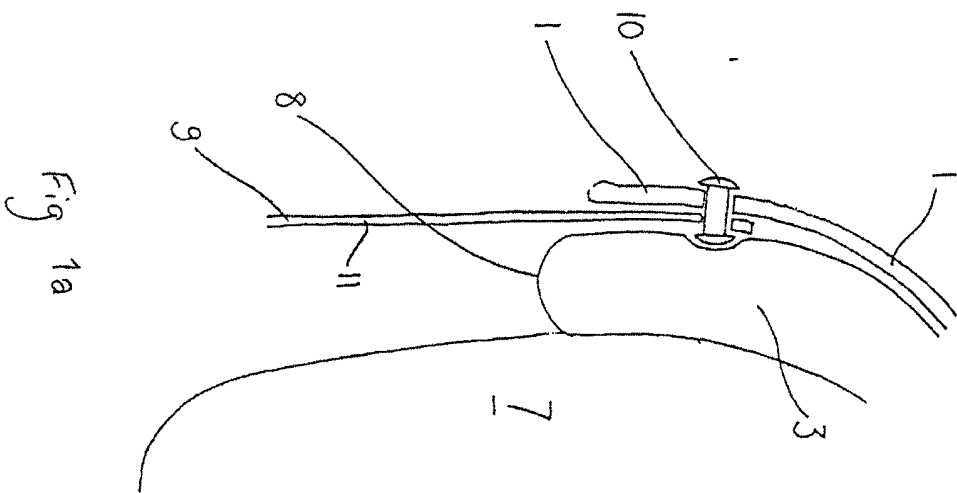


Fig 3a

1/3



2/3

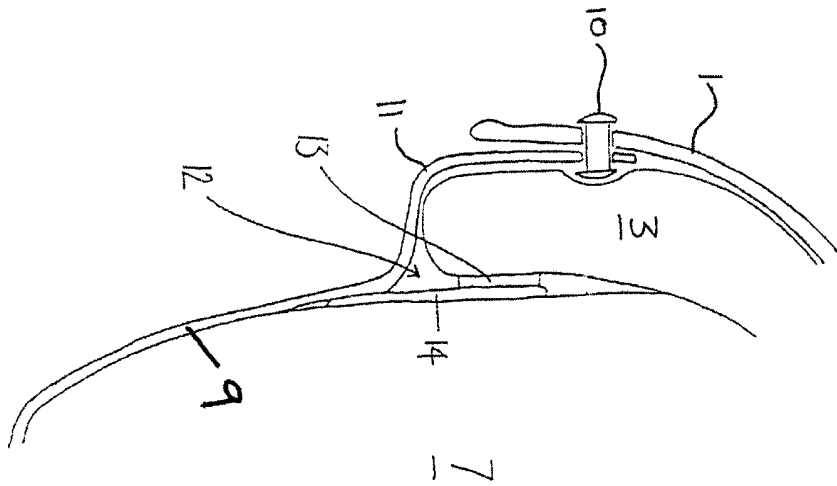


Fig 2

3/3

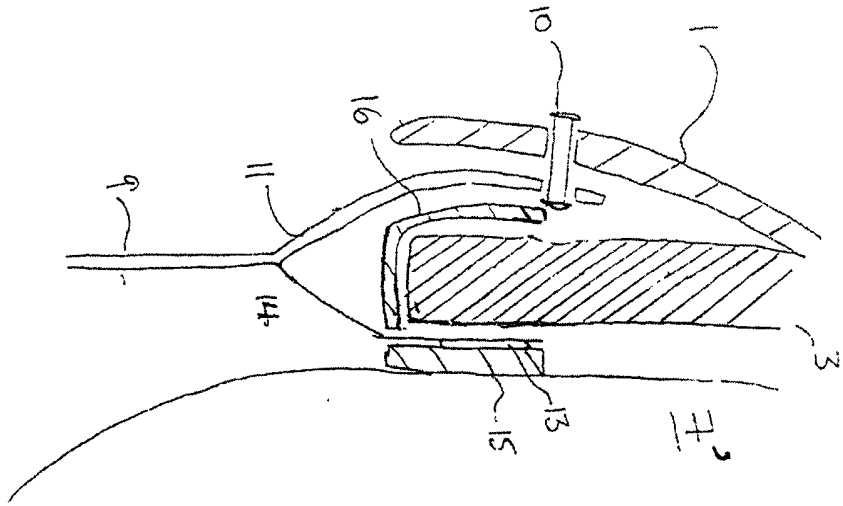


Fig 3a

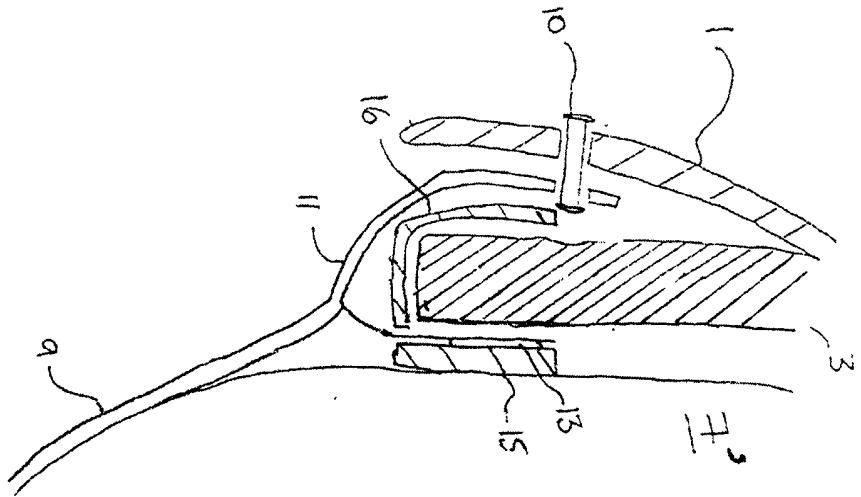


Fig 3b

## A HELMET

The present invention relates to helmets and in particular to, but not exclusively to, horse riding helmets.

5

Horse riding helmets have long been employed to lessen the damage caused by impacts to the heads of horse riders. Part of a known type of riding helmet is shown in figures 1a and 1b; figure 1a shows the helmet when one half of a strap hangs loose and figure 1b shows the helmet when the strap is fastened under the chin of a wearer.

10

The helmet shown has a hard outer shell 1 that acts as a shield and a soft inner lining 3 that acts as a cushion. The lining 3 has two effects, the first is to improve the comfort of a user wearing the helmet and the second is to help reduce the force transmitted to the wearer from any impacts to the outer shell 1.

15

The helmet is fitted with a strap 9 that when fastened holds the helmet in place, preventing the helmet from becoming dislodged. The strap 9 is formed in two halves 11, the strap halves 11 each being attached to opposite sides of the outer shell 1. The two strap halves 11 are able to meet under the chin of a wearer 7, where they can be  
20 secured to one another. Each strap half is anchored securely to the outer shell 1 by a rivet 10.

Given that the outer shell 1 is spaced from the side of the wearer's head by edge 8 of the inner lining 3 and the strap 9 is secured to the inner surface 5 of the outer shell 1,  
25 when fastened the strap 9 does not lie flat against the face of the wearer 7. Thus, when the strap 9 is fastened, two triangular spaces 12 are defined between the face of the wearer 7, the strap 9 and the lower edge 8 of the lining 3. This represents a hazard as a tree branch, for example, could become entangled with the helmet, if the branch passed through one of the triangular spaces 12. If a tree branch did become  
30 entangled, the wearer would be exposed to the risk of severe injury.

