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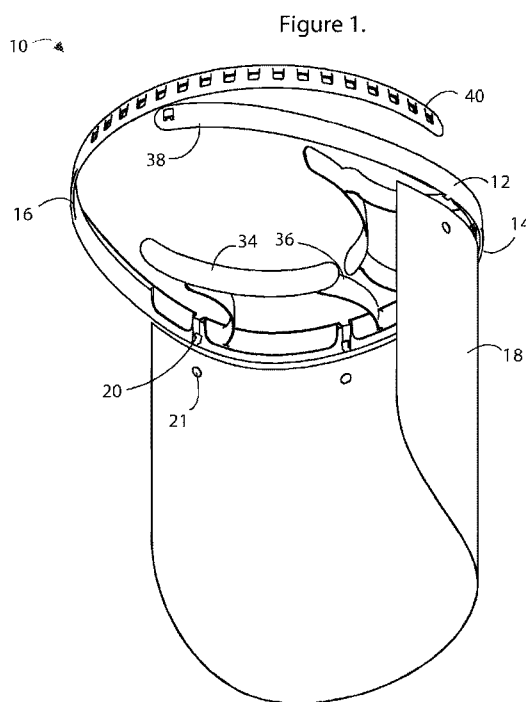
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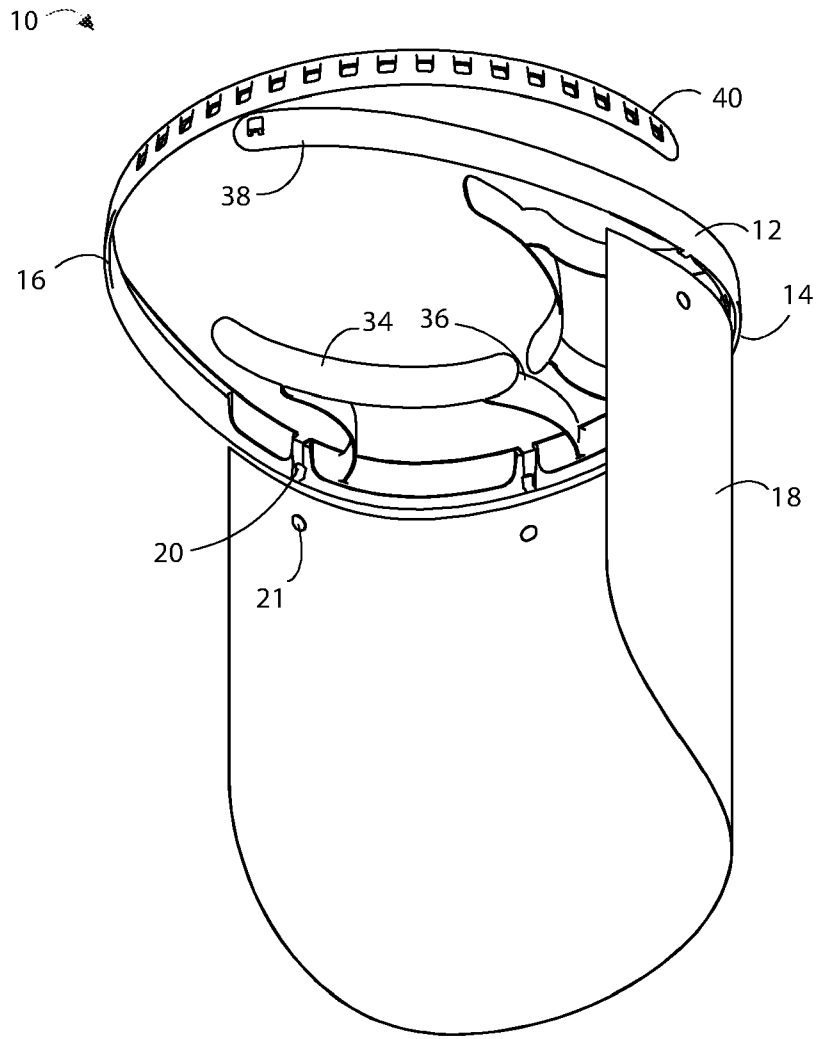
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JP 6793986

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(54) Title of the Invention: **Face shield headband**
Abstract Title: **Face shield headband with a cushioning portion**

(57) A face shield headband 10 for protect against splashes of liquid and debris. The headband is configured to accommodate the head of a wearer and comprises attachment means for releasably attaching a visor 18 to a front portion 14. At least one cushioning portion 34 is connected to and spaced apart from an inner surface of the band 12 by a biasing element, wherein the biasing element urges the cushioning portion 34 into engagement with the forehead of the wearer. The invention further relates to a method of manufacturing said face shield headband and a kit comprising said face shield headband and a visor. The biasing element may be elastically deformable and may comprise a plurality of strips of resilient material. The headband may comprise a plurality of slots for cooperating with at least one projection to allow the user to select the size of the band.





