



US 20160324228A1

(19) **United States**

(12) **Patent Application Publication**  
**Ito et al.**

(10) **Pub. No.: US 2016/0324228 A1**

(43) **Pub. Date: Nov. 10, 2016**

(54) **SHIELD AND EYE PROTECTION METHOD**

**Publication Classification**

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(51) **Int. Cl.**  
**A41D 13/11** (2006.01)

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(52) **U.S. Cl.**  
CPC ..... **A41D 13/1184** (2013.01); **A41D 13/1161** (2013.01); **A41D 2500/30** (2013.01)

(21) Appl. No.: **15/110,970**

(22) PCT Filed: **Jan. 27, 2015**

(86) PCT No.: **PCT/US2015/013062**

§ 371 (c)(1),

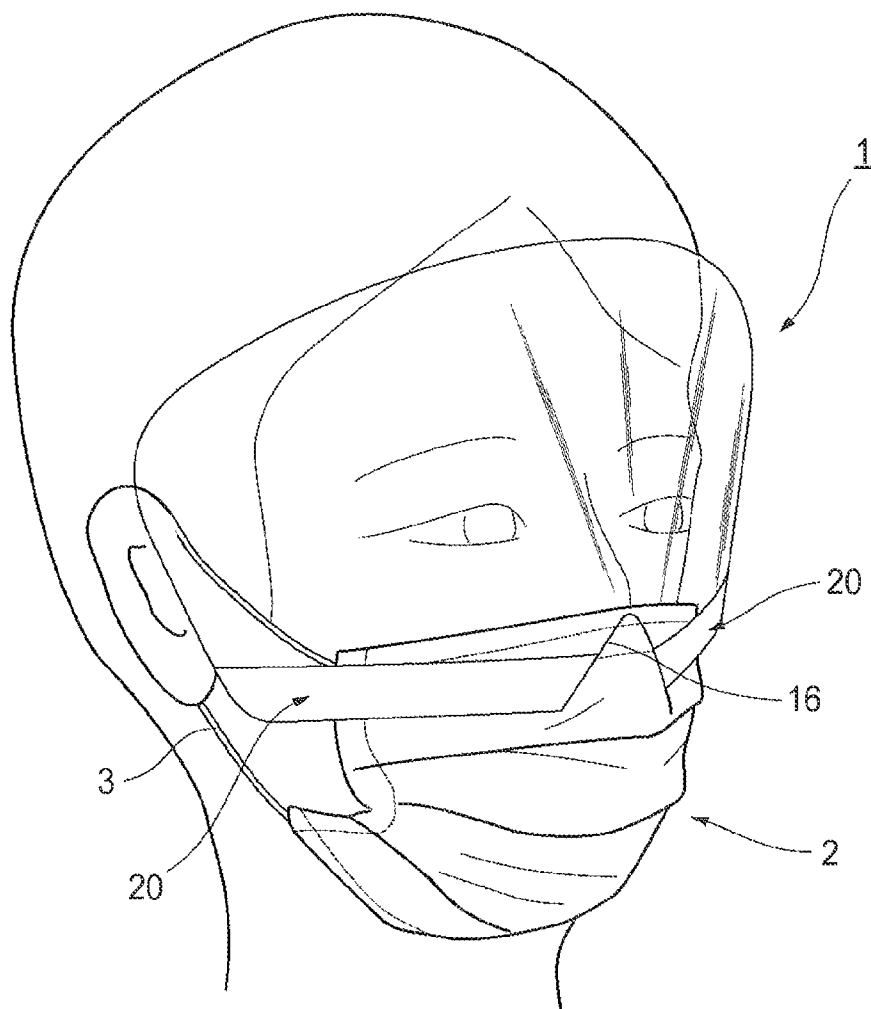
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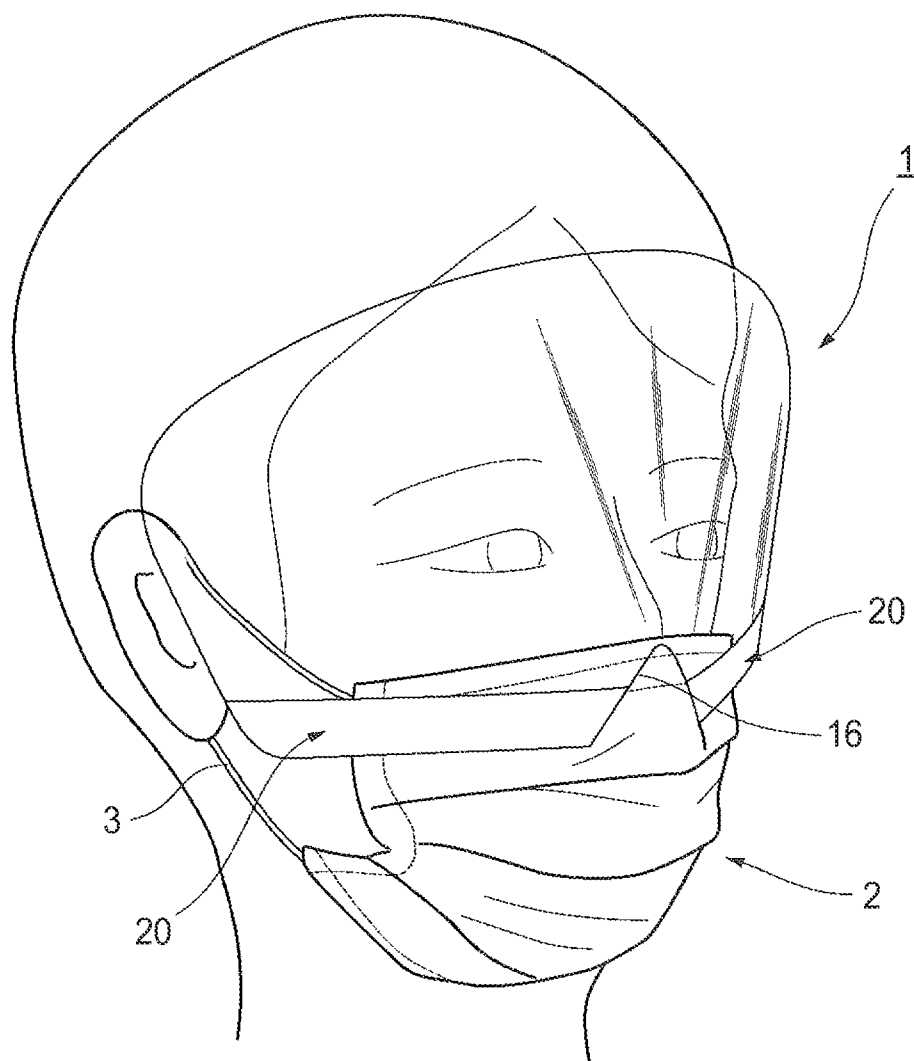
(57) **ABSTRACT**

Problem: To provide a shield and an eye protection method where it is possible to improve the convenience of handling. Resolution Means: A shield (1) for protecting the eyes of a user wearing a non-woven mask (2) is provided with an attachment section (E1) formed on a lower edge section (12) side of the shield (1), overlapping with the non-woven mask (2), and attached to the non-woven mask (2), and with an eye protection section (E2) formed on an upper edge section (11) side of the shield (1) and capable of protecting the eyes of the user, a linking section (20), which is fixed to be able to be attached and detached to and from the non-woven mask (2), being formed on the attachment section (E1).