The above problem has been appreciated in the past and has been addressed by producing helmets in which the strap extends from the points of attachment on the outer shell and through the lining, such that the strap extends around the wearer's head from the inner side of the lower edge of the lining. The strap thereby lies flat adjacent to the wearer's face, reducing the risk of the strap becoming hooked on, for example, a tree branch. Unfortunately, such an arrangement is relatively complicated to manufacture, as the strap cannot be attached to the outer shell before addition of the lining.

10 Furthermore, US patent number 6735786, in the name of Charles Owen & Co. (Bow) Ltd., discloses a helmet with a strap 9 (as shown in figure 2). A facing 14 is provided which extends from the strap 9. In use this facing 14 extends between the strap 9 and the head 7 of the wearer, and the inner surface 6 of the lining 3 and the head 7 of the wearer. The facing is attached to the inner surface 6 of the lining 3 by a fastener 15 portion 13, (e.g. hook and loop or glue) causing the strap 9 to conform to the profile of the wearer's head 7, thereby reducing the size of the space 12.

However, when a user comes to put on the helmet, the two strap halves 11 are pulled away from the helmet. As a result of pulling the two strap halves 11, the fastener 20 portion 13 on the facing 14 is liable to separate from the lining 3. Thus, the insertion of a head into the helmet by pulling the two strap halves 11, and thereby the two facings 14, can cause one or both of the facings 14 to become uncoupled from the lining 3. This is particularly problematic for those using helmets that are tight fits when on, as the necessary force to be applied to the two strap halves 11 to insert the 25 head may be considerable.

It is an object of the present invention to provide an improved helmet.

In a first aspect, the present invention provides a helmet for protecting the head of a 30 wearer comprising: a helmet body comprising an outer shell; a strap for coupling the helmet to the head, the strap being secured to the helmet body; a piece of material

coupled to the helmet body proximate an edge surface of the helmet body and arranged to lie between the helmet body and the head of the wearer; and means for attaching a portion of the strap to the piece of material at an attachment point distant from the edge surface, such that the strap adjacent the surface edge is pulled towards the head of the wearer; wherein the piece of material is flexible, thereby allowing the attachment point to move relative to the helmet body.

As the attachment point is able to move, it prevents undue stress being placed on the attaching means as the straps are moved, thus decreasing the likelihood of the attaching means being damaged and/or released from the attachment point. Furthermore, the biasing effect the attaching means has on the strap also reduces the size of the gap between strap, the face of the wearer and the edge of the helmet and thus improves the safety of the helmet.

The attaching means may comprise a tab extending from the strap.

The attachment point may be separated from the head of the wearer by at least the piece of material.

The attachment point may be located between the piece of material and the helmet body.

The outer shell may define an inwardly facing surface extending to an edge of the shell, and the helmet body may further comprise a lining defining an outer surface facing the inwardly facing surface of the shell, and inner surface which in use faces the head of a person wearing the helmet, and an edge surface extending between the inner and outer surfaces of the lining adjacent to the edge of the shell.

The piece of material may extend between the shell and the lining.

The piece of material may be coupled to the helmet body by a flexible hinge.

The piece of material may form a headband.

The attaching means may extend through an aperture on the piece of material

5 The attaching means may be arranged for releasably attaching the portion of the strap to the piece of material.

The said attaching means may be arranged to release under a load of 15kg. It may be arranged to release under a lower load e.g. a load of 7kg or less.

10

The attaching means may comprise an elastic material.

The piece of material may act as padding.

15 Furthermore, the biasing effect the attaching means has on the strap also reduces the size of the gap between strap, the face of the wearer and the edge of the helmet and thus improves the safety of the helmet.

An embodiment of the present invention will now be described by way of example  
20 only with reference to the accompanying drawings, in which:

Figures 1a and 1b represent a known helmet with respectively the strap unfastened and the strap fastened;

Figure 2 represents a further known helmet with the strap fastened; and

Figures 3a and 3b represent a cross-sectional view of only half of a helmet in  
25 accordance with an embodiment of the present invention, with respectively the strap unfastened and the strap fastened.