29 06 22

Figure 1.

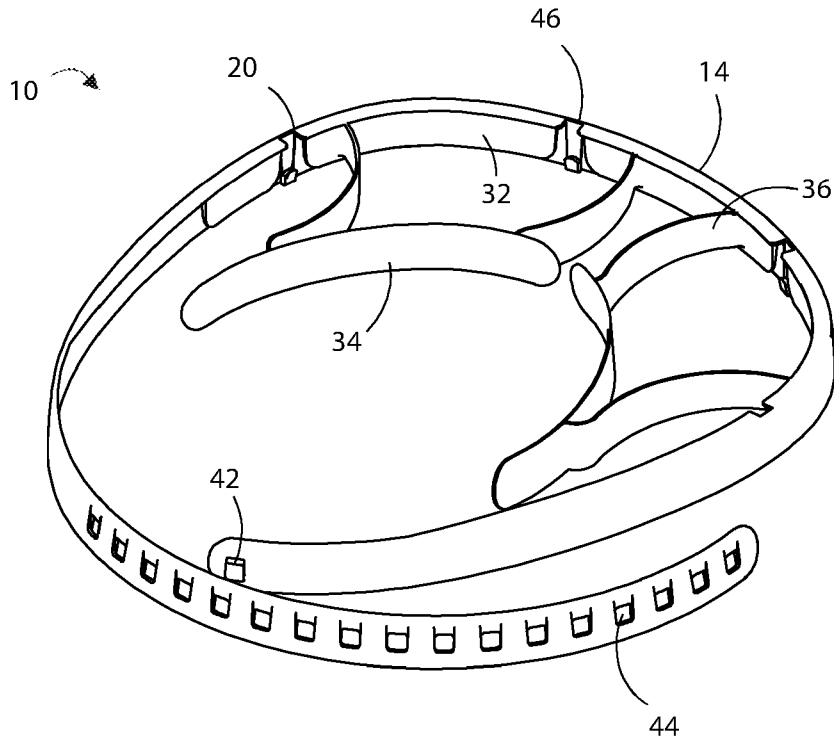


Figure 2.

29 06 22

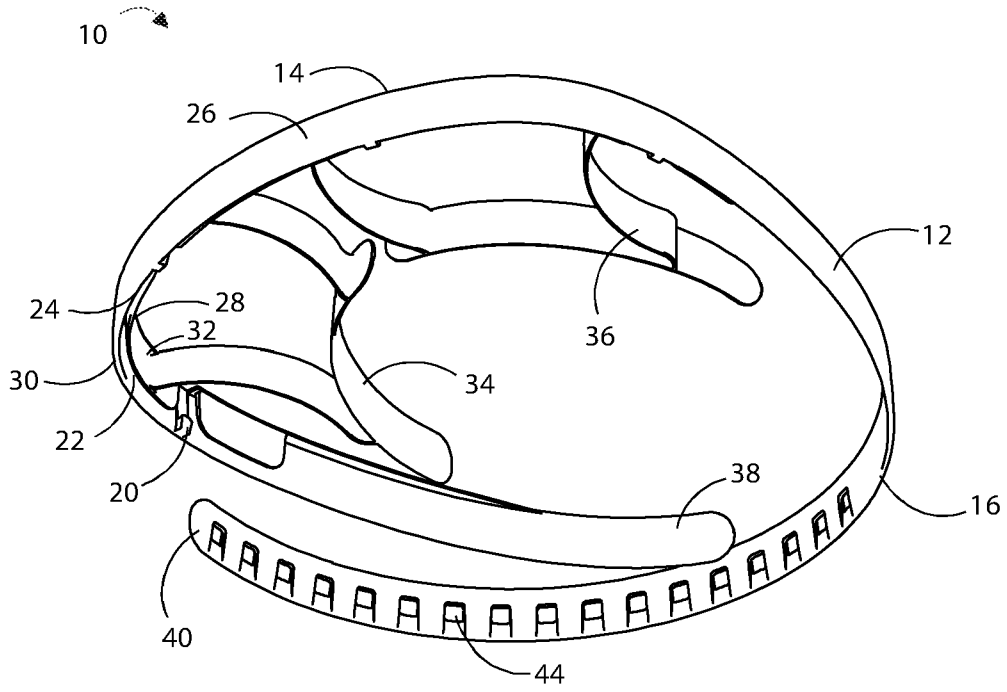


Figure 3.