(30) **Foreign Application Priority Data**

Jan. 31, 2014 (JP) ..... 2014-016795





*FIG. 1*

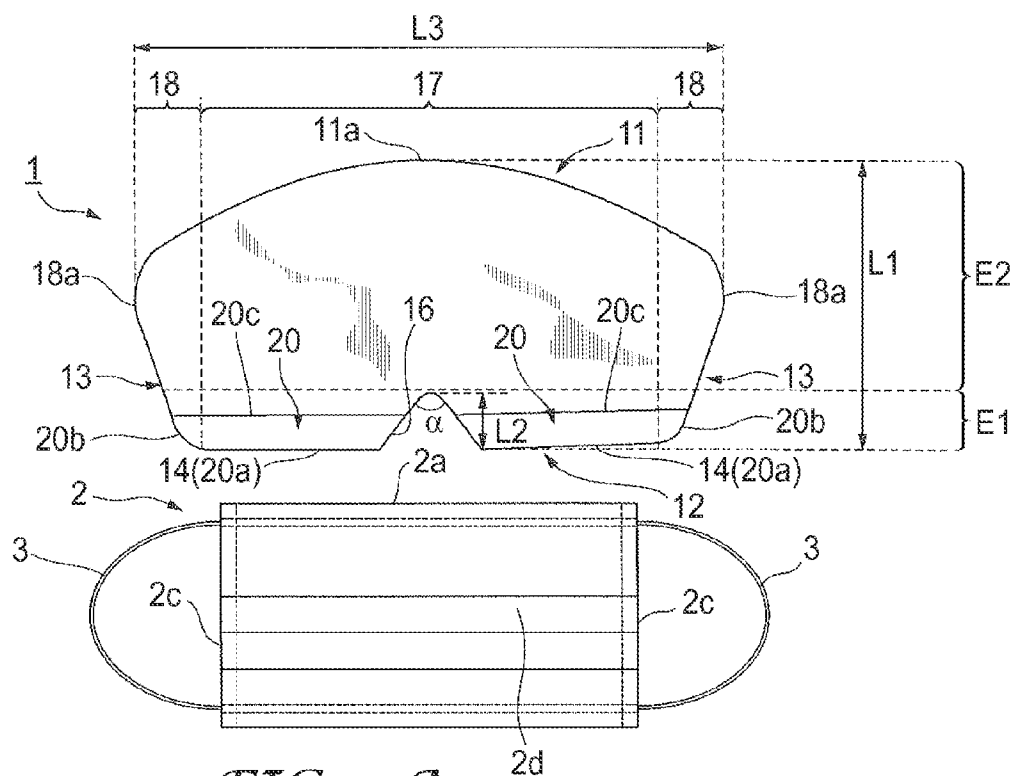


FIG. 2A

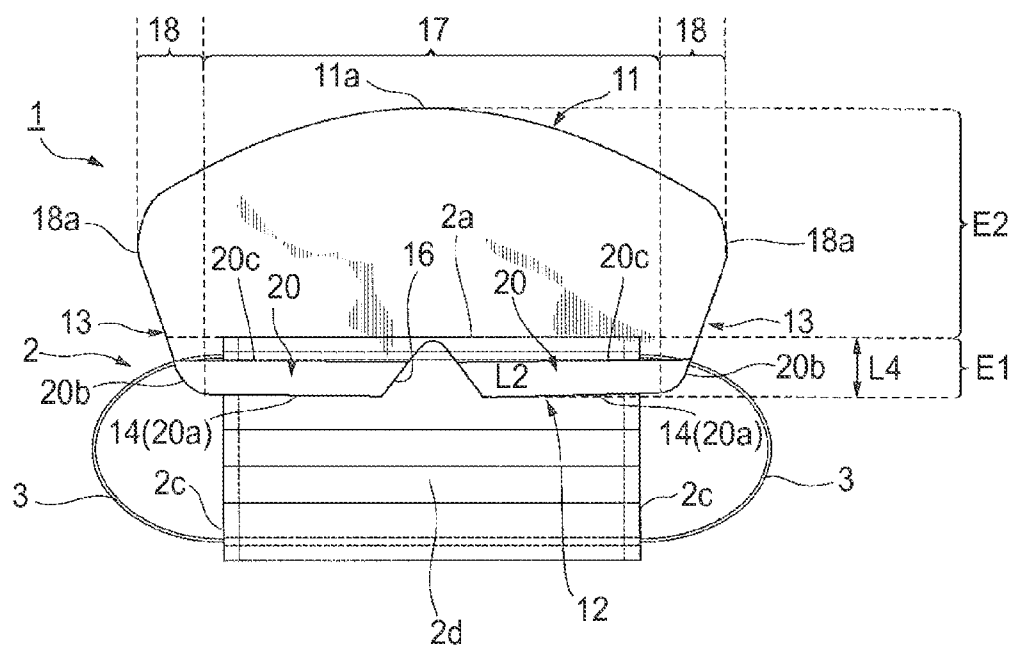
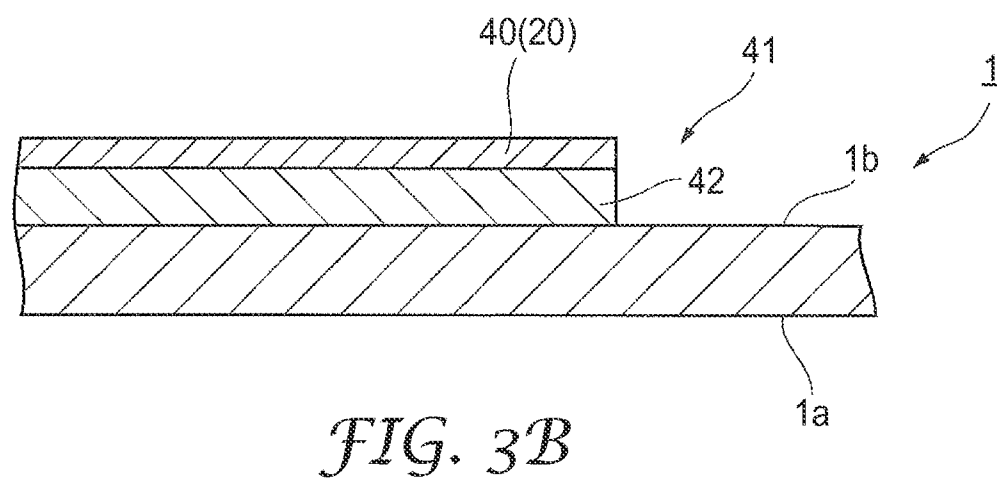
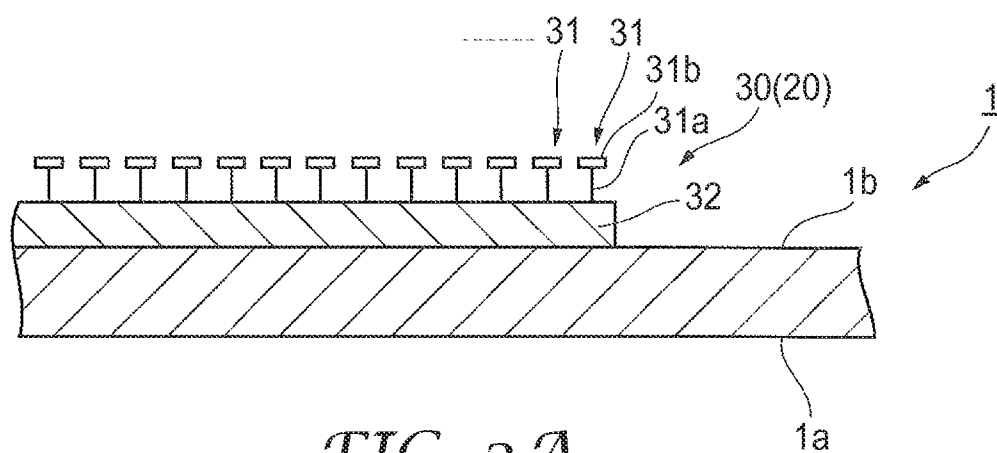


