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(54) **Title:** FACE SHIELD

(57) **Abstract:** A face shield comprising a shield portion formed from a sheet (2) of transparent plastic, a fastening system (4, 6) adapted to secure the shield portion to a wearer's head such that the shield portion is positioned in front of the wearer's face, and a resilient brow pad (8) mounted adjacent an upper edge of the shield portion on an inner face thereof to rest against the wearer's forehead, wherein the brow pad incorporates a elastically deformable portion on at least one side of a central brow portion thereof adapted to elastically deflect and/or compress towards the wearer's head when the face shield is worn.

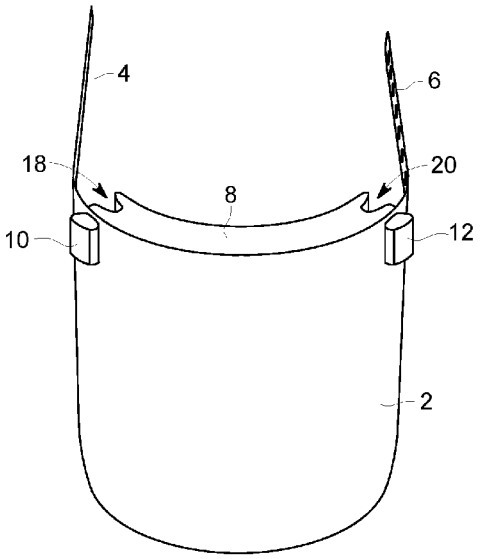

Figure 1

WO 2022/171498 A1

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Face Shield

FIELD OF THE INVENTION

The present invention relates generally to a face shield to be worn over the face to provide protection from liquid splashes and droplets, and more particularly to a face shield that can be readily cleaned to permit reuse and with improved fit.

BCKGROUND OF THE INVENTION

Medical professionals oftentimes must wear shields to protect themselves from liquid splashes, fluid droplets and other contaminants from a patient and also to reduce the transmission of fluid droplets from the wearer to other persons to thereby provide protection from air borne pathogens, such as COVID 19 and similar viruses and/or disease. These face shields are typically in the form of a large clear sheet of plastic that is positioned in front of the face and attached to head with a fastening system attached to the shield. The fastening system may comprise straps provided with hook and loop fasteners or an elastic strap. An open cell foam brow pad is typically adhesively affixed to an upper edge of an inner face of the shield to rest against the wearer's forehead, providing increased comfort and spacing the shield from the wearer's face.

While known face shields provide a great deal of protection, they are generally unduly complex to assemble and expensive and in particular cannot be adequately cleaned for reuse due to the mixture of different materials used to make the shield, fastening system and foam pad, in particular the absorbent open cell foam brow pad. Therefore known face shields tend to be disposed of after only a single use, particularly in medical environments where there is a greater risk of cross contamination.

In order to alleviate this problem is has been proposed to replace the open cell foam pad with a mould pad formed from closed cell foam that can does not absorb moisture and therefore is able to be readily cleaned and reused. However, such closed cell moulded material is less compressible that the prior art open cell foam

and therefore may lead to discomfort or a poor fit for the wearer, particularly where the strap used to retain the face shield on the wearer's head can only be adjusted in discrete steps. This problem may be solved by using an elasticated strap. However, such elasticated straps typically cannot be readily cleaned for reuse and add to the cost of complexity of the face shield.

SUMMARY OF THE INVENTION

According to the present invention there is provided a face shield comprising a shield portion formed from a sheet of transparent plastic, a fastening system adapted to secure the shield portion to a wearer's head such that the shield portion is positioned in front of the wearer's face, and a resilient brow pad mounted adjacent an upper edge of the shield portion on an inner face thereof to rest against the wearer's forehead, wherein the brow pad incorporates an elastically deformable portion on at least one side of a central brow portion thereof adapted to elastically deflect and/or compress towards the wearer's head when the face shield is worn.

The brow pad may incorporate elastically deformable portions on either side of the central brow portion thereof.

The or each elastically deformable portion may be defined by a reduced thickness portion of the brow pad.