29 06 22

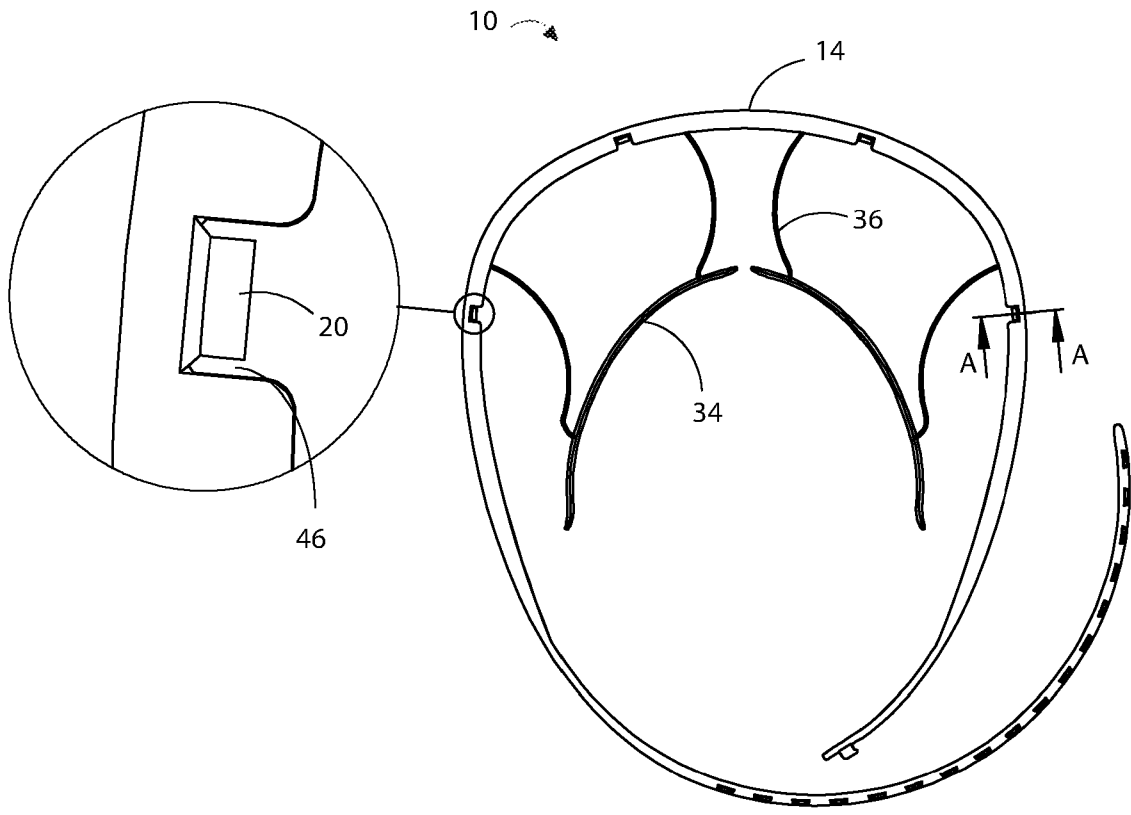


Figure 4A.

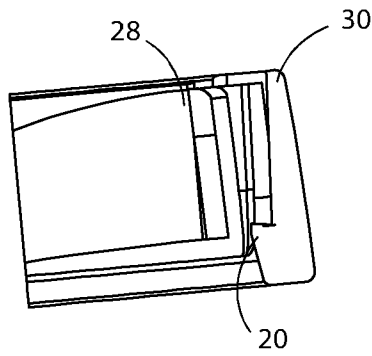


Figure 4B.