The helmet 7 comprises a helmet body formed of a hard bowl-shaped outer shell 1 and an inner lining 3 that sits inside the shell 1. A headband 15 is shaped to sit around  
30 the inner lower edge of the lining 3. The headband 15 is preferably padded for wearer comfort, by incorporating and/or being formed of padding material. Preferably, the



headband is both soft and flexible. Two strap halves 11 are fixed between the outer shell 1 and the inner lining 3 in diametrically opposed positions such that when a user wears the helmet, the two strap halves 11 can be fastened under the chin of a user.

5 The headband 15 is attached to the shell 1 by a material hinge 16 and to portions of the lining 3 by an adhesive (not shown). The hinge 16 may be formed of any flexible material, including the material forming the headband 15, or any part thereof. The hinge 16 is mainly fixed between the lining 3 and the shell 1, but in some places, such as those shown by the figures, it is fixed between the lining 3 and part of a strap half  
10 11.

Each strap half 11 has an attaching means in the form of a tab 14 that extends therefrom. The tab 14 is attached to an attachment point on the headband 15 so that when the strap 9 is fastened below the chin of the wearer 7, the tab 14 biases the strap  
15 9 towards the face of the wearer 7. The gaps 12 between the lower edge of the helmet innards and the face of the rider 7 and the strap 9 are thereby reduced. The tab 14 is preferably made from an elastic material. The tab 14 is preferably releasably attached to the headband 15 e.g. by means of a hook and loop mechanism 13 or Velcro™. There is no adhesive in the vicinity of the tab 14, so that at least part of the headband  
20 15 in the vicinity of the tab can move downwards and outwardly. Preferably this release is arranged to occur under a predetermined load, such as maybe exerted by a wearer. Thus, the wearer may release the tab 14 from the headband 15 so as to facilitate the removal of the strap 11 when the helmet is being removed. As for instance, the strap 11 will still be secured to the helmet by the rivet 10.

25

Each side of the helmet is thus formed from several layers: the outer-most layer being the shell 1, then the strap 9, the material hinge 16, the lining 3, the tab 14 and finally the headband 15. As shown in the figures, the tab 14 extends through an aperture on the surface connecting the headband 15 and hinge 16.

30

It is common for a helmet to be put on by the user by grasping the strap halves 11 and pulling each strap outwardly before placing the helmet on the head. As the headband comprises a flexible piece of material, and at least part of the headband is in the vicinity of the tab 14 can move, then this movement of the straps by the user will not place undue stress on the attachment point at which the tab 14 couples to the headband 15. Instead, the headband 15 will move/flex. Thus, the risk of the tab 14 becoming detached from the headband 15 is reduced – something undesirable when the helmet is then being located on the head of the wearer.

10 It will be appreciated that the above embodiment is described for example only. For instance, whilst the attaching means for attaching the strap to an attachment point on the headband has been described as a tab, it will be appreciated that the attaching means need not be limited to a small strip of material, but could be any suitable material on any suitable form e.g. a cord or a string. Equally, although the attachment point has been described as being on a headband, it will be appreciated that the attaching means can in fact be located on any piece of material that is predominant to the helmet body, and free to move to provide the desired movement range of the attaching range. Typically, such as movement range is greater 0.5cm, but less than 3cm. In the providing embodiment, the tab 14 extends between the inner lining 3 and the headband 15. This is preferable, as the headband 15 will then prevent the wearer being discomforted by the tab 14.

The shell 1 is preferably rigid, and may be covered or coated for aesthetic reasons. The shell 1 can be made from any one or more of glass fibre, polyester resin, carbon fibre, kevlar, abs (acrylonitrile butadiene styrene), high impact styrene, high density polyethylene or other suitable thermoplastic or thermoset plastic.

The lining 3 may be made from any impact absorbing material, including EPS (expanded polystyrene), EPE (expanded polyethylene), EPP (expanded polypropylene) or a foamed polyurethane.