In one embodiment the or each elastically deformable portion incorporates one or more voids to permit elastic deflection of said portion of at least a region of the elastically deformable portion towards the wearer's head when the face shield is worn. The or each void may be defined by an inwardly extending recess formed in a respective end of the brow pad. The or each void may comprise a V or U shaped recess formed in a respective end of the brow pad.

In an alternative embodiment the or each void may be defined by a recess formed in a rear face of the or each elastically deformable portion of the brow pad, the or each recess defining a gap between the respective elastically deformable portion and the wearer's head when the face mask is worn.

In one embodiment the or each void may comprise a hole extending through the or each elastically deformable portion.

In an alternative embodiment, the or each elastically deformable portion comprises a reduced thickness portion of the brow pad shaped to flare outwardly away from the wearer's head, in use.

Preferably the brow pad is pre-curved such that at least the brow portion thereof fits against the wearer's head.

The brow pad may be formed from self skinning foam, such as closed cell polyethylene foam. This allows the brow pad to be washed and prevents the brow pad from absorbing moisture.

Preferably the brow pad is releasably mounted on the shield portion by a detachable mounting system permitting removal of the brow pad from the shield portion to facilitate cleaning of the face shield following use. The detachable mounting system may comprise first and second projections formed respectively on a first face of said brow pad at or adjacent opposite ends thereof, wherein said projections are received in receiving apertures formed in said shield portion when said first face of the brow pad is placed against an inner face of the shield portion to thereby detachably secure the brow pad to the shield portion. Each receiving aperture in said shield portion comprises a rectangular window, said projections having a corresponding rectangular cross sectional shape. Said first and second projections may each comprise rearwardly extending tab portions adapted to retain the projections within the respective apertures in the shield portion once the brow pad has been attached to the shield portion.

Preferably the fastening system is integrally formed with the shield portion. The fastening system may comprise a pair of straps extending from opposing side edges of the shield portion, said straps being provided with fastening means to permit attachment of the straps to one another to form a band around the wearer's head, a first of said pair of straps being provided with a plurality of spaced apertures

along at least a portion of its length and a second of said pair of straps is provided with an integrally formed tab adapted to engage a selected one of said plurality of apertures to permit adjustment of the length of the fastening system.

The shield portion may be formed from Polyethylene terephthalate sheet material. An inner face of said shield portion may be coated with an anti-fog coating.

BRIEF DESCRIPTION OF THE DRAWINGS

Face shields in accordance with embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which :-

Figure 1 is a front perspective view of a face shield in accordance with a first embodiment of the present invention;

Figure 2 is a rear perspective view of the face shield of Figure 1;

Figure 3 is plan view of the face shield of Figure 1;

Figure 4 is a plan view of the brow pad of the face shield of Figure 1;

Figure 5 is a plan view the brow pad of a face shield in accordance with a second embodiment of the present invention;

Figure 6 is a plan view the brow pad of a face shield in accordance with a further embodiment of the present invention; and

Figures 7 to 22 illustrate brow pad of face shields incorporating elastically deformable portions in accordance with further embodiments of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

A face shield in accordance with a first embodiment of the present invention is illustrated in Figures 1 to 4. The face shield comprises a sheet of optically transparent plastic, preferably PET, defining a shield portion 2 to be positioned in front of the wearer's face and first and second integrally formed straps 4,6 extending respectively from opposite side edges of the shield portion 2 adjacent an upper edge of the shield portion 2.

Cut outs are formed in the first and second straps 4,6 to define an integrally formed fastening system to allow the straps 4,6 to be coupled together such that the face shield forms a band around the wearer's head. The first strap 4 may be provided with a plurality of transversely extending slots along its length and the second strap 6 may be provided with at least one tab adapted to engage a selected slot of the first strap 4 to adjustably connect the straps 4,6 together. By inserting the at least one tab of the second strap 6 into selected slots in the first strap 4 the circumference of the loop defined by the assembled face shield can be adjusted in a plurality of steps to suit the size of the wearer's head.