29 06 22

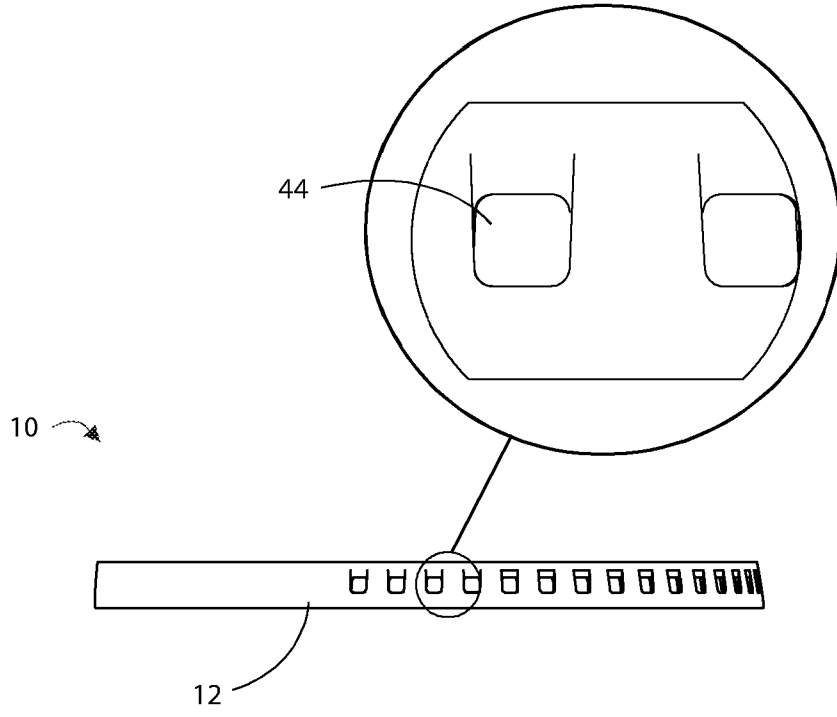


Figure 5.

FACE SHIELD HEADBAND

TECHNICAL FIELD

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The present invention relates to a face shield headband and a method of manufacturing said face shield headband. The invention further relates to a kit comprising said face shield headband and a visor.

10 INTRODUCTION

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Face shields are an effective way to protect wearers against airborne pathogens and splashes of liquid and other debris. As such, the use of face shields is commonplace in medical applications such as surgery and dentistry, and non-medical applications such as hazardous materials handling and sporting activities.

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Such face shields are typically in the form of a transparent sheet of plastic, commonly called a visor, that extends from a headband in front of a wearer's face. The headband may be fitted with a foam pad that contacts the wearer's forehead during use. However, during extended use, the presence of the foam pad extending across the forehead can make the headband hot and uncomfortable to wear. As a result, the foam pads frequently become soiled with sweat and dirt, which may hasten the need to dispose of the face shield. In an alternative face shield configuration, the visor is attached to an acrylic frame similar to that of lensless glasses. However, this face shield configuration is often cumbersome for users who wear corrective lens glasses.

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A further problem with existing face shields is that they are typically constructed from several components, which are glued together or joined in some other manner. These parts may require time-consuming assembly, which leads to longer production times and therefore higher manufacturing cost. The component parts may also be made of several different materials. For example, a face shield may include components made from clear PVC (or less commonly PET) plastic foam or sponge, elastic, adhesive and/or metal. These materials are uneconomic to separate for

recycling, and are therefore landfilled or incinerated in large quantities. This is particularly problematic as it is common for face shields to be single-use items.

5 The issues with existing face shields noted above have been further exacerbated by the recent pandemic caused by COVID-19 (coronavirus disease of 2019), which has fuelled a drastic increase in the demand for face shields.

Objects and aspects of the present claimed invention seek to alleviate at least some of the problems with the prior art.

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SUMMARY OF INVENTION

According to a first aspect of the invention, there is provided a face shield headband, comprising:

15 a band configured to accommodate the head of a wearer, wherein the band includes attachment means for releasably attaching a visor to a front portion of the band; and

at least one cushioning portion connected to and spaced apart from an inner surface of the band by a biasing element;

20 wherein the biasing element urges the cushioning portion into engagement with the forehead of the wearer.