The headband 15 can be made from any one of leather, suede, faux leather, faux suede, polyester, nylon, cotton or wool. The strap halves 11 can be made from any one of cotton, nylon, polyester, polypropylene, or a mixture thereof. The strap can be covered for comfort or aesthetic reasons.

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The strap halves 11, the material hinge 16 and the outer shell 1 are secured to one another by means of a rivet 10. The rivet 10 has a cylindrical body with a head located either side of the body, the two heads being broader than the diameter of the cylindrical body.

10

Holes are pre-formed in the shell 1, hinge 16 and strap halves 11. The holes all have the same size diameter and the diameter is slightly larger than the diameter of the cylindrical body of the rivet 10, but smaller than the width of the two heads of the rivet 10. The body of the rivet 10 is threaded through the holes and the two heads are  
15 fixed in place. Alternatively, the body may be used to pierce the shell 1, hinge 16 and strap halves 11 and then have the heads fixed in place.

## CLAIMS

1. A helmet for protecting the head of a wearer comprising:
  - a helmet body comprising an outer shell;
  - 5 a strap for coupling the helmet to the head, the strap being secured to the helmet body;
  - a piece of material coupled to the helmet body proximate to an edge surface of the helmet body and arranged to lie between the helmet body and the head of the wearer; and
  - 10 means for attaching a portion of the strap to the piece of material at an attachment point distant from the edge surface, such that the strap adjacent the surface edge is pulled towards the head of the wearer;
  - wherein the piece of material is flexible, thereby allowing the attachment point to move relative to the helmet body.
  - 15
2. A helmet as claimed in claim 1, wherein the attaching means comprises a tab extending from the strap.
3. A helmet as claimed in claim 1 or claim 2, wherein the attachment point is  
20 separated from the head of the wearer by at least the piece of material.
4. A helmet as claimed in any one of the above claims, wherein the attachment point is located between the piece of material and the helmet body.
- 25 5. A helmet as claimed in any one of the preceding claims, wherein the outer shell defines an inwardly facing surface extending to an edge of the shell, and the helmet body further comprises a lining defining an outer surface facing the inwardly facing surface of the shell, and inner surface which in use faces the  
30 head of a person wearing the helmet, and an edge surface extending between the inner and outer surfaces of the lining adjacent to the edge of the shell.

6. A helmet as claimed in claim 5, wherein the piece of material extends between the shell and the lining.
7. A helmet as claimed in any one of the preceding claims, wherein the piece of material is coupled to the helmet body by a flexible hinge.
8. A helmet as claimed in any one of the preceding claims, wherein the piece of material forms a headband.
9. A helmet as claimed in any one of the preceding claims, wherein the attaching means extends through an aperture on the piece of material
10. A helmet as claimed in any of the preceding claims, wherein the attaching means is arranged for releasably attaching the portion of the strap to the piece of material.
11. A helmet as claimed in claim 10, wherein said attaching means is arranged to release under a load of 15kg.
12. A helmet as claimed in any one of the preceding claims, wherein the attaching means comprises an elastic material.
13. A helmet as claimed in any one of the preceding claims, wherein the piece of material acts as padding.
14. A helmet substantially as hereinbefore described with reference to figures 3a and 3b.



INVESTOR IN PEOPLE

Application No: GB0427999.8

Examiner: Mr Karl Whitfield

Claims searched: 1 to 14

Date of search: 20 April 2005

### Patents Act 1977: Search Report under Section 17

#### Documents considered to be relevant:

| Category | Relevant to claims | Identity of document and passage or figure of particular relevance |
|----------|--------------------|--|
| A        | -                  | US6735786 B2<br>(ROY et al.) whole document                        |
| A        | -                  | US2846683 A<br>(E. R. DYE et al.) whole document                   |
| A        | -                  | WO97/37553 A1<br>(RBR ARMOUR) figure 8 & page 20 lines 8 to 17     |

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#### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

A3V

Worldwide search of patent documents classified in the following areas of the IPC<sup>07</sup>

A42B

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, TXTE