A resilient brow pad 8 is releasably attached to an upper portion of an inner face of the shield portion 2 to rest against the wearer's forehead, providing increased comfort and serving to space the shield portion 2 from the wearer's face as well as closing the gap between an upper side of the shield portion and the wearer's forehead. The brow pad 8 is preferably formed from a self skinning closed cell foam material such as closed cell cross-linked polyethylene foam. The self skinning nature of such materials provides the brow pad 8 with a smooth outer surface that it is impermeable to moisture and which can be readily cleaned and re-used.

The brow pad 8 may be formed by an injection moulding process and is includes a central brow portion shaped to provide a comfortable and flexible fit against the wearer's forehead while correctly spacing the shield portion 2 from the wearer's face and constraining the face shield 2 into the required curvature around the wearer's face.

In order to releasably secure the brow pad 8 to the shield portion 2, tabs 10,12 are integrally formed on an outer face of the brow pad 8, said tabs 10,12 being adapted

to be inserted through respective receiving apertures formed in the shield portion 2. When it is required to clean the face shield for reuse, the shield portion 2 and brow pad 8 can be manipulated to remove the tabs 10,12 from the receiving apertures in the shield portion 2 and thereby detach the brow pad 8 from the shield portion 2.

The integrally formed fastening system of the face shield, comprising cooperating slots and tabs on the first and second straps 4,6, provides a stepped adjustment of the circumference of the assembled face shield. However, the relative firmness of the closed cell foam brow pad 8 compared to prior art open cell foam brow pads provides less "give" in the brow pad and therefore can lead to a poor fit where the straps are too loose or uncomfortable pressure on the wearer's head where the straps are too tight.

In order to provide enhanced resilience while ensuring a good seal between the wearer's forehead and the shield portion 2, the brow pad 8 is provided with elastically deformable portions on either side of the central brow portion thereof, at least one region of each of said elastically deformable portions being adapted to elastically deflect or compress towards the wearer's head when the face shield is worn.

In the embodiment show in Figures 1 to 4, each elastically deformable portion incorporates a respective V or U shaped recess 18,20 formed in the outer ends of the brow pad 8 and extending towards the centre of the brow pad. Each V or U shaped recess 18,20 defines a void permitting elastic deflection of a respective outer wall portion 14,16 towards the wearer's head when the face shield is worn, thereby taking up any slack in the fit of the face shield without placing undue pressure on the wearer's head and/or outward deflection of the respective inner wall portions 15,17 of the recesses 18,20 away from the wearer's head.

In a second embodiment, illustrated in Figure 5, each elastically deformable portion of the brow pad 8 of the face shield is defined by a recess 22,24 formed in a rear face the brow pad 8 adjacent each end of the brow pad 8 on either side of the brow portion thereof, each recess 22,24 defining a gap between the respective wing and the wearer's head when the face mask is worn. Such gaps, along with the reduced

thickness of the elastically deformable portions 26,28 compared to the remainder of the brow pad 8, allow the wing portions 26,28 to elastically deflect towards the wearer's head when the face shield is worn, thereby taking up any slack in the fit of the face shield without placing undue pressure on the wearer's head.

In a further embodiment, illustrated in Figure 6, each elastically deformable portion 30,32 of the brow pad 8 is defined by a reduced thickness portion of the brow pad 8, each elastically deformable portion 8 being flared outwardly away from the wearer's head, in use, allowing the wing portions to elastically deflect towards the wearer's head when the face shield is worn, thereby taking up any slack in the fit of the face shield without placing undue pressure on the wearer's head.

Further embodiments of the invention are illustrated in Figures 7 to 22, showing elastically deformable portions having a number of different shapes. The embodiments shown in Figures 7, 8, 10,11,12 and 20 incorporate differently shaped V or U shaped recesses in the ends of the brow pad. The embodiments in Figures 9, 14, 15 to 18, 21 and 22 incorporate differently shaped reduced thickness portions defining the elastically deformable portions of the brow pad 8. In the embodiments shown in Figures 13 and 19, the elastically deformable portions incorporate through holes to provide the desired compressibility of said portions.

The face shields described above have a number of advantages over the prior art. The single piece shield portion with the integrally formed straps can be cheaply and easily manufactured and the fastening system, utilising cut outs in the straps to define a buckle assembly, greatly eases assembly of the face shield.