The biasing element is deformable between an extended state and a contracted state such that the position of the at least one cushioning portion is flexible. This offers the significant advantage of providing a common headband design to fit a wide variety of head shapes. Such headbands also provide a high degree of comfort to the wearer due to the light pressure applied to the forehead by the at least one cushioning portion when the band is worn by the wearer. Advantageously, the biasing element also allows for a visor to be attached to the headband such that it is spaced apart from the face of the wear. This provides clearance for glasses, protruding facial features and other forms of personal protective equipment (PPE) that may be worn on the face, such as goggles or mouth coverings. Significantly, the distance between the wearer's face and the visor also substantially reduces or prevents fog from building on the visor. Additionally, the headbands may be re-used by simply attaching a new visor to the front portion of the band.

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Optionally, the biasing element may comprise an elastically deformable element.

5 Optionally, the biasing element may comprises a plurality of strips of resilient material extending in a shaped configuration between the at least one cushioning portion and the inner surface of the band. For example, the shaped configuration may be substantially arcuate.

10 The headband may be configured such that only a portion of the wearer's forehead is contacted by the or each cushioning portion. For example, the headband may comprise at least two cushioning portions arranged to engage opposite sides of the forehead. Advantageously, this may keep the wearer cooler compared to existing designs due to a reduced contact area between the headband and the forehead. This may be particularly beneficial when the headband is to be worn for extended
15 periods and/or for wearers who suffer from skin allergies and other contract-triggered skin conditions.

20 Optionally, the band may comprise a first open end configured to cooperate with a second open end for selecting a size of the headband. For example, at least one projection may be arranged on the first open end and a plurality of cooperating slots may be arranged on the second open end. Optionally, the or each projection may be substantially hook-shaped. The cooperating slots may be configured to receive the or each projection for selecting the size of the headband. In this way, the size of the band may be adjusted according to the head shape and size of the wearer. That is,
25 a single design having a particular set of dimensions may be provided and adjusted so that it can fit a range of head shapes and sizes. The presence of the biasing element also allows the wearer to customise the amount of pressure applied by the cushioning portion by adjusting the size of the band.

30 Optionally, the attachment means may comprise a plurality of catch members configured to cooperate with a plurality of apertures on the visor to releasably attach the visor to the headband. In this way, the visor is readily releasable and can be replaced in a quick and easy manner. For example, the catch members may be substantially hook-shaped.

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Optionally, the catch members may be arranged in a channel formed on a lower surface of the front portion of the band such that the visor is insertable into the channel for attachment of the visor to the headband. In this way, the outer surface of the front portion of the band is free of significant features and therefore presents a surface for branding and/or labelling if so desired.

Optionally, the channel may form a boundary to guide the plurality of apertures on the visor into alignment with the plurality of catch members. Advantageously, this facilitates the replacement of the visor when necessary. For example, in use, upon insertion of the visor into the channel, the visor may contact at least one wall forming the channel to guide the plurality of apertures on the visor into alignment with the plurality of catch members.

Optionally, the band, the biasing element and the at least one cushioning portion may be one-piece and integrally formed. Advantageously, the one-piece design means that no complex assembly stages are required, thereby reducing the cost of manufacturing the headband.

Optionally, the band may have a substantially parallelogram-shaped cross-sectional profile.

According to a second aspect of the invention, there is provided a kits of parts comprising:

- a headband according to the first aspect; and
- a visor, wherein the visor comprises a transparent sheet sized to cover at least a portion of a human face.

The kit of parts may include a single visor or a plurality of visors.

According to a third aspect of the invention, there is provided a method of manufacturing a face shield headband, comprising the step of injection molding a headband described in the first aspect. Advantageously, an injection molded design is inexpensive to manufacture.

It will be appreciated that any feature described herein as being suitable for incorporation into one or more aspects or embodiments of the present invention is intended to be generalisable across any aspect or embodiment of the present disclosure.

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BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings illustrate presently exemplary embodiments of the disclosure, and together with the general description given above and the detailed
10 description of the embodiments given below, serve to explain, by way of example, the principles of the disclosure.

Figure 1 shows a headband in accordance with the first aspect of the present invention with a visor attached;

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Figure 2 shows a perspective top view of a headband in accordance with the first aspect of the present invention without a visor attached;

Figure 3 shows a perspective bottom view of the headband shown in Figure 2;

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Figure 4A shows a top view of a headband shown in Figure 2;

Figure 4B shows a cross-sectional view along A-A of the headband shown in Figure 4A; and

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Figure 5 shows a side on view of the headband shown in Figure 2.

