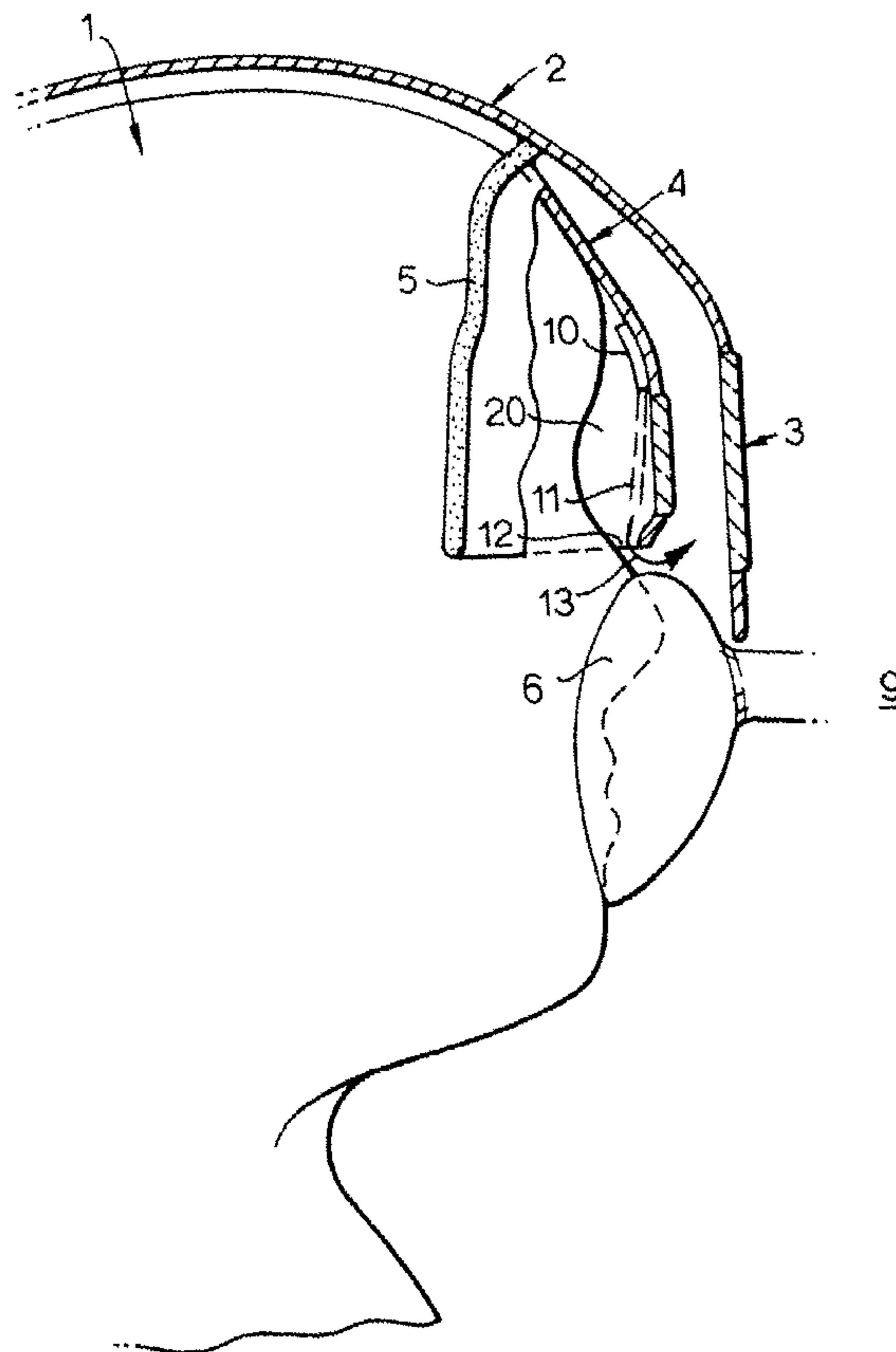




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 (54) Title: EYE PROTECTION DEVICES



(57) Abrégé/Abstract:

With reference to figure (2), a helmet (2) for an aircraft crew member (1) is provided with a device (10) for forming an eye-shielding curtain (11) of air in front of the crew members eyes. The air exhausts to the ambient atmosphere (9) by way of an escape path (12) beneath the lower edge of the visor (4), as indicated by arrow (13).