FIG. 2B



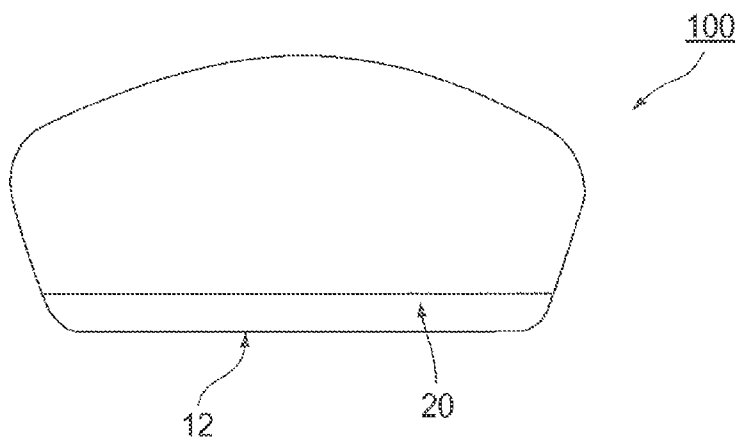


FIG. 4A

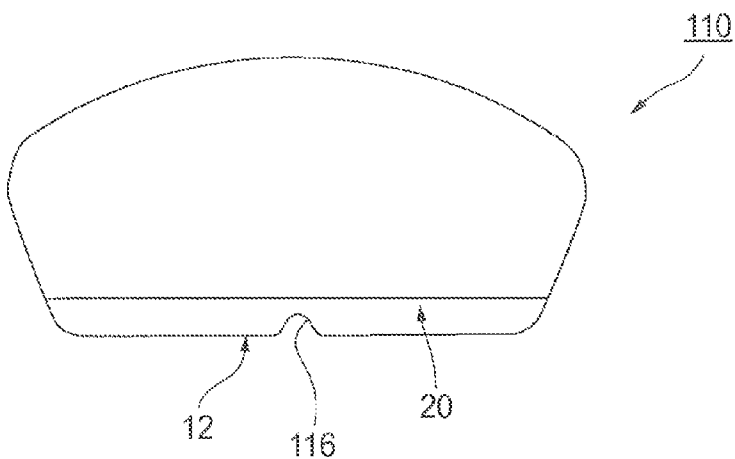


FIG. 4B

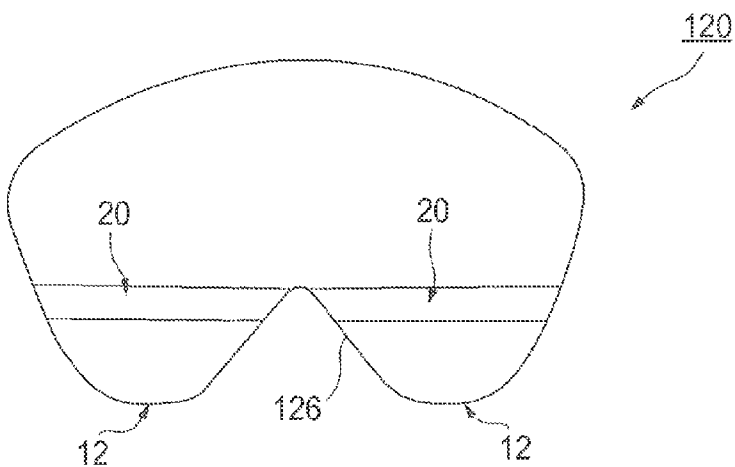


FIG. 4C

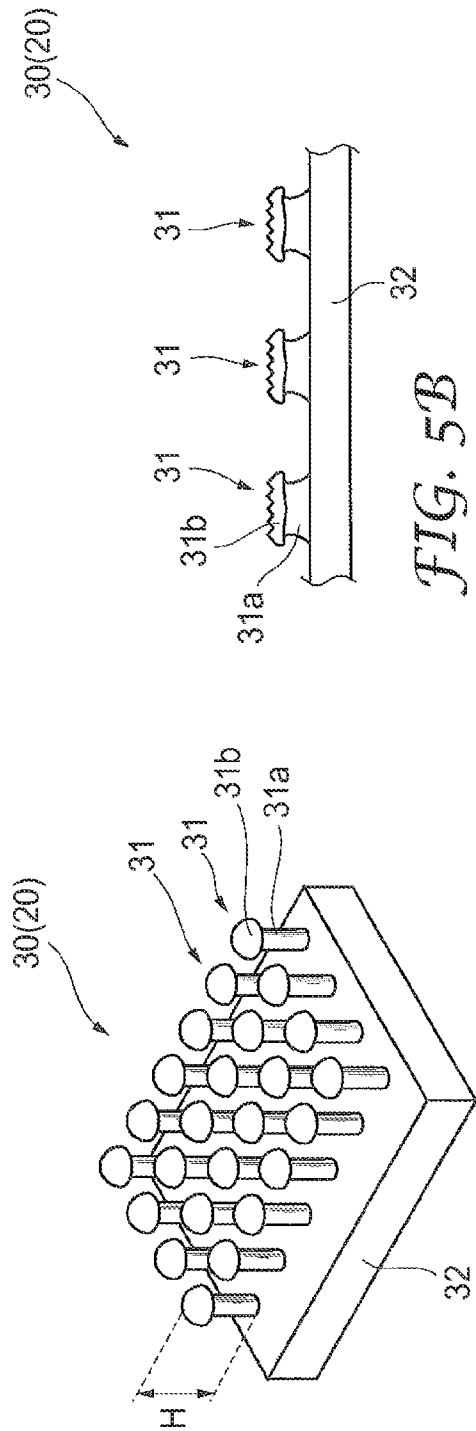


FIG. 5A

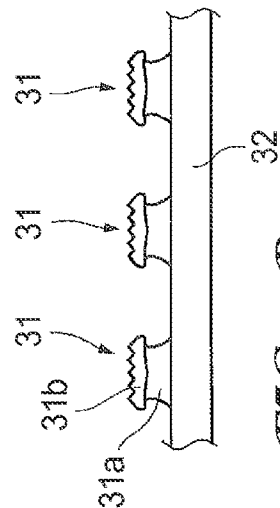


FIG. 5B

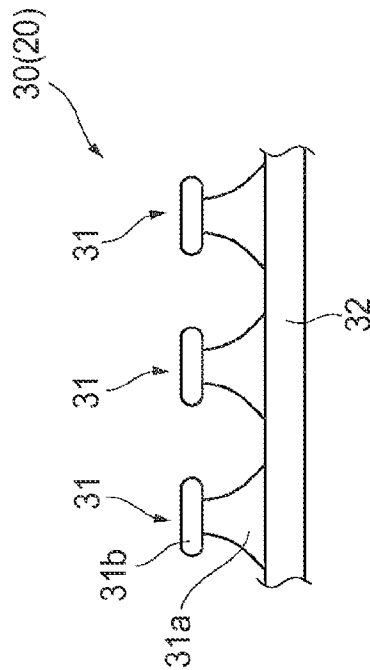
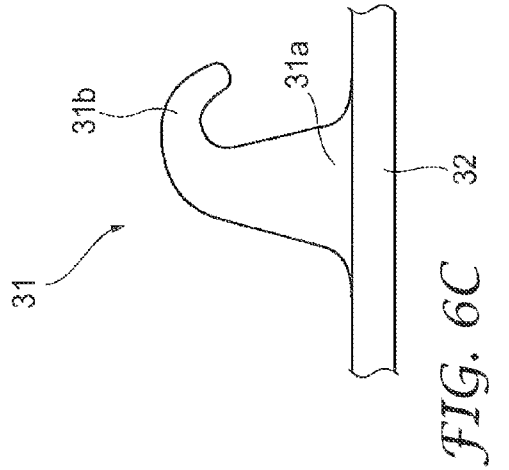
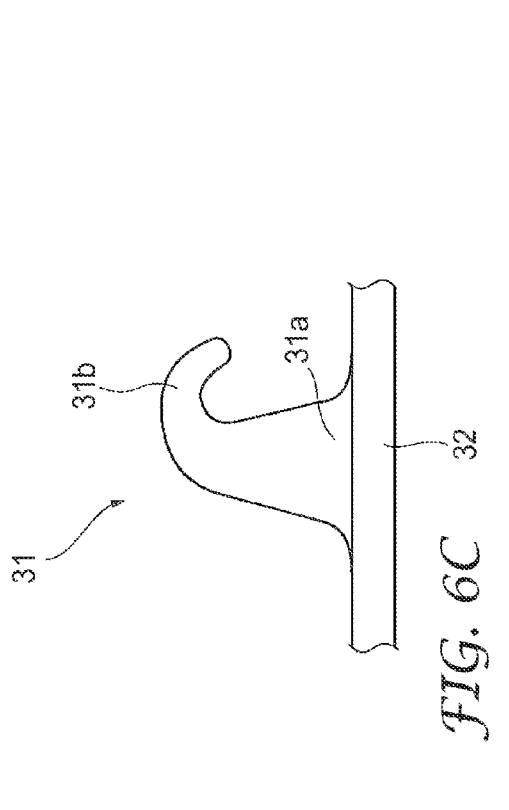
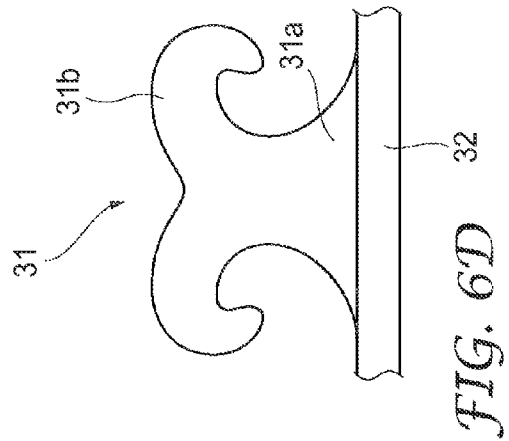
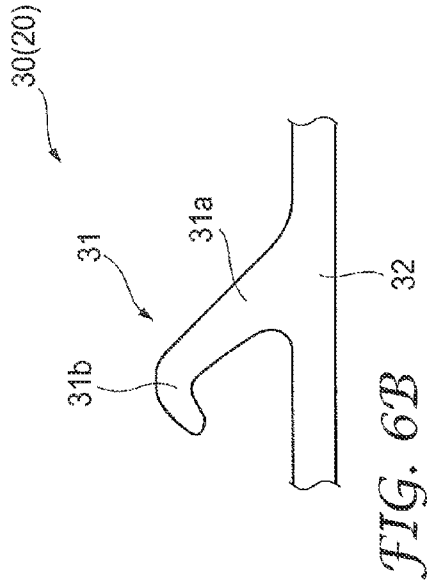