The readily removable brow pad can be easily removed from the shield portion to facilitate cleaning and reuse of the face shield. The pre-curved brow portion of the brow pad provides an effective, reliable and comfortable seal between the top edge of the face shield and the wearer's head while the integrally formed elastically deformable portions on either end of the brow pad provide enhanced comfort by facilitating elastic deflection of the elastically deformable portions towards the wearer's head when the face shield is worn, thereby taking up any slack in the fit of the face shield without placing undue pressure on the wearer's head.

The invention is not limited to the embodiments described herein but can be amended or modified without departing from the scope of the present invention as defined by the appended claims.

CLAIMS

1. A face shield comprising a shield portion formed from a sheet of transparent plastic, a fastening system adapted to secure the shield portion to a wearer's head such that the shield portion is positioned in front of the wearer's face, and a resilient brow pad mounted adjacent an upper edge of the shield portion on an inner face thereof to rest against the wearer's forehead, wherein the brow pad incorporates an elastically deformable portion on at least one side of a central brow portion thereof adapted to elastically deflect and/or compress towards the wearer's head when the face shield is worn.

2. A face shield as claimed in claim 1, wherein the brow pad incorporates an elastically deformable portion on each side of the central brow portion thereof.

3. A face shield as claimed in claim 1 or claim 2, wherein the or each elastically deformable portion is defined by a reduced thickness portion of the brow pad.

4. A face shield as claimed in any preceding claim, wherein the or each elastically deformable portion incorporates one or more voids to permit elastic deflection of at least a region of said elastically deformable portion towards the wearer's head when the face shield is worn.

5. A face shield as claimed in claim 4, wherein the or each void is defined by recess formed in a respective end of the brow pad.

6. A face shield as claimed in claim 5, wherein the or each void comprises a V or U shaped recess formed in a respective end of the brow pad.

7. A face shield as claimed in claim 4, wherein the or each void is defined by a recess formed in a rear face of the or each elastically deformable portion of the brow pad, the or each recess defining a gap between the respective elastically deformable portion of the brow pad and the wearer's head when the face mask is worn.

8. A face shield as claimed in claim 4, wherein the or each void comprises a hole extending through the or each elastically deformable portion.

9. A face shield as claimed in claim 3, wherein the or each elastically deformable portion comprises a reduced thickness end portion of the brow pad shaped to flare outwardly away from the wearer's head, in use.

10. A face shield as claimed in any preceding claim, wherein said brow pad is pre-curved such that at least the brow portion thereof fits against the wearer's head.

11. A face shield as claimed in any preceding claim, wherein said brow pad is formed from self skinning foam.

12. A face shield as claimed in claim 11, wherein said brow pad is formed from closed cell polyethylene foam.

13. A face shield as claimed in any preceding claim, wherein the brow pad is releasably mounted on the shield portion by a detachable mounting system permitting removal of the brow pad from the shield portion to facilitate cleaning of the face shield following use.

14. A face shield as claimed in claim 13, wherein said detachable mounting system comprises first and second projections formed respectively on a first face of said brow pad at or adjacent opposite ends thereof, wherein said projections are received in receiving apertures formed in said shield portion when said first face of the brow pad is placed against an inner face of the shield portion to thereby detachably secure the brow pad to the shield portion.

15. A face shield as claimed in claim 14, wherein each receiving aperture in said shield portion comprises a rectangular window, said projections having a corresponding rectangular cross sectional shape.

16. A face shield as claimed in claim 14 or claim 15, wherein said first and second projections each comprise rearwardly extending tab portions adapted to retain the

projections within the respective apertures in the shield portion once the brow pad has been attached to the shield portion.

17. A face shield as claimed in any preceding claim, wherein the fastening system is integrally formed with the shield portion.

18. A face shield as claimed in claim 17, wherein the fastening system comprises a pair of straps extending from opposing side edges of the shield portion, said straps being provided with fastening means to permit attachment of the straps to one another to form a band around the wearer's head, a first of said pair of straps being provided with a plurality of spaced apertures along at least a portion of its length and a second of said pair of straps is provided with an integrally formed tab adapted to engage a selected one of said plurality of apertures to permit adjustment of the length of the fastening system.

