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A3V V11D V52

(56) Documents Cited:
EP 0090720 A **WO 1994/002042 A1**
FR 002539010 A **US 4564959 A**

(58) Field of Search:
UK CL (Edition V) **A3V**
INT CL⁷ **A42B, A42C**
Other: **ONLINE DATABASES: WPI, EPODOC, JAPIO**

(54) Abstract Title: **Protective helmet shell**

(57) A protective helmet shell 10 comprises at least two spaced apart depressions 12 and/or projections 12' on its external surface, which are used as locating points for a jig 28 during manufacture. Preferably there are at least three depressions/projections and they are spaced as far apart as possible. The depressions may be concave and the projections convex. Further depressions 14 may be provided to accommodate mountings 16 for use with a mask 20. The locating depressions or projections could also be used to hold a helmet accessory such as a visor structure (28, Fig 3). A method of manufacturing the helmet shell is also claimed.

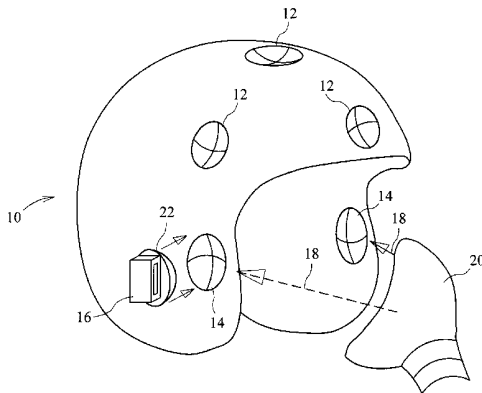


Fig. 1

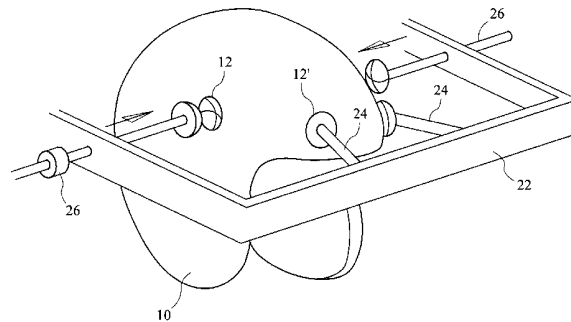


Fig. 2

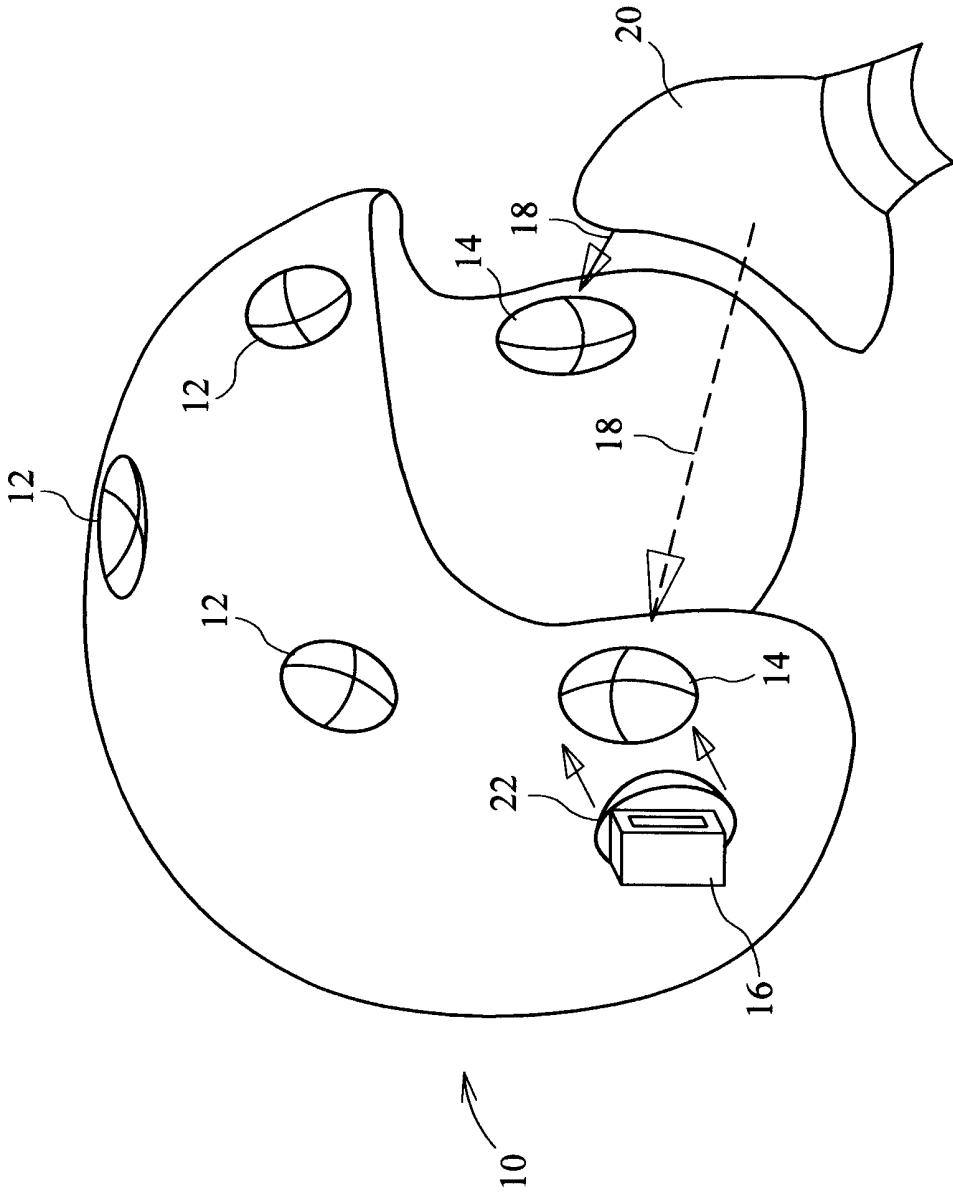


Fig. 1

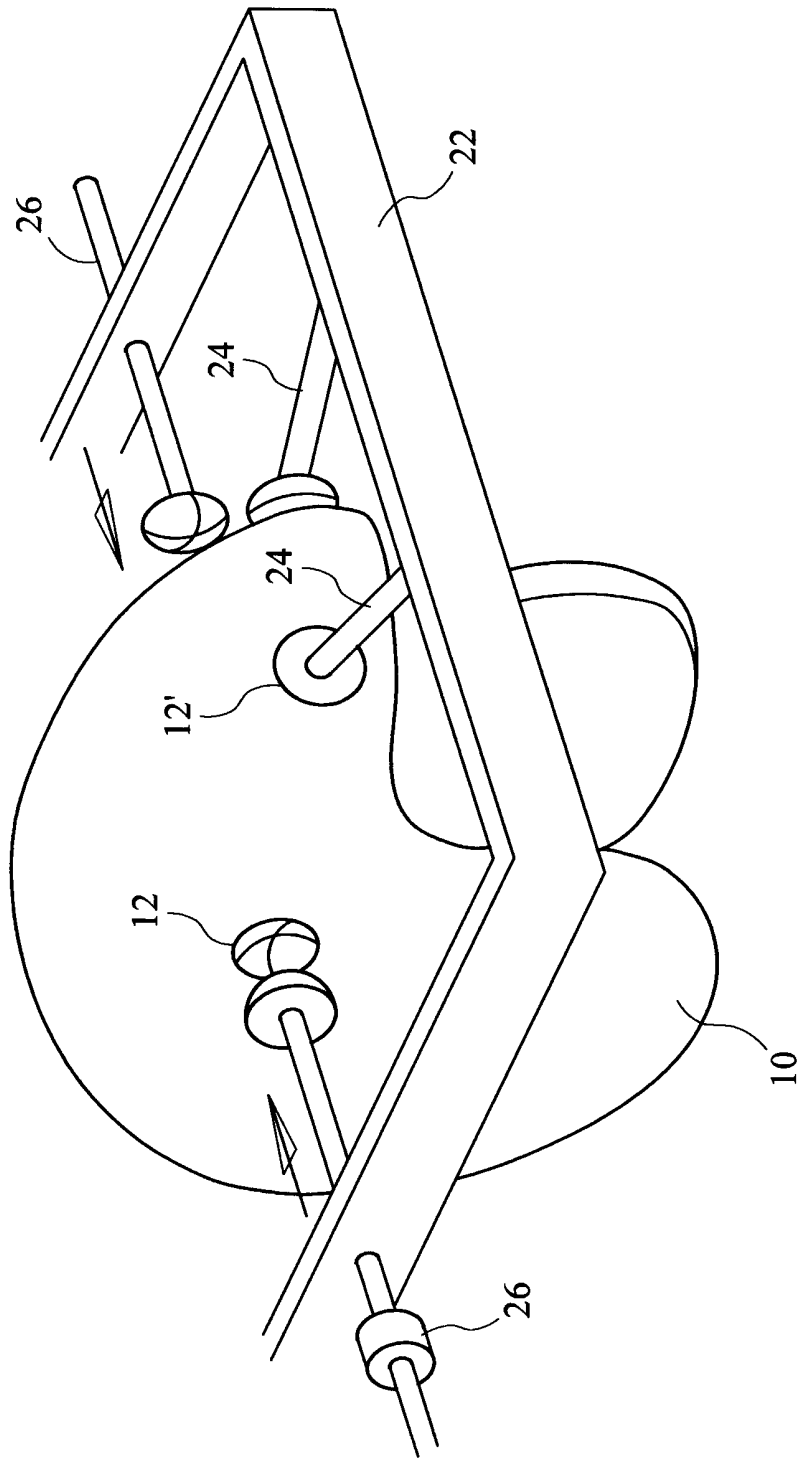


Fig. 2

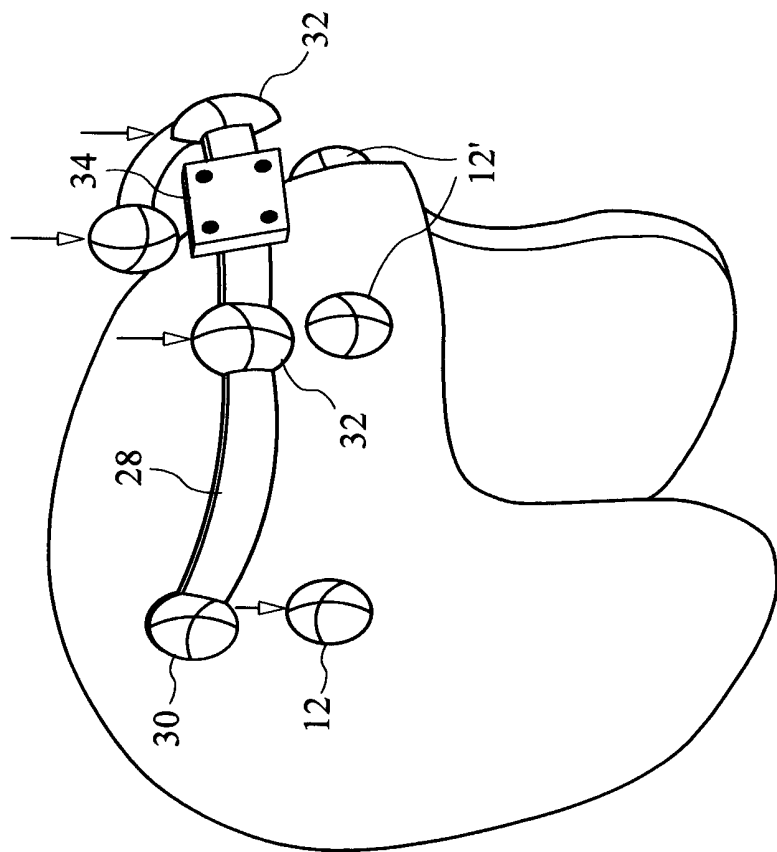


Fig. 3

Protective Helmet

This invention relates to a protective helmet, and a method of manufacture thereof.