FIG. 5C



## SHIELD AND EYE PROTECTION METHOD

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Japanese Application No. 2014-016795, filed Jan. 31, 2014, the disclosure of which is incorporated by reference in its entirety herein.

### FIELD OF THE INVENTION

[0002] An aspect of the present invention relates to a shield for a mask and an eye protection method.

### SUMMARY OF THE INVENTION

[0003] A shield according to one aspect of the present invention protects the eyes of a user wearing a non-woven mask and includes an attachment section formed on a lower edge section side of the shield, overlapping with the non-woven mask, and attached to the non-woven mask, and an eye protection section formed on an upper edge section side of the shield and capable of protecting the eyes of the user, where a linking section, which is fixed to be able to be attached and detached to and from the non-woven mask, is formed on the attachment section.

[0004] According to this aspect, a linking section, which is fixed to be able to be attached and detached to and from the non-woven mask, is formed on the attachment section on the lower edge section side of the shield. Due to this, when the attachment section is made to overlap with the non-woven mask, the shield is attached to the non-woven mask by the linking section being fixed to be able to be attached and detached to and from the non-woven mask. With such a configuration, it is possible for the shield to be attached without detaching the non-woven mask from the face in a state where the non-woven mask is worn by the user. Accordingly, when the user performs work where it is necessary to protect the eyes, the shield may be attached to the non-woven mask which is already being worn and only the shield may be detached after the work is finished in a state where the non-woven mask is being worn. In addition, it is possible to handle the shield as a member which is independent from the mask. Due to the above, it is possible to improve the convenience of handling of the shield for protecting the eyes.

[0005] In a shield according to another aspect, the linking strength of the linking section with respect to the non-woven mask may be 0.05 N or more.

[0006] In a shield according to another aspect, the linking section may comprise a mechanical engagement means having engagement elements.

[0007] In a shield according to another aspect, the linking section may comprise an adhesive.

[0008] In a shield according to another aspect, the adhesive may have a characteristic having a linking strength of 1.5 N or less with respect to the non-woven mask.

[0009] In a shield according to another aspect, a notch section may be formed in the lower edge section at a position which corresponds to a portion which covers the nose in the non-woven mask.

[0010] In a shield according to another aspect, the linking section may be formed at a position which corresponds to at least both end sections in the width direction of the non-woven mask.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective view illustrating a state when a shield according to an embodiment of the present invention is used.

[0012] FIG. 2A is a front view illustrating a state before attaching the shield according to the embodiment of the present invention to a non-woven mask.

[0013] FIG. 2B is a front view illustrating a state where the shield according to the embodiment of the present invention is attached to the non-woven mask.

[0014] FIG. 3A is a schematic cross-sectional view of a case of adopting a mechanical engagement means as a linking section.

[0015] FIG. 3B is a schematic cross-sectional view of a case of adopting an adhesive as the linking section.

[0016] FIGS. 4A to 4C are diagrams illustrating shields according to modified examples.

[0017] FIGS. 5A to 5C are diagrams illustrating examples of the mechanical engagement means.

[0018] FIGS. 6A to 6D are diagrams illustrating examples of the mechanical engagement means.

## DETAILED DESCRIPTION

[0019] Embodiments of the present invention will now be described in greater detail below with reference to the attached drawings. In the following description, the same or the equivalent elements are given the same reference number, and duplicate descriptions are omitted. Here, the terms “upper” and “lower” will be used in the following description with reference to the state when a user is wearing a shield and a non-woven mask.

[0020] FIG. 1 is a perspective view illustrating a state when a shield 1 according to the present embodiment is used. FIG. 2A is a front view illustrating a state before attaching the shield 1 according to the present embodiment to a non-woven mask 2. FIG. 2B is a front view illustrating a state where the shield 1 according to the present embodiment is attached to the non-woven mask 2. As illustrated in FIG. 1 and FIGS. 2A and 2B, the shield 1 is attached to be able to be attached and detached to and from the non-woven mask 2 for covering the periphery of the mouth and nose of the user and is a member for covering the periphery of the eyes of the user.

[0021] The non-woven mask 2 is formed of a mask member with a rectangular shape and may comprise a single member or a multi-layer member. In addition, a flexible metal insert (which is not illustrated in the diagram) may be provided along the edge section 2a on the bridge of the nose. Rubber strings 3 for hooking on the ears are attached at both edge sections 2c and 2c in the width direction (the long side direction) of the non-woven mask 2. Here, the manner of attaching the non-woven mask 2 is not particularly limited, and the mask need not be a type hooked over the ears, but may be a type where a string is tied behind the head. The front surface 2d of the non-woven mask 2 is a surface where the shield 1 is attached. In the non-woven mask 2, at least the front surface 2d comprises a non-woven fabric. However, a part of the mask member constituting the non-woven mask 2 may include a member other than the non-woven fabric.

[0022] The shield 1 is a member protecting the eyes of the user wearing the non-woven mask 2. The shield 1 is provided with an attachment section E1 formed on a lower edge section 12 side of the shield 1, overlapping with the non-

woven mask 2, and attached to the non-woven mask 2, and with an eye protection section E2 formed on an upper edge section 11 of the shield 1 and being able to protect the eyes of the user. The shield 1 has the attachment section E1 on the lower edge section 12 side overlapping with the front surface 2d of the non-woven mask 2 and is attached to be able to be attached and detached in a state where the non-woven mask 2 is worn by a person A linking section 20 fixed to be able to be attached and detached to and from the non-woven mask 2 is formed on the attachment section E1. The shield 1 is formed of a transparent planar member having flexibility. Polyester, acrylic acid resin, polycarbonate, polystyrene, and the like are used as the material of the shield 1. A polymer film forming the shield 1 has a thickness of 0.05 mm to 0.25 mm, most preferably a thickness of 0.1 mm, and imparts a desired flexibility to the shield 1. The term “flexibility” has the meaning that the modulus of elasticity of the material which forms the shield 1 is approximately 400 MPa to 7,000 MPa, preferably approximately 1,200 MPa to 5,000 MPa, and most preferably approximately 1,350 MPa to 3,500 MPa.