19. A face shield as claimed in any preceding claim, wherein said shield portion is formed from Polyethylene terephthalate sheet material.

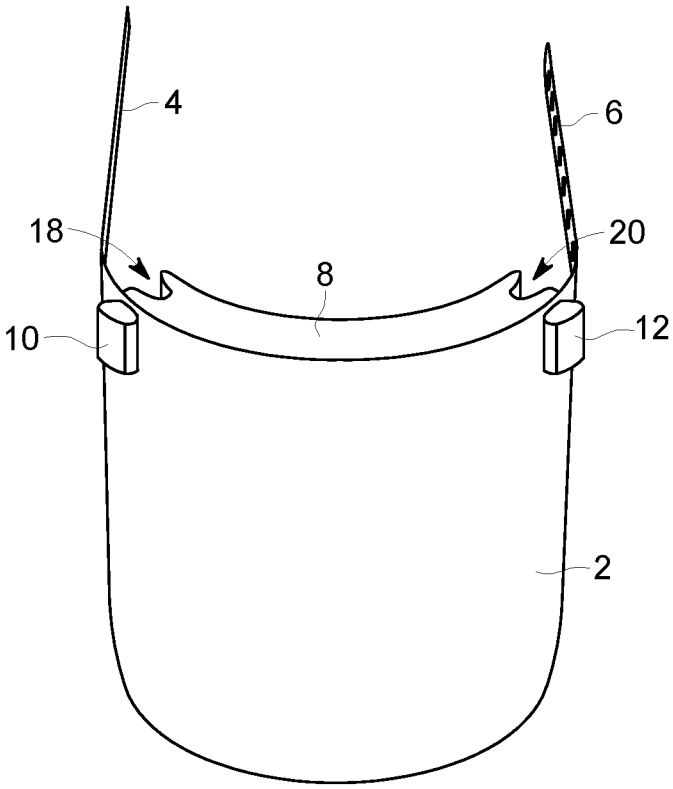


Figure 1