DETAILED DESCRIPTION

30 The present invention provides a face shield headband, which can be worn in conjunction with a visor to protect a face of a wearer from airborne pathogens and flying debris or fluids. Headbands of the present invention may be used by healthcare professionals or by users in any hazardous environment, including hazardous material handling and sporting activities. Additionally, headbands of the
35 present invention may be coupled to or integrally formed with a protective hood or

other headtop assembly worn over a wearer's head and, optionally, neck and shoulders.

5 With reference to Figures 1 to 5, there is illustrated a face shield headband 10 according to an embodiment of the present invention. The face shield headband 10 comprises a band 12 having a front portion 14 and a strap portion 16. The front portion 14 of the band 12 includes an attachment means to allow a transparent sheet, also called a visor 18, to be releasably attached to the band 12. In use, the band 12 is worn around a wearer's head in order to maintain the position of the visor 10 18 in front of the wearer's face.

The attachment means may comprise a plurality of catch members 20 that are configured to cooperate with a plurality of apertures 21 on the visor 18. In use, the visor 18 is attached to the headband 10 by inserting each catch member 20 into its 15 corresponding aperture formed in the visor 18. Thus, the apertures 21 formed in the visor may be any suitable shape for receiving the catch member 20.

In the illustrated example shown in Figures 1 to 5, the catch members 20 are arranged in an internal channel 22 formed on a lower surface 24 of the front portion 20 14 of the band 12. In this context, the term 'lower' refers to the position of the surface 24 when the headband is orientated for use as shown in Figure 1, such that the visor is arranged in front of the wearer's face. By arranging the catch members 20 in the channel 22, the catch members 20 are obscured from view during normal use. In this way, an outer surface 26 of the front portion 14 of the band 12 is free of 25 any significant features and therefore presents a surface for branding or labelling if so desired. For example, the outer surface 26 may be branded using pad printing or labelled with the name of the wearer for ease of identification. As shown in Figure 3, the channel 22 extends along the lower surface 24 of the front portion 14 between a first wall 28 and a second wall 30. The catch members 20 extend inwardly from an 30 inner surface of the second wall 30 in a direction towards the centre of the headband 10. The catch members 20 shown are substantially hook-shaped but it should be appreciated that any suitable shape may be used that allows the visor 18 to be removably attached thereto. Similarly, while four catch members 20 are shown, it would be apparent to a person skilled in the art that any suitable number may be

used provided that the visor 18 is thereby attached to and suitably extends across the front portion 14 of the band 12.

5 The visor 18 is attached to the headband 10 by inserting the visor 18 into the channel 22 and aligning the catch members 20 with the corresponding apertures 21 on the visor 18. Once the catch members 20 are inserted in the apertures 21, the visor 18 is attached to the headband 10. The channel 22 may form a boundary to guide the plurality of apertures 21 on the visor 18 into alignment with the plurality of catch members 20. That is, upon insertion of the visor 18 into the channel 22, the
10 visor 18 may contact at least one wall forming the channel 22 to guide the plurality of apertures 21 on the visor 18 into alignment with the plurality of catch members 20.

In a normal operational orientation, an attached visor 18 extends downwardly from the band 12 and protects the wearer against airborne pathogens and/or fluids and
15 other debris traveling toward the wearer's face. The visor 18 may be made of a polymeric material, such as polylactic acid (PLA), polyvinyl chloride or polyethylene terephthalate, or other similar material. It is also contemplated that the visor 18 may be of any size or shape sufficient to protect the face of the wearer for the intended purpose. For example, the visor 18 may be substantially rectangular in
20 shape when disposed on a planar surface. In illustrated example shown in Figure 1, the visor is substantially A4-sized and extends downwardly from the front portion of the band to cover an entirety of the wearer's face. However, a person skilled in the art would readily appreciate that other lengths and shapes of the visor may also be employed. Additionally, the visor 18 should have a thickness suitable to provide
25 sufficient rigidity to protect the face of the wearer. For example, the visor 18 may have a thickness in the range of 100 μm to 1 mm.

After use, the visor 18 may be removed and a subsequent visor may be attached in the same manner described above. Thus, it should be appreciated that the visor is
30 changeable and the headband 10 may be re-used any number of times.

The headband 10 further comprises at least one cushioning portion 34. The cushioning portion(s) 34 are connected to and spaced apart from an inner surface of the front portion 14 of the band 12 by a biasing element. When the headband 10 is
35 worn by a wearer, the at least one cushioning portion 34 is positioned in engagement

with the wearer's forehead by the biasing element, which urges the at least one cushioning portion 34 towards the forehead of the wearer. That is, the biasing element is deformable between an extended state and a contracted state such that the position of the at least one cushioning portion is flexible. This offers the significant advantage of providing a common headband design to fit a wide variety of head shapes.