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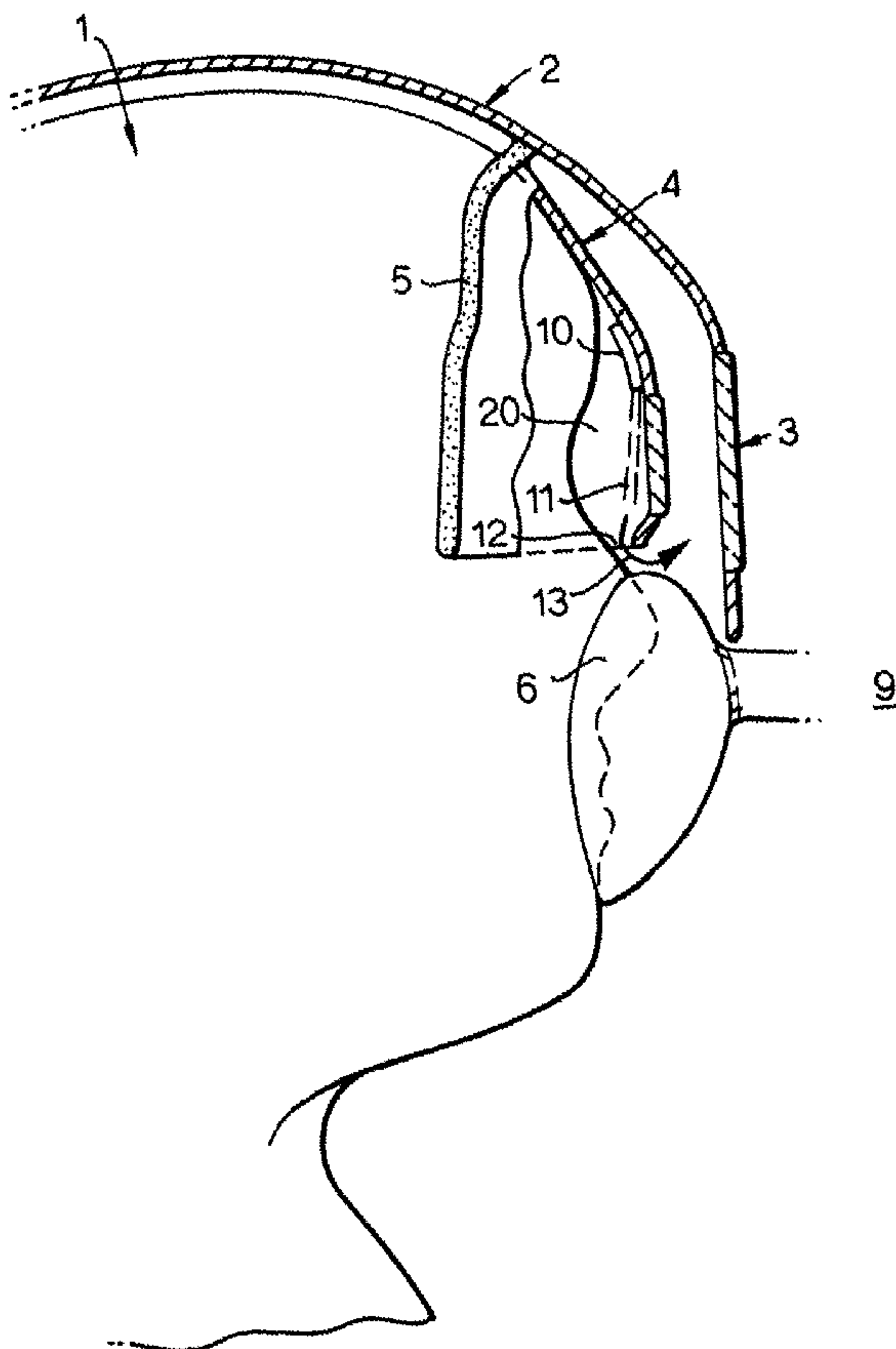
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(57) Abstract: With reference to figure (2), a helmet (2) for an aircraft crew member (1) is provided with a device (10) for forming an eye-shielding curtain (11) of air in front of the crew members eyes. The air exhausts to the ambient atmosphere (9) by way of an escape path (12) beneath the lower edge of the visor (4), as indicated by arrow (13).

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EYE PROTECTION DEVICES

This invention relates to eye protection devices, and particularly, but not exclusively, relates to eye protection devices for aircraft crew members.

5

In certain operational conditions, aircraft crew members are sometimes troubled by ambient atmospheres which can irritate the eyes. These effects can be due to chemical warfare agents or other hazards, and some of these hazards can affect flight safety or the ability to undertake delicate tasks.

10

The present invention seeks to at least alleviate this problem.

According to the present invention, an eye protection device comprises means for forming an eye-shielding curtain of air in front of the eyes.

15

The invention has many applications and particularly, but not exclusively, provides an embodiment comprising a helmet incorporating such an eye protection device. The helmet may comprise an aircraft crew member's helmet.

20

An embodiment of the invention will now be described by way of example only, with reference to the accompanying drawings, wherein:-

Figure 1 is a side view, partly in section of an aircraft crew wearing a helmet incorporating an eye protection device, Figure 2 is an enlargement of part of Figure 1 and illustrates further detail, Figure 3 is front view of the eye protection device, and Figure 4 is an end view of the device, looking in the direction of arrow IV of Figure 3.