[0023] Description will be given of the shape of the shield 1 according to the present embodiment. However, the shape and size of the shield 1 according to the present embodiment is only an example, and as long as the shield 1 has a configuration which is able to be attached to the non-woven mask 2 and which is able to protect the eyes of the user, any kind of configuration may be used. As illustrated in FIGS. 2A and 2B, the shield 1 has a lower edge section 12 which is an edge on the side which is linked with the non-woven mask 2 (in other words, the lower side in a state where the non-woven mask 2 is used), an upper edge section 11 which is an edge on the opposite side to the lower edge section 12 (in other words, a tip end section on the upper side in a state where the non-woven mask 2 is used), and both edge sections 13 and 13 which are the edges of the non-woven mask 2 in the width direction. The upper edge section 11 extends along the width direction of the shield 1 so as to draw an arc so as to protrude to the opposite side to the lower edge section 12 at a position which is separated from the edge section 2a of the non-woven mask 2 when attached. A dimension L1 between an apex 11a (the point which is separated to be furthest from the edge section 2a of the non-woven mask 2) of the upper edge section 11 and the lower edge section 12 is not particularly limited; however, the dimension L1 is set to 100 to 150 mm. An extending section 14 which extends along the width direction is formed in the lower edge section 12 of the shield 1 and a notch section 16 with a V shape is formed at the central position in the width direction. In other words, the notch section 16 is formed in the lower edge section 12 of the shield 1 at a position which corresponds to a portion which covers the nose in the non-woven mask 2. A depth dimension L2 of the notch section 16 is not particularly limited; however, the dimension L2 is set to 10 to 25 mm. In addition, an angle  $\alpha$  of the notch section 16 is not particularly limited; however, the angle  $\alpha$  is set to 45° to 135°. The extending section 14 is formed on both sides in the width direction to interpose the notch section 16 in the central position. In the present embodiment, the extending section 14 extends to the outside from both the edge sections 2c and 2c of the non-woven mask 2 when attached. In addition, both the edge sections 13 and 13 extend at an angle so as to widen toward the upper edge section 11 side. The shield 1 is partitioned into a base

section 17 provided at a position which corresponds to both eyes of the user and which is a region near the central position in the width direction and lateral sections 18 provided at both sides of the base section 17 in the width direction. The lateral sections 18 are configured so as to extend toward the ears of the user when used. A dimension L3 between the tip end sections 18a and 18a of the lateral sections 18 in the width direction, in other words, the total length of the shield 1 in the width direction, is not particularly limited; however, the dimension L3 is set to 180 to 350 mm. In the shield 1, at least the region closer to the lower edge section 12 than the central position in the up and down direction is defined as the attachment section E1. In addition, the region closer to the upper edge section 11 side than the attachment section E1 is defined as the eye protection section E2.

[0024] Description will be given of the linking section 20 of the shield 1. The linking section 20 is for attaching the shield 1 to the non-woven mask 2 by linking with the non-woven mask 2. The linking section 20 is able to release the link with the non-woven mask 2 and it is possible to detach the shield 1 from the non-woven mask 2 by this releasing. In addition, the linking section 20 may be able to repeatedly perform the linking and releasing with respect to the non-woven mask 2. In such a case, the shield 1 is able to be repeatedly attached and detached with respect to the non-woven mask 2. In addition, the shield 1 is fixed to the non-woven mask 2 by the linking section 20 with a strength (a linking strength) of a degree which is able to attach the shield 1 to the non-woven mask 2 to be able to be attached and detached to and from the non-woven mask 2 in a state where the non-woven mask 2 is worn by a person. By having such a linking strength, the shield 1 has a configuration which is able to be attached to the non-woven mask 2 via the linking section 20 in a state where the non-woven mask 2 is worn by the user, and which is able to be detached from the non-woven mask 2 in a state where the non-woven mask 2 is worn by the user. The linking strength of the linking section 20 is set to be a strength of a degree that the shield 1 does not fall off when the linking section 20 of the shield 1 is linked with the non-woven mask 2 while the user is wearing the non-woven mask 2. Here, it is preferable that the linking strength be set to a strength at which the shield 1 does not fall off even in a case where the user moves his/her head while performing work in a state where the shield 1 is attached to the non-woven mask 2. In addition, the linking strength is set to a strength of a degree where it is possible to detach the shield 1 by pulling the shield 1 in a state where the user is wearing the non-woven mask 2 without applying excessive force. In addition, the linking strength may be set to a strength of a degree where it is possible to detach the shield 1 without causing excessive damage (for example, tearing or ripping of the non-woven mask 2, excessive fluffing on the surface, or the like) to the non-woven mask 2 when the shield 1 is detached.

[0025] The linking section 20 is formed in the attachment section E1 of the shield 1. In addition, the linking section 20 is formed on the rear surface (the surface which is opposite to the eyes of the user when being worn) of the shield 1. The linking section 20 is configured by fixing a flat member, which is able to link with respect to the non-woven mask 2, to the rear surface of the attachment section E1 of the shield 1. In the present embodiment, the linking section 20 is formed so as to extend along the extending section 14 of the

lower edge section 12. The linking section 20 is configured so as to extend in a band shape having a predetermined width. The width of the linking section 20 may be set to approximately 90 to 110 mm and the total length of the linking section 20 may be set to approximately 180 to 220 mm (in the present embodiment, since the linking section 20 is divided into two by the notch section 16, the total length refers to both parts). In the present embodiment, the edge section 20a on the lower side of the linking section 20 coincides with the extending section 14 of the lower edge section 12 of the shield 1 and the end sections 20b and 20c of the linking section 20 coincide with the edge sections 13 and 13 of the shield 1. With such a configuration, the linking section 20 is formed at a position which corresponds to substantially the entirety of the non-woven mask 2 in the width direction including a position which corresponds to both end sections of the non-woven mask 2 in the width direction.

[0026] When attaching the shield 1 to the non-woven mask 2, the attachment section E1 of the shield 1 overlaps with the front surface 2d of the non-woven mask 2 and the linking section 20 is pushed onto and links with the front surface 2d of the non-woven mask 2. Here, the size of the attachment section E1 (the amount of overlap between the shield 1 and the non-woven mask 2), in other words, where the linking section 20 links with the front surface 2d of the non-woven mask 2 (to what extent the position is separated from the edge section 2a of the non-woven mask 2) is not particularly limited as long as it is within a range where it is possible to sufficiently cover the eyes of the user with the shield 1. For example, a dimension L4 of the attachment section E1 which is a region where the shield 1 overlaps with the non-woven mask 2 may be set to approximately 15 to 50 mm (refer to FIG. 2B). However, it is not necessary for a boundary line between the attachment section E1 and the eye protection section E2 to be precisely defined on the product. At least a region closer to the lower edge section 12 side than the upper edge section 20c of the linking section 20 may function as the attachment section E1. Here, a visible mark indicating the attachment section E1 (in other words, a visible mark illustrating a guide to what extent the shield 1 overlaps with the non-woven mask 2) may be illustrated on the shield 1. In addition, depending on the method of attachment by the user, a part of the eye protection section E2 may overlap with the non-woven mask 2. It is preferable that the shield 1 be positioned such that the center line of the shield 1 in the width direction and the center line of the non-woven mask 2 in the width direction substantially coincide. In addition, it is preferable that the notch section 16 be positioned at a position which corresponds to the portion which covers the nose in the non-woven mask.

[0027] As long as it is possible to link with the front surface 2d of the non-woven mask 2, it is possible to adopt any configuration as the configuration of the linking section 20. In detail, it is preferable that the linking strength of the linking section 20 with respect to the non-woven mask 2 be 0.05 N or more. For example, as illustrated in FIG. 3A, the linking section 20 may comprise a mechanical engagement means 30. Examples of the mechanical engagement means 30 include a hook-and-loop fastener (a mechanical fastener), and the like. The mechanical engagement means 30 has a structure where a plurality of engagement elements (hooks) 31 are integrally formed with a base material 32 and each of the engagement elements 31 is directly provided on the base

material 32. The rear surface of the base material 32 of the mechanical engagement means 30 (a surface which is opposite to the surface where the engagement elements 31 are formed) is fixed to a rear surface 1b of the shield 1 by adhesive, bonding material, or the like. The fixing strength of this portion is at least higher than the linking strength of the linking section 20 with respect to the non-woven mask 2. Here, from the point of view of suppressing damage to the non-woven mask 2 during detachment without excessively increasing the linking strength and carrying out the fixing so as to be able to be attached and detached with respect to the non-woven mask 2, it is preferable that the mechanical engagement means 30 be adopted where the linking strength with respect to the non-woven mask 2 is 0.05 N or more. On the other hand, the upper limit of the linking strength is not particularly limited and it is generally possible to use a mechanical engagement means 30 which can be normally used with respect to non-woven fabric by persons skilled in the art. Here, in some aspects, the upper limit of the linking strength may be 1.5 N or less.