As such, the invention also provides a headband that is comfortable to wear, even for extended periods. This is possible as the pressure applied to the forehead of the wearer may be reduced compared to known face shields that have a rigid headband structure. The biasing element may also provide more clearance between the visor and the wearer's face compared to typical sponge-based designs. For example, headbands according to the present invention may provide a distance of at least 35 mm between the visor and the wearer's face. Thus, sufficient space is provided for glasses, protruding facial features and other forms of personal protective equipment (PPE) that may be worn on the face, such as goggles or mouth coverings. Advantageously, the clearance between the wearer's face and the visor also substantially reduces or prevents fog from building on the visor. Consequently, the need for anti-fog additives and/or coatings on the visor may be reduced or eliminated entirely. By reducing the need for additives and/or coatings, the visor may be more easily recycled.

The biasing element may comprise an elastically deformable element, which may be formed from the same material as the band 12 and/or the cushioning portion 34. For example, in the embodiments shown in Figures 1 to 5, the band 12, the biasing element and the cushioning portions 34 are one-piece and integrally formed. That is, the components of the headband are formed without joins or being coupled through attachment means, and are formed from the same material. In the embodiments shown, the headband 10 is injection molded from PLA. Advantageously, both the headband and the visor are formed from PLA, which is biodegradable and compostable. In other embodiments, the headband may be formed from another injection grade commodity polymer, such as polypropylene, polyethylene, acrylonitrile butadiene styrene or a biopolymer.

In the embodiments shown in Figures 1 to 5, the biasing element comprises elongated strips 36 that extend in a substantially arcuate configuration between the cushioning portion 34 and an inner surface 32 of the first wall 28. In the example shown, each cushioning portion is provided with two strips of the resilient material
5 but any suitable number may be used. When the headband is injection molded from PLA, the elongated strips 36 may have a thickness of 0.5 mm to 0.9 mm, which allows for good material flow into the tool, without being too rigid. The strips may have a length of 40 mm to 65mm and a width of 9 mm to 15mm. However, a person skilled in the art would readily understand that other suitable dimensions may be
10 selected when the headband is formed from a different polymer, having a different stiffness value. Additionally, the biasing element may be any suitable size and shape provided that it is resiliently deformable such that when the headband 10 is worn by the wearer, the cushioning portion 34 is urged into engagement with the forehead of the wearer.

The embodiments shown in Figure 1 to 5 include two cushioning portions 34 that are arranged to engage opposite sides of the forehead. This reduces the contact area between the headband 10 and the forehead of the wearer compared to existing face shield designs, which typically encircle the head in a continuous manner. Thus, the
20 headbands of the present invention may be cooler and therefore more comfortable to wear. This may be particularly beneficial for users who have skin allergies or skin conditions, such as eczema, which may be aggravated or triggered by physical contact and/or sweat. Further, arranging the cushioning portions 34 in an opposing configuration provides additional stability to help keep the headband 10 in place
25 during use. Thus, the headband 10 provides a high degree of comfort to the user without sacrificing the shielding performance. The cushioning portions 34 may additionally be provided with a cover member (not shown) for extra comfort. For example, the cover member may be formed from any textile or non-woven material.

The size of band 12 may also be adjustable to accommodate different head shapes. In particular, the strap portion 16 of the band 12 may comprise a first open end 38 that is configured to cooperate with a second open end 40 for selecting a size of the headband. For example, one or more projection(s) 42 may be arranged on the first
30 open end 38 and a plurality of cooperating slots 44 may be arranged on the second open end 40. The cooperating slots are configured to receive the projection 42 for
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selecting the size of the headband. Advantageously, this also allows a user to customise the amount of pressure applied by the cushioning portion 34 by adjusting the size of the band 12. In the illustrated embodiment, the first open end 38 includes a single projection 42 that is substantially hook-shaped. The cooperating slots 44 on the second open 40 end are substantially square-shaped.