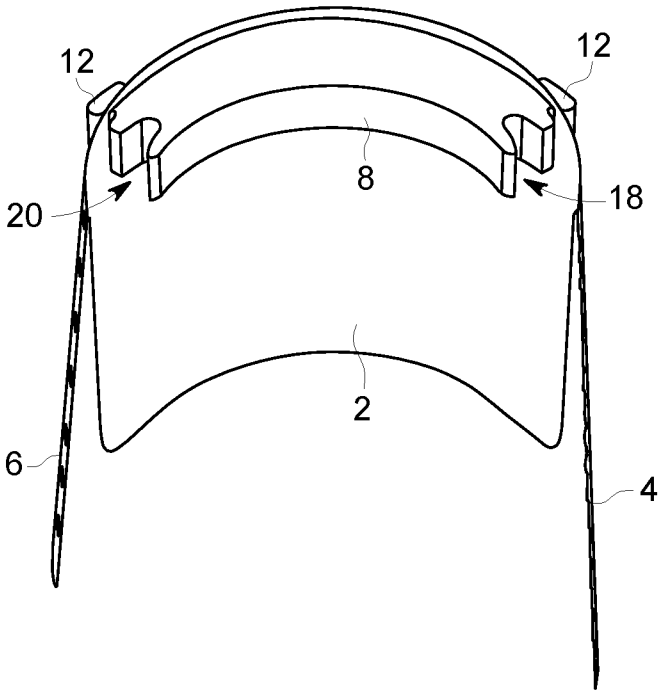


Figure 2

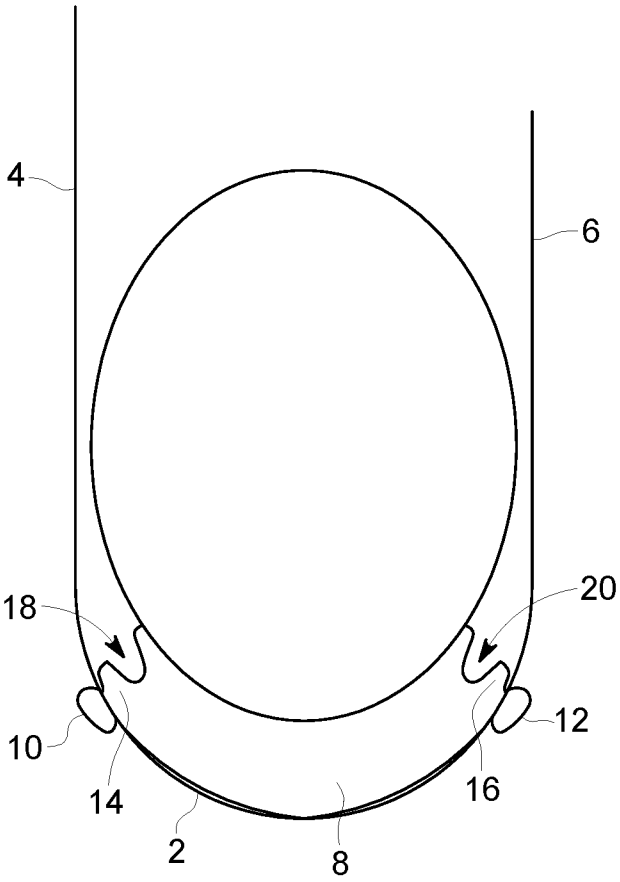


Figure 3

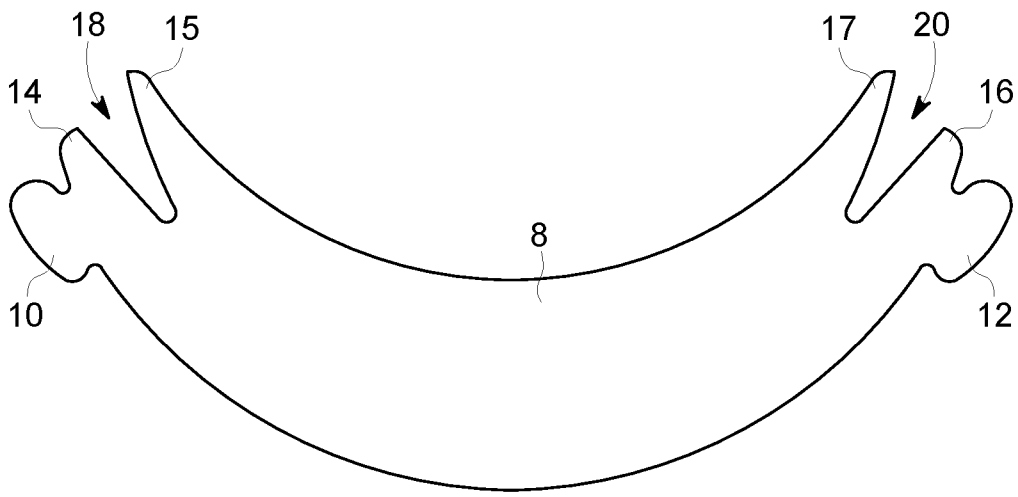
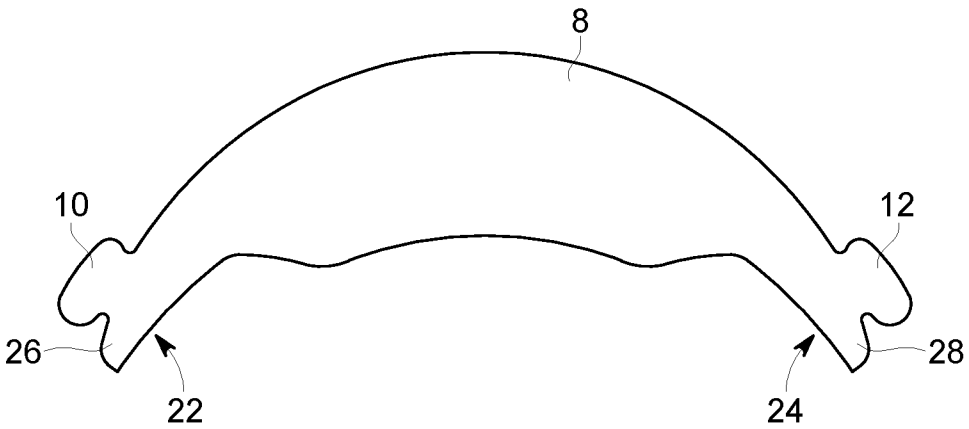