[0028] Here, the “linking strength” described herein is a value measured in the following manner. First, the non-woven mask 2 and the shield 1 overlap such that the width direction of the non-woven mask 2 and the width direction of the shield 1 are parallel to each other. At this time, at least a portion of the linking section 20 overlaps with the non-woven mask 2. After that, a cylindrical roller with a smooth surface and having a mass of 1 kg moves back and forth twice to link the non-woven mask 2 and the shield 1. Next, in a state where the non-woven mask 2 is fixed to a jig, the shield 1 is pinched by a clip of a tensile tester and is peeled off so as to be lifted off in a direction at 90° with respect to the non-woven mask 2 at a speed of 300 mm/min. The force which is necessary at this time is defined as the “linking strength of the linking section with respect to the non-woven mask”.

[0029] As illustrated in FIG. 3A, the engagement elements 31 of the present embodiment are provided with a column section 31a extending from the base material 32 and a head section 31b formed at the tip end of the column section 31a. The shape of the engagement elements 31 is not particularly limited, but may be appropriately set based on the dimensions (the length and the width) and the degree of stretchability of the mechanical engagement means 30. For example, as illustrated in FIG. 5A, the engagement elements 31 may be provided with the column section 31a with a cylindrical shape and the head section 31b with a hemispherical shape. Here, the head section 31b may be provided with a plurality of grooves on a circular plate as illustrated in FIG. 5B, or may have a circular plate shape as illustrated in FIG. 5C. Alternatively, as illustrated in FIG. 6A, the engagement elements 31 may be provided with the column section 31a with a prism shape and the head section 31b with an arrowhead shape. In addition, as illustrated in FIG. 6B, the engagement elements 31 may be provided with the column section 31a which extends obliquely upward and the head section 31b which bends obliquely downward from the tip end of the column section 31a. In addition, as illustrated in FIG. 6C, the engagement elements 31 may be provided with the column section 31a which extends upward and the head section 31b which extends so as to curve to one side in the lateral direction from the upper end of the column section 31a and may form the shape of a J as a whole. In addition, as illustrated in FIG. 6D, the engagement elements

**31** may be provided with the column section **31a** which extends upward and the head section **31b** which extends so as to curve to both sides in the lateral direction by being divided into a fork from the upper end of the column section **31a**.

**[0030]** The height of the engagement elements **31** may be 0.25 to 0.75 mm or may be 0.38 to 0.68 mm. In addition, the density of the engagement elements **31** may be 900 to 2400 elements/inch<sup>2</sup>, or may be 900 to 1600 elements/inch<sup>2</sup>. Here, the “height of the engagement elements **31**” indicates the distance from the surface of the base material **32** to the top portion (the highest position) of the head section **31b** of the engagement element **31** and, for example, is a dimension illustrated by H in FIG. 5A. In this range, regardless of the shape of the engagement elements **31**, it is possible to secure an appropriate linking strength which is required as the linking section **20** of the shield **1**. In addition, when attaching the shield **1** in a state where the user is wearing the non-woven mask **2**, it is possible to carry out the linking with light pressure without excessively pressing the linking section **20** to the non-woven mask **2**. In addition, the shield does not peel off even if the user shakes his/her head in a state where the shield **1** is attached to the non-woven mask **2**. In addition, at the time of detachment, it is possible for the user to detach the shield **1** with a pulling force needing only one hand. In addition, it is possible to not leave visible damage on the non-woven mask at the time of detachment. In a case where the obtained linking strength is lower than the numerical range described above, it is difficult to maintain the state where the shield **1** is attached to the non-woven mask **2**. In a case where the obtained linking strength is higher than the numerical range described above, there is a possibility that the non-woven mask **2** will be damaged when detaching the shield **1**.

**[0031]** The material of the mechanical engagement means **30** having stretchability is a thermoplastic resin or the like and examples of the material include a mixture of polypropylene resin (PP) and polyethylene resin (PE), or ethylene-vinyl acetate copolymer (EVA) resin. In a case of using the mixture of PP and PE, PP and PE may be mixed in a weight ratio of approximately 95:5 to 30:70. When the amount of PP exceeds the upper limit, the PP characteristic becomes dominant and there is a tendency for the engagement elements to harden. In contrast, when the amount of PP is less than the lower limit, the engaging force of the engagement elements is weakened. PP may be either of a homopolymer or a copolymer. Examples of PE include low density polyethylene (LDPE), high density polyethylene (HDPE), linear low density polyethylene (LLDPE), and the like.

**[0032]** In addition, as illustrated in FIG. 3B, the linking section **20** may comprise an adhesive **40**. In detail, the linking section **20** may comprise a tape **41** provided with a layer of the adhesive **40**. In the tape **41**, the layer of the adhesive **40** is provided on the base material **42**. The rear surface of the base material **42** of the tape **41** (the surface opposite to the layer of the adhesive **40**) is fixed to the rear surface **1b** of the shield **1**. The fixing strength of this portion is at least higher than the linking strength between the linking section **20** and the non-woven mask **2**. For example, double-sided tape may be used as the tape **41**. The rear surface of the base material **42** (the surface opposite to the surface where the layer of the adhesive **40** is formed) is fixed to a rear surface **1b** of the shield **1** by an adhesive, a bonding material, or the like. The fixing strength of this portion is at

least higher than the linking strength of the linking section **20** with respect to the non-woven mask **2**. The adhesive **40** may have a characteristic having an adhesive strength of 0.05 N or more with respect to the non-woven mask **2** or may have a characteristic having an adhesive strength of 0.05 to 1.5 N. As the adhesive **40**, for example, acrylic-based adhesives, synthetic rubber-based adhesives, and silicon-based adhesives are used. In this range, it is possible to secure an appropriate linking strength which is required as the linking section **20** of the shield **1**. In addition, when attaching the shield **1** in a state where the user is wearing the non-woven mask **2**, it is possible to carry out the linking with light pressure without excessively pressing the linking section **20** to the non-woven mask **2**. In addition, the shield does not peel off even if the user shakes his/her head in a state where the shield **1** is attached to the non-woven mask **2**. In addition, at the time of detachment, it is possible for the user to detach the shield **1** with a pulling force needing only one hand. In addition, it is possible to not leave visible damage on the non-woven mask at the time of detachment. In a case where the obtained linking strength is lower than the numerical range described above, it is difficult to maintain the state where the shield **1** is attached to the non-woven mask **2**. In a case where the obtained linking strength is higher than the numerical range described above, there is a possibility that the non-woven mask **2** will be damaged when detaching the shield **1**.

**[0033]** Next, the action and effect of the shield **1** according to the present embodiment will be described.

**[0034]** Here, in the related art, a mask with a shield, in which the shield is fixed by fusing or the like to the mask, for protecting the eyes is known. Such a mask with a shield is used in the medical sites such as in hospitals. For example, packages each having a plurality of masks with a shield stacked with each other are placed on a rack or the like in a hospital and the user takes out the mask with a shield from the package and wears the mask when performing work where the eyes are protected. However, in the site of health care, the user will already be wearing a normal type mask in many cases and it is necessary to detach the normal type mask to wear the mask with a shield. In addition, after the work where eye protection is necessary is finished, it is necessary to detach the whole mask with a shield and put on the normal mask again. In addition, the area of the mask with a shield is larger compared to the area of a normal mask and there is a demand to improve the convenience of handling.

**[0035]** On the other hand, according to the shield **1** according to the present embodiment, the linking section **20** fixed to be able to be attached and detached to and from the non-woven mask **2** is formed on the attachment section E1 on the lower edge section **12** side of the shield **1**. Due to this, when the attachment section E1 of the shield **1** overlaps with the front surface **2d** of the non-woven mask **2**, the shield **1** is attached to the non-woven mask **2** by the linking section **20** being fixed to the front surface **2d** of the non-woven mask **2** so as to be able to be attached and detached. With such a configuration, it is possible for the shield **1** to be attached without detaching the non-woven mask **2** from the face in a state where the user is wearing the non-woven mask **2**. Accordingly, when the user performs work where it is necessary to protect the eyes, the shield may be attached to the non-woven mask **2** which is already being worn and only the shield **1** may be detached after the work is finished in a state where the non-woven mask **2** is being worn. In

addition, it is possible to handle the shield as a member which is independent from the mask. Accordingly, in a case where a plurality of the shields 1 is packaged by being stacked with each other, it is possible to make the package of the masks with a shield more compact than in the related art.