As described above, the headband 10 may be formed by injection molding. The band itself has a substantially parallelogram-shaped cross-sectional profile, which presents a conical surface to the wearer's forehead. During manufacture, the parallelogram cross-sectional shape allows parts of the tooling to meet and shut-off where slots 44 are required. Similarly the parallelogram cross-sectional shape allows for a constant wall section, where normally draft would taper the part on both sides. This makes it easier to release the part from the tool despite it being thin walled. Additionally, the front portion 14 of the band 12 includes four cut-out portions 46 to allow for the tooling to penetrate this area and form the catch members 20 where the apertures 21 of the visor 18 are attached. The cut-out portions 46 also allow an extension component to be attached above the headband 10, for example, a browguard or the like (not shown).

An advantage of the injection molded design is that the headband 10 is relatively inexpensive to manufacture. However, a person skilled in the art would readily understand that other suitable fabrication methods and materials may also be employed to form the one-piece headband. For example, a 3D printing process may be used. In other embodiments, the headband may be formed from separate components and assembled using any suitable attachment means.

It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only and not in any limitative sense, and that various alterations and modifications are possible without departing from the scope of the invention as defined by the appended claims.

CLAIMS

1. A face shield headband, comprising:
 - a band configured to accommodate the head of a wearer, wherein the band
5 includes attachment means for releasably attaching a visor to a front portion of the band; and
 - at least one cushioning portion connected to and spaced apart from an inner surface of the band by a biasing element;
 - wherein the biasing element urges the cushioning portion into engagement
10 with the forehead of the wearer.
2. The headband according to claim 1, wherein the biasing element comprises an elastically deformable element.
- 15 3. The headband according to claims 1 or 2, wherein the biasing element comprises a plurality of strips of resilient material extending in a shaped configuration between the at least one cushioning portion and the inner surface of the band.
4. The headband according to claim 3, wherein the shaped configuration is
20 substantially arcuate.
5. The headband according to any one of the preceding claims, comprising at least two cushioning portions arranged to engage opposite sides of the forehead.
- 25 6. The headband according to any one of the preceding claims, wherein the band comprises a first open end configured to cooperate with a second open end for selecting a size of the headband.
7. The headband according to claim 6, wherein at least one projection is arranged
30 on the first open end and a plurality of cooperating slots configured to receive the at least one projection are arranged on the second open end for selecting the size of the headband.
8. The headband according to claim 7, wherein the or each projection is substantially
35 hook-shaped.

9. The headband according to any one of the preceding claims, wherein the attachment means comprise a plurality of catch members configured to cooperate with a plurality of apertures on the visor to releasably attach the visor to the headband.

10. The headband according to claim 9, wherein the catch members are arranged in a channel formed on a lower surface of the front portion of the band; and wherein the visor is insertable into the channel for attachment of the visor to the headband.

11. The headband according to claim 10, wherein the channel forms a boundary to guide the plurality of apertures on the visor into alignment with the plurality of catch members.

12. The headband according to claims 10 or 11, wherein, in use, upon insertion of the visor into the channel, the visor contacts at least one wall forming the channel to guide the plurality of apertures on the visor into alignment with the plurality of catch members.

13. The headband according to any one of claims 9 to 12, wherein the catch members are substantially hook-shaped.

14. The headband according to any one of the preceding claims, wherein the band, the biasing element and the at least one cushioning portion are one-piece and integrally formed.

15. The headband according to any one of the preceding claims, wherein the band has a substantially parallelogram-shaped cross-sectional profile.

16. A kits of parts comprising:
a headband according to any one of the preceding claims; and
a visor, wherein the visor comprises a transparent sheet sized to cover at least a portion of a human face.

17. A method of manufacturing a face shield headband, comprising the step of injection molding a headband according to any one of claims 1 to 15.



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Examiner: Gabriel Battcock

Claims searched: 1-17

Date of search: 29 September 2021

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	1-17	DE 202020102131 U (ONTARIO INC OPERATING MOLDED) WPI Abstract Accession Number 2020-57334A
A	-	JP 6793986 B (AKAMATSU) Figures 1, 2, 4; WPI Abstract Accession Number 2020-B9559A
A	-	DE 202020103575 U (SAINT-GOBAIN SEKURIT DEUT GMBH & CO KG) Figure 1, 4; WPI Abstract Accession Number 2020-82608S

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^X :

Worldwide search of patent documents classified in the following areas of the IPC

A41D; A42B; A61F

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

WPI, EPODOC, INTERNET

International Classification:

Subclass	Subgroup	Valid From
A41D	0013/11	01/01/2006