5 Protective helmets, particularly those for military aircrew or motorcyclists, tend to be spherical in overall shape. This can cause difficulties in positioning the shell of the helmet during manufacture. Preferred embodiments of the invention address this problem.

10 In one aspect the invention provides a protective helmet shell having at least two (preferably at least three) spaced-apart depressions and/or projections on its external surface positioned as location points.

The depression may be a curved concavity, preferably part-spherical.

15

The projection may be a curved convexity, preferably part-spherical.

Preferably the depressions and/or projections are spaced as far apart as the shell conveniently permits.

20

At least one said depression or projection may be apertured.

In another aspect the invention provides a method of manufacturing a helmet or a helmet shell comprising, during a manufacturing or assembly process, locating a
25 helmet shell as set forth above in a jig or fixture by engaging at least two and preferably at least three said depressions or projections with said jig or fixture.

A further aspect of the invention is a helmet shell as set forth above having an accessory or a mounting for an accessory adhesively secured to a said depression
30 or projection.

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

5 Figure 1 shows a helmet according to the invention with an associated breathing mask,

 Figure 2 shows a helmet shell in a jig, and

10 Figure 3 shows the helmet of figure 2 fitted with a helmet-mounted display visor.

As can be seen from figure 1, the helmet has an external moulded shell 10 which is generally spherical in shape. Conventionally, this makes it difficult to position the moulded shell for trimming, drilling and other assembly operations. However, in
15 accordance with the invention, by moulding shallow spherical convexities or concavities 12 into the shell in at least three positions the shell can be registered accurately with a jig or fixture. Here the features 12 are concavities, but could equally well be convexities.

20 For accuracy of location the features 12 should form the apexes of a triangle (or other polygon, if there are more than three) on the surface of the helmet. They should be as far separated as the shell conveniently permits. Slight rotational movement of the shell about a location point of a jig in one recess 12 would be related to translational movement in another recess 12 that would be easily
25 detectable.

Figure 2 shows a helmet shell, this time with four location features 12, 12' being received in a jig 22. Two front convex projections 12' are engaged by fixed datum points 24 of the jig, and two concavities 12 at the sides of the helmet shell are
30 engaged by moveable clamps 26.

The four location features 12, 12' of figure 2 have an advantage compared to the

three of figure 1 in that the mould tooling for the helmet can be simpler. Usually the tooling divides on the centre line of the helmet, and the presence of one of the concavities 12 on the centre line in figure 1 requires special attention when designing the tooling. This is avoided in figure 2, where none of the features 12, 12' is on the centre line.

The features 12, 12' have a further purpose in providing accurate locations for mountings for ancillary equipment, for example mounting plates for night vision equipment, or a helmet-mounted display system.

10

New materials such as aramids and carbon composites recently introduced for shell construction permit the shell to be made thinner, but also tend to be more sensitive to load concentration. Load spreading over larger areas is best achieved by adhesives. However adhesives are susceptible to peel and the adhered component must be accurately positioned. The use of the features 12, 12' first for accurately positioning the helmet in a fixture, and then to receive the mountings ensures that the ancillary equipment is accurately located. This is of particular importance when the equipment is required to interface optically with the wearer's eye.

20 Further, the part-spherical shape of the concavities 12 and convexities 12' has the additional advantage that a load tending to peel the adhesive at one point on the part-spherical surface will be a more tangential load at another point, producing a shear stress which the adhesive is better able to withstand.