[0036] In addition, since the shield 1 according to the present embodiment is a member which is independent from the non-woven mask 2, for example, it is possible to discard only the non-woven mask 2 and store the shield 1 or it is possible to continue to use the non-woven mask 2 and discard only the shield 1. In addition, for example, in a case where the shield and the mask are fixed using a clip or the like, it is necessary to prepare the clip as a separate member; however, since the linking section 20 is fixed to the shield 1 itself in the present embodiment, it is not necessary to prepare a separate member such as the clip. Due to the above, it is possible to improve the convenience of handling of the shield for protecting the eyes.

[0037] In addition, in the shield 1 according to the present embodiment, the linking strength of the linking section 20 with respect to the non-woven mask 2 may be 0.05 N or more. Due to this, it is possible to reliably attach the shield 1 to the non-woven mask 2 without the shield 1 being peeled off easily.

[0038] In the shield 1 according to the present embodiment, the linking section 20 may comprise the mechanical engagement means 30 which has the engagement elements 31. In such a case, since it is difficult for the linking strength to be lowered even after repeated use, it is possible to repeatedly use the shield 1 while the non-woven mask 2 is being worn. In addition, since it is possible to easily detach the shield 1 from the non-woven mask 2, it is possible to provide safe eye protective equipment for health care workers which is easy to dispose of. Then, without using a release sheet unlike an adhesive, after the shields 1 are stacked with each other and put into a package, it is possible to place the package onto a rack or the like. For this reason, an action of peeling off and throwing away a release sheet each time the shield 1 is used is not necessary and it is possible to provide protective equipment for protecting the eyes which is accessible for health care workers.

[0039] In addition, in the shield 1 according to the present embodiment, the linking section 20 may comprise the adhesive 40. In such a case, there is an effect in that the peeling sound is minimized when the shield 1 is detached from the non-woven mask 2. In addition, since it is possible to easily detach the shield 1 from the non-woven mask 2, it is possible to provide safe eye protective equipment for health care workers which is easy to dispose of.

[0040] In addition, in the shield 1 according to the present embodiment, the linking strength of the adhesive 40 with respect to the non-woven mask 2 may be 1.5 N or less. In such a case, it is possible to provide eye protective equipment able to be repeatedly used while the non-woven mask 2 is being worn without causing excessive raising in the non-woven fabric.

[0041] In addition, in the shield 1 according to the present embodiment, the notch section 16 is formed in the lower edge section 12 at a position which corresponds to a portion which covers the nose in the non-woven mask 2. Accordingly, when the user attaches the shield 1 in a state where the non-woven mask 2 is being worn, it is possible to carry out the attaching by aligning the position of the notch section 16

of the shield 1 with the position of the nose. According to the above, it is possible to easily align the positions when attaching the shield 1.

[0042] In addition, in the shield 1 according to the present embodiment, the linking section 20 is formed at a position which corresponds to at least both end sections in the width direction of the non-woven mask 2. Due to this, for example, compared to a case where the linking section 20 is formed only at the central position in the width direction of the non-woven mask 2, it is possible to attach the shield 1 to the non-woven mask 2 so as to be well-balanced.

[0043] In addition, the eye protection method according to the present embodiment is for protecting the eyes of the user wearing the non-woven mask 2, in which the shield 1 having the linking section 20 which is fixed so as to be able to be attached and detached to and from the non-woven mask 2 is attached to the non-woven mask 2 via the linking section 20 and the eyes are protected with the shield 1. By using such a method, it is possible to achieve actions and effects similar to the shield 1 described above.

[0044] In addition, in the eye protection method according to the present invention, the shield 1 is attached to the non-woven mask 2 in a state of being worn by the user and the shield 1 is detached from the non-woven mask 2 in a state of being worn by the user. Due to this, it is possible for the user to easily protect his/her eyes.

[0045] The present invention is not limited to the embodiment described above.

[0046] The shape and size of the shield 1 and the shape and size of the linking section 20 according to the embodiment described above are merely one example and may be appropriately changed. For example, as in a shield 100 illustrated in FIG. 4A, the entirety of the lower edge section 12 may extend straight without a notch section being formed in the lower edge section 12. In accordance with this, the linking section 20 is also formed on the shield 100 so as to extend straight along the lower edge section 12. In addition, a notch section 116 which is smaller than the notch section 16 illustrated in FIGS. 2A and 2B may be formed as in a shield 110 illustrated in FIG. 4B. The depth dimension of the notch section 116 is smaller than the width of the linking section 20. Accordingly, the linking section 20 is configured as a single continuous member without being divided at the position of the notch section 116. In addition, a notch section 126 which is larger than the notch section 16 illustrated in FIGS. 2A and 2B may be formed as in the shield 100 illustrated in FIG. 4C. In addition, the position where the linking section 20 is formed may be separated from the lower edge section 12. In the example illustrated in FIG. 4C, the linking section 20 is formed at a position which corresponds to the valley portion of the V-shape in the notch section 126 and is separated from the lower edge section 12 toward a position on the upper side. Here, the linking section 20 in FIGS. 2A and 2B, FIGS. 4A and 4B, and the like may be separated from the lower edge section 12.

[0047] In addition, the shield need not have the shape of a fan as in the shields 1, 100, 110, and 120, but may have any shape such as a rectangle, a trapezoid, a circle, an ellipse, or a rounded rectangle. In addition, the linking section 20 in the embodiment described above is formed so as to extend along substantially the entirety of the shield 1 in the width direction (excluding the position of the notch section); however, the linking section 20 may be partially formed. For example, the linking section 20 may be partially formed at least at

positions which correspond to both end sections of the non-woven mask 2 in the width direction, and the linking section 20 need not be formed near the central section. In addition, the linking section 20 may be formed so as to be separated from the edge sections 13 on both sides of the shield in the width direction. In addition, the linking section 20 is configured so as to have a predetermined width and to extend in a band shape; however, the linking section 20 is not limited to this shape. For example, the linking section 20 which is formed with a rectangular shape or a circular shape may be arranged at one location or at a plurality of locations at predetermined positions on the shield.

#### Examples

**[0048]** Detailed description will be given below of a shield according to one aspect of the present invention based on Working Examples; however, the configuration of the shield is not limited to the following Working Examples.

**[0049]** First, shields were prepared as Working Examples 1 to 6 and Comparative Examples 1 to 3 using linking sections according to conditions which were different to each other. In all of the Working Examples, a shield having the shape illustrated in FIG. 4B was used, and a linking section having a width of 15 mm and a length of 50 mm was used. Working Examples 1 to 6 and Comparative Examples 1 to 3 had the respective mechanical engagement means used as the linking section and their mechanical engagement means had different pin densities and pin heights (for the details of the conditions, refer to Table 1 and Table 2). In addition, in Working Example 5, the linking section was set by attaching a weak adhesive double-sided tape to the shield. In addition, in Working Example 6, the linking section was set by attaching an adhesive double-sided tape to the shield. For these Working Examples and Comparative Examples, the linking strength with respect to the non-woven mask was measured and various types of tests relating to use were performed. For the measuring of the linking strength, the linking strength was measured when the shield was first attached to the non-woven mask and the linking strength was measured after repeating the attaching and detaching 10 times. As the non-woven masks which were used, three types of commercially available masks were selected and used. In addition, as tests relating to the use, tests were performed regarding the ease of attaching when attaching the shield to the non-woven mask, whether or not there was peeling in a state where the shield was attached to the non-woven mask, whether or not the shield was able to be attached to the non-woven mask when used repeatedly, the ease of detaching when detaching the shield from the non-woven mask, and the state of the mask after detaching the shield.