Figure 4



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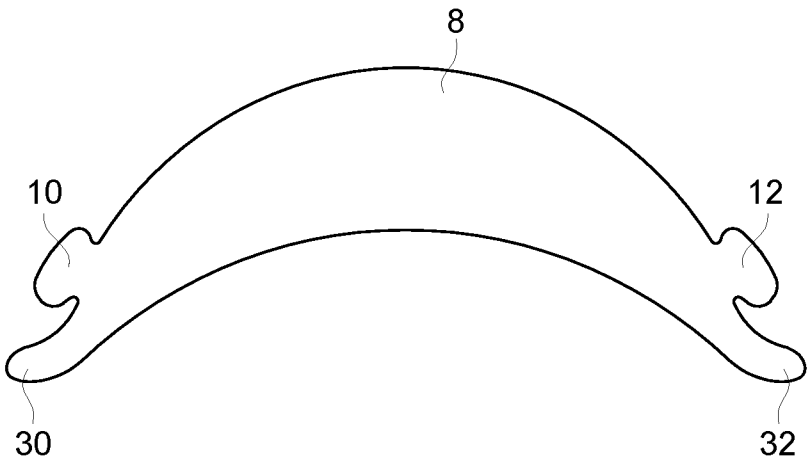

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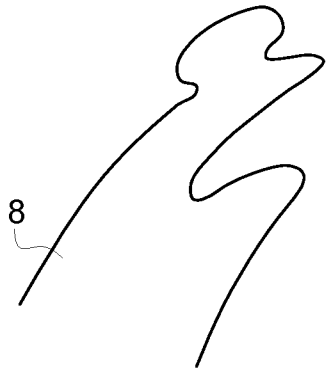


Figure 7

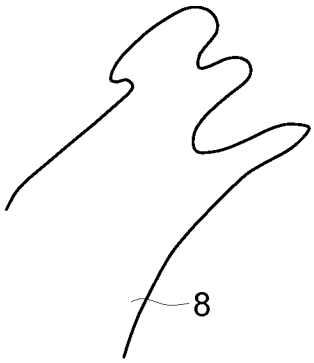
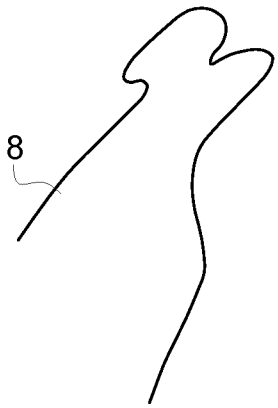


Figure 8



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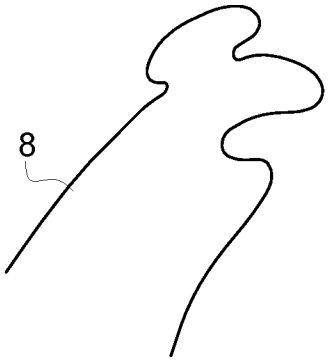