25 Thus, in figure 1, additional concavities 14 are provided for oxygen mask or respirator mountings 16 which receive straps 18 (shown diagrammatically) of a mask 20. The mountings 16 are provided with part-spherical seatings 22 which conform to the concavities 14 so that the orientation of the mounting 16 can be adjusted to suit the individual wearer. The mountings may then be fixed with adhesive.

30 Alternatively if a permanently adjustable mounting is preferred, the concavities 14 may be apertured to permit the passage of a stud (not shown) having a shank with a smaller diameter than the aperture so that the mounting is moveable in the

concavity 14 whilst being retained therein.

Figure 3 shows the helmet of figure 2 in connection with a visor structure 28 for helmet-mounted equipment such as a display or a night vision (infra-red) system.

5 The visor has convex pads 30 which engage concavities 12 at the sides of the helmet, and which are fixed thereto eg. by studs as already described. Convex frontal protrusions 12' are engaged by conforming concave recesses 32 in the visor. A plate 34 provides a mounting for the display, night vision system or other equipment.

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Whilst the described embodiments have three or more depressions or projections it is possible to achieve the location function using only two such features provided that the helmet shell is supported in a jig or fixture so that it registers accurately with both location features. Preferably the two features are located on intersecting axes

15 eg. one at the rear, one at the side so that the helmet shell is located on those two axes. Alternatively they may be symmetrically arranged on the shell, eg. as are concavities 14 of figure 1 or 12 of figure 2, a third location then being provided by the jig or fixture engaging or supporting the shell elsewhere, for example at the centre of the rear rim of the shell or elsewhere on its centre line.

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Whilst the invention has been described in the context of helmets for pilots or other aircrew, it is applicable to many other forms of protective helmet eg. for motorcyclists, the police, the military, fire fighters and construction workers amongst others.

25

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated features.

Claims

1. A protective helmet shell having at least two (preferably at least three) spaced-apart depressions and/or projections on its external surface,
5 positioned as location points.
2. A helmet shell as claimed in claim 1 wherein a said depression is a curved concavity.
- 10 3. A helmet shell as claimed in claim 1 or 2 wherein a said projection is a curved convexity.
4. A helmet shell as claimed in claim 2 or 3 wherein the concavity or convexity is part-spherical in form.
- 15 5. A helmet shell as claimed in any preceding claim wherein the depressions and/or projections are spaced as far apart as the shell conveniently permits.
6. A helmet shell as claimed in any preceding claim wherein at least one
20 depression or projection is apertured to permit the attachment of a helmet accessory.
7. A method of manufacturing a helmet or a helmet shell comprising, during a manufacturing or assembly process, locating a helmet shell as claimed in any
25 preceding claim in a jig or fixture by engaging at least two (preferably at least three) said depressions or projections with said jig or fixture.
8. A helmet comprising a helmet shell as claimed in any of claims 1 to 6 and having an accessory or a mounting for an accessory adhesively secured to
30 a said depression or projection.
9. A helmet, a helmet shell or a manufacturing method substantially as herein described with reference to the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0308326.8
Claims searched: All

Examiner: James Hull
Date of search: 19 December 2003

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
X	1, 3, 6	FR 2539010 A NOLAN SPA. See Abstract and Figures. A helmet 1 having projections which serve to locate measuring rods 5.
X	1 to 4	WO 94/02042 A1 W H VELKE. See Figures. Helmet having a plurality of circular rises or depressions.
X	1, 2 & 6	EP 0090720 A RENAULT. See Abstract and Figures. Cycling helmet with depressions 2.
X	1 at least	US 4564959 A SCHUBERT-WERK. See Figures. Crash helmet with depressions.

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art
Y Document indicating lack of inventive step if combined with one or more other documents of same category	P Document published on or after the declared priority date but before the filing date of this invention
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^v:

A3V

Worldwide search of patent documents classified in the following areas of the IPC⁷:

A42B
A42C

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

WPI, EPODOC, JAPIO