**[0050]** As illustrated in Table 1, in Working Examples 1 to 4, it was confirmed that it was possible for the linking strength of the linking section with respect to the non-woven mask to be 0.05 N or more for all of the non-woven masks even after repeated use. Even when the linking strength value is weakest (the linking strength with respect to the non-woven mask 2 after 10 repetitions in Working Example 4), it was possible for the linking strength to be 0.05 N or more. In Working Examples 1 to 4, favorable results were obtained in all of the test items. On the other hand, as illustrated in Table 2, in Comparative Examples 1 to 3, it was confirmed that the linking strength of the linking section with respect to the non-woven mask was less than 0.05 N for

all of the non-woven masks. In addition, in Comparative Examples 1 to 3, it was confirmed that it was not possible to attach the shield to the non-woven mask.

**[0051]** As illustrated in Table 3, in Working Example 5, it was confirmed that it was possible for the linking strength of the linking section with respect to the non-woven mask to be 0.05 N or more for all of the non-woven masks even after repeated use. In addition, in Working Example 5, it was confirmed that it was possible for the linking strength of the linking section with respect to the non-woven mask to be 1.5 N or less for all of the non-woven masks even after repeated use. In Working Example 5, favorable results were obtained in all of the test items. In Working Example 6, it was confirmed that it was possible for the linking strength of the linking section with respect to the non-woven mask to be 0.05 N or more for all of the non-woven masks even after repeated use. In addition, in Working Example 6, it was confirmed that the linking strength of the linking section with respect to the non-woven mask was 1.5 N or more for all of the non-woven masks even after repeated use. In such a case, when the shield was detached from the non-woven mask, excessive fluffing occurred on the front surface of the non-woven fabric, fluff on the front surface of the non-woven mask was taken away by the engagement section, and the front surface of the non-woven mask was damaged, but it was confirmed that favorable results were obtained for the other test items.

TABLE 1

Results of experiments on shields according to Working Examples.					
		Working Example 1	Working Example 2	Working Example 3	Working Example 4
	Pin density (pins/inch <sup>2</sup> )	1600	1600	900	1600
	Pin height (μm)	470	500	680	370
Linking strength (N)	Non-woven mask 1	0.283	0.272	0.131	0.167
	Non-woven mask 2	0.11	0.155	0.103	0.056
	Non-woven mask 3	0.339	0.324	0.116	0.072
Linking strength after repeating attaching and detaching 10 times (N)	Non-woven mask 1	0.192	0.250	0.125	0.132
	Non-woven mask 2	0.132	0.126	0.082	0.051
	Non-woven mask 3	0.233	0.187	0.106	0.126
	Effect of fixing member	Attaching was easy	Attaching was easy	Attaching was easy	Attaching was easy
	Ease of attaching	Did not peel	Did not peel	Did not peel	Did not peel
	Ease of peeling from the mask	after three shakes	after three shakes	after three shakes	after three shakes
	Verification of whether shield is peeled after shaking head left and right three times	Attaching to the mask was possible even after	Attaching to the mask was possible even after	Attaching to the mask was possible even after	Attaching to the mask was possible even after
	Sticking test				
	Confirmation of linking strength after				

TABLE 1-continued

Results of experiments on shields according to Working Examples.				
	Working Example 1	Working Example 2	Working Example 3	Working Example 4
attaching and detaching 10 times	attaching and detaching 10 times	attaching and detaching 10 times	attaching and detaching 10 times	attaching and detaching 10 times
Sticking test	Detaching	Detaching	Detaching	Detaching
Ease of detaching from the mask	was possible with one hand	was possible with one hand	was possible with one hand	was possible with one hand
Sticking test	There was no visible damage	There was no visible damage	There was no visible damage	There was no visible damage
State of mask after detaching the shield	on the mask	on the mask	on the mask	on the mask

TABLE 2

Results of experiments on shield according to Comparative Examples.				
	Comparative Example 1	Comparative Example 2	Comparative Example 3	
Pin density (pins/inch <sup>2</sup> )	300	2500	1600	
Pin height (μm)	1300	460	200	
Linking strength (N)	0.025	0.029	0.01	
Non-woven mask 1	0.018	0.044	—	
Non-woven mask 2	0.037	0.035	—	
Non-woven mask 3	0.049	0.039	0.01	
Linking strength after repeating attaching and detaching 10 times (N)	0.027	0.047	—	
Non-woven mask 3	0.048	0.044	—	
Effect of fixing member	Attaching was not possible	Attaching was not possible	Attaching was not possible	
Ease of attaching	Evaluation was not possible	Evaluation was not possible	Evaluation was not possible	
Ease of peeling from the mask	Evaluation was not possible	Evaluation was not possible	Evaluation was not possible	
Verification of whether shield is peeled after shaking head left and right three times	Evaluation was not possible	Evaluation was not possible	Evaluation was not possible	
Sticking test	Evaluation was not possible	Evaluation was not possible	Evaluation was not possible	
Confirmation of linking strength after attaching and detaching 10 times	Evaluation was not possible	Evaluation was not possible	Evaluation was not possible	
Sticking test	Came off mask easily	Came off mask easily	Came off mask easily	
Ease of detaching from the mask				

TABLE 2-continued

Results of experiments on shield according to Comparative Examples.			
	Comparative Example 1	Comparative Example 2	Comparative Example 3
Sticking test	There was	There was	There was
State of mask after detaching the shield	no visible damage on the mask	no visible damage on the mask	no visible damage on the mask

TABLE 3

Results of experiments on shields according to Working Examples.			
	Working Example 5	Working Example 6	
Linking strength (N)	Weak adhesive double-sided tape 0.530	Adhesive double-sided tape 5.252	
Non-woven mask 1	0.448	10.397	
Non-woven mask 2	0.252	9.925	
Non-woven mask 3	0.451	2.026	
Linking strength after repeating attaching and detaching 10 times (N)	0.429	1.759	
Non-woven mask 1	0.228	3.418	
Non-woven mask 2			
Non-woven mask 3			
Effect of fixing member	Attaching was possible	Attaching was easy	
Ease of attaching	Did not peel after three shakes	Did not peel after three shakes	
Ease of peeling from the mask			
Verification of whether shield is peeled after shaking head left and right three times			
Sticking test	Attaching to the mask was possible even after attaching and detaching 10 times.	Attaching to the mask was possible even after attaching and detaching 10 times	
Confirmation of linking strength after attaching and detaching 10 times		However, the linking strength was not uniform.	
Sticking test	Detaching was possible with one hand	Shield was detached while controlling the mask with one hand	
Ease of detaching from the mask			

TABLE 3-continued

Results of experiments on shields according to Working Examples.		
	Working Example 5	Working Example 6
Sticking test State of mask after detaching the shield	There was no visible damage on the mask	Excessive fluffing occurred on the surface of the non-woven fabric and the mask was damaged.

1. A shield for protecting the eyes of a user wearing a non-woven mask, the shield comprising:

an attachment section formed on a lower edge section side of the shield, the attachment section overlapping with the non-woven mask and being attached to the non-woven mask; and

an eye protection section formed on an upper edge section side of the shield, the eye protection section being capable of protecting the eyes of the user,

the attachment section having a linking section formed thereon, the linking section being fixed to be able to be attached and detached to and from the non-woven mask.

2. The shield according to claim 1, wherein a linking strength of the linking section with respect to the non-woven mask is 0.05 N or more.

3. The shield according to claim 2, wherein the linking section comprises mechanical engagement means having an engagement element.

4. The shield according to claim 2, wherein the linking section comprises an adhesive.

5. The shield according to claim 4, wherein the adhesive has a characteristic having a linking strength of 1.5 N or less with respect to the non-woven mask.

6. The shield according to claim 1, wherein a notch section is formed in the lower edge section at a position corresponding to a portion covering a nose in the non-woven mask.

7. The shield according to claim 1, wherein the linking section is formed at a position corresponding to at least both end sections in the width direction of the non-woven mask.

8. An eye protection method for protecting eyes of a user wearing a non-woven mask, the method comprising the step of:

attaching a shield having a linking section to the non-woven mask via the linking section, the linking section being fixed to be able to be attached and detached to and from the non-woven mask; and  
protecting the eyes with the shield.

9. The eye protection method according to claim 8, wherein

the shield is attached to the non-woven mask in a state of being worn by a user and the shield is detached from the non-woven mask in a state of being worn by a user.

\* \* \* \* \*