30 With reference to the figures, an aircraft crew member 1 is shown wearing a helmet 2 which fits closely to the head and is held firmly in place, eg. using a strap arrangement. The helmet 2 is fitted with an outer visor 3 or similar (eg. Anti-glare, wind blast protection). This may be of a standard type design.

Within the helmet 2 is fitted an inner visor 4 curved so that the impact on the wearer's peripheral vision is minimised. The inner visor 4 carries a soft rubber lip 5 which provides a peripheral seal along the brow of the wearer and vertical sides of the visor 4. There is no peripheral seal along the
5 bottom edge of the visor 4. The inner visor 4 is fixed in place via attachment to the helmet 2. A flexible oronasal mask 6 of a standard type interfaces in the normal fashion, but does not provide an airtight seal to that section of the inner visor 4 which passes across the bridge of the nose or across the corresponding area if this is not the bridge of the nose.

10

The device 10 comprises means for forming an eye shielding curtain 11 of slightly pressurised clean air discharged downwardly, across, but not into the crew members eyes into space 20 behind the inner visor 4. The air forming the curtain 11 exhausts to the ambient atmosphere 9 by way an
15 escape path 12, (Figure 2), beneath the lower edge of the visor 5, as indicated by arrow 13. Provision of the escape path 12 ensures that space 20 does not become pressurised.

The device 10 comprises a substantially flat casing 14 with an air inlet
20 portion 15 and a divergent portion 16. The bottom of the casing 14 is open-ended and defines an air discharge slot 17. (Figure 4).

The casing 14 dimensions can be altered (length and height; width of discharge slot; as well as the direction of the air supply) vertically downward
25 into the device 10, or via a right angle or supply pipe angled in a different manner.

The divergent portion 16 of the casing 14 serves as an air diffuser, and is filled with a plurality of generally triangular shaped particles 21 of plastics
30 material so as to form a tortuous path for the outflowing air as it escapes to the slot 17. An alternative to the particles 21 comprises "bubble-pack" material, used to protect articles sent through the post. Such material also suitably defines tortuous paths for the outflowing air.

In this embodiment, airflow entering the inlet portion 15 of the device 10 is about 10.5 litres per minute, but can vary according to requirements. The air outlet slot 17 is substantially 2.5 mm in width. The air escape path 12 is
5 substantially 4.5 mm in width. These dimensions may be varied however according to requirements. The eye-protecting device 10 may be curved slightly, so as to conform with the inner visor 5.

The invention provides low burden protection for the crew-members eyes.

10

Establishment of a continuous curtain of air 11 avoids the creation of unwanted vortices as would be the case if a row of air outlet holes were used instead of the continuous slot 17.

15 The continuous slot arrangement of the invention is, however, reliant on the air supply being directed to the centre, or near to the centre, of the device 10. The design presents a low pressure drop to the air supply, whilst preventing any venturi or other effects which would result in contamination being drawn upward and into the inner visor and thus being brought into
20 contact with the wearer's eyes.

In the embodiment illustrated, the face seal 5 extends across the air crew members brow and then down the wearers temples, so as to roughly define an inverted "V", the opening at the bottom defining in turn, and with the
25 wearers head, the air escape path 12.

The invention, in the embodiment illustrated, provides protection factors (defined as the quotient of the concentration of contaminant external to the inner visor and the concentration of contaminant in the locality of the eyes
30 within the inner visor) as measured using sodium chloride (salt) aerosol challenge and sampling at the eye positions using a sensitive flame photometer of say, 10,000 to 100,000 depending on requirements and conditions.

CLAIMS

1. An eye-protection device comprising means for forming an eye-shielding curtain of air in front of the eyes.
5
2. An eye-protection device as claimed in Claim 1, wherein the device comprises a casing having an air inlet and divergent air outlet, the outlet defining an air discharge slot.
- 10 3. An eye-protection device as claimed in Claim 2, wherein the divergent portion of the device serves as an air diffuser.
4. An eye-protection device as claimed in Claim 2 or 3, wherein the divergent portion of the device houses material which defines
15 tortuous paths for outflowing air.
5. An eye-protection device as claimed in Claim 4, wherein the tortuous paths are defined by a plurality of particles.
- 20 6. An eye-protection device as claimed in Claim 5, wherein the particles are of generally triangular shape.
7. An eye-protection device, substantially as herein before described with reference to the accompanying drawings.
25
8. A helmet incorporating an eye-protection device as claimed in any one of Claims 1 to 7.
9. A helmet as claimed in Claim 8, incorporating a visor disposed in
30 front of the helmet wearer's eyes, wherein the eye-protection device is disposed behind the visor.

10. A helmet as claimed in Claim 9, wherein the visor is provided with a peripheral seal extending along the brow and down the temples of the helmet wearer, to define a bottom opening providing a curtain air escape path.
- 5
11. A helmet as claimed in any one of Claims 8 to 10, comprising an aircraft crew member's helmet.
12. A helmet, substantially as herein before described, with reference to
- 10 the accompanying drawings.

Fig.2.