Figure 10

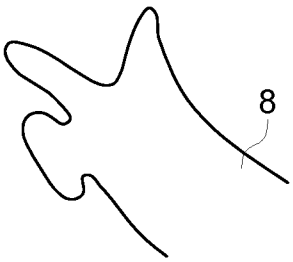

Figure 11

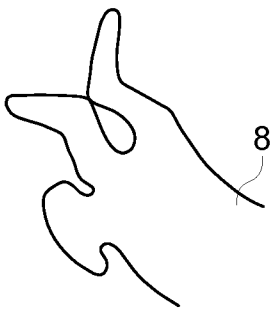

Figure 12

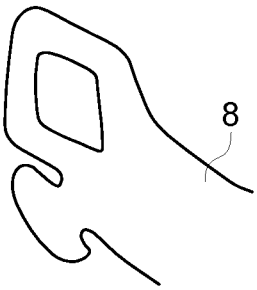

Figure 13

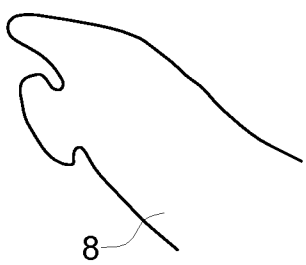

Figure 14

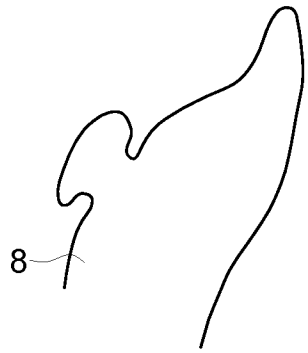

Figure 15

Figure 16

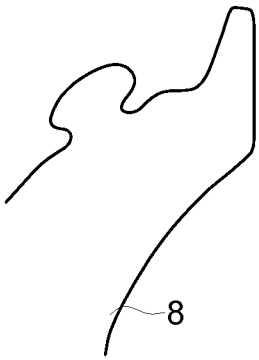

Figure 17

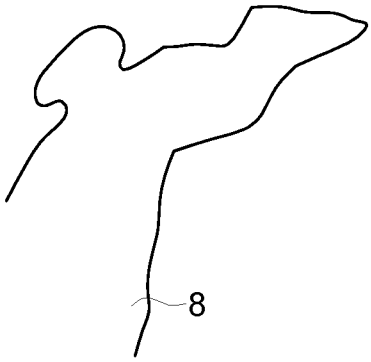

Figure 18

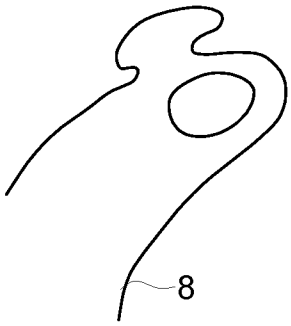

Figure 19

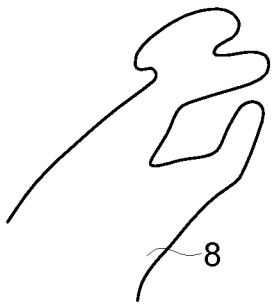

Figure 20

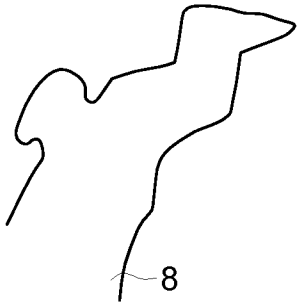

Figure 21

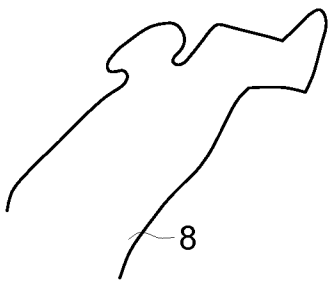

Figure 22

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2022/052458

A. CLASSIFICATION OF SUBJECT MATTER
INV. A41D13/11
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A41D A44C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2020 103575 U1 (SAINT-GOBAIN SEKURIT DEUTSCHLAND GMBH & CO KG [DE]) 22 July 2020 (2020-07-22)	1-16,19
A	the whole document	17,18

X	GB 2 585 974 A (RAMFOAM LTD [GB]) 27 January 2021 (2021-01-27)	1-3, 9-16,19
A	the whole document	4-8,17, 18

X	DE 20 2020 001406 U1 (PACCOR PACKAGING GMBH [DE]) 16 June 2020 (2020-06-16)	1,2, 11-13, 17-19
A	the whole document	3-10, 14-16

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
26 April 2022	09/05/2022

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Dewaele, Karl

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2022/052458

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 4 852 185 A (OLSON DAVID V [US]) 1 August 1989 (1989-08-01)	1-5, 8-12,19
A	the whole document	6,7, 13-18

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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		EP 3892142 A1	13-10-2021
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