A disposable face shield having an improved attachment mechanism for securing a band to attach the shield to a user's face is disclosed. The disposable face shield includes a flexible transparent member having at least one slit therethrough. The slit edges have points that grab the elastic holding strap at a selected location to make a selected adjustment of the face shield to the user's head. A flexible forehead support member is provided on the upper portion of the transparent member to nestle against a user's forehead.
DISPOSABLE FACE SHEILD

FIELD OF THE INVENTION

[0001] This invention relates generally to face shields. More particularly, this invention relates to a disposable face shield having an improved adjustable attachment for a band securing the shield to the user's head.

BACKGROUND OF THE INVENTION

[0002] It has long been advantageous for individuals working with liquids to wear a protective face shield to prevent those liquids from spattering on the face. For example, face protection in medical procedures to prevent the splattering of blood on the face is recommended. It is also advantageous in medical procedures to use disposable surgical equipment where possible to substantially reduce the risk of infection and the cost of sterilizing the surgical equipment. Additionally, cleaning face shields of deposited chemicals, such as blood, paint, adhesives, dyes, solvents, resins, etc., is time consuming and often ineffective. Thus, disposable face shields have seen a wide application in various industries, e.g., medicine, dentistry, painting, manufacturing, and the like.

[0003] Because of the wide application and use of disposable face shields, the mounting bands or straps which secure the shield to the face must be adjustable to accommodate a variety of different sized faces and heads. Some prior art face shields utilize a fastener or integral member to attach the band or strap to the shield. A prior art face shield as disclosed in U.S. Pat. No. 5,983,390 to Desy makes use of slits with smooth edges, formed in the flexible transparent face shield material itself. A strap having a width greater than the width of the slits is looped through the slits. The straps are threaded in a particular direction through the slits. Pulling on the ends of the strap, so threaded, decreases the amount of strap positioned to hold the shield to a user's head, thus making a secure fit.

[0004] However, such slits, and therefore disposable face shields having those slits, can be improved upon as will be disclosed in the present application.

SUMMARY OF THE INVENTION

[0005] A face shield has a flexible transparent portion with a flexible forehead support member, and is held on a user's head by an elastic strap. The elastic strap has pores, and is threaded through at least one slit in the flexible transparent portion. The edges of the slits have points that enter the pores of the strap, and keep the elastic strap at a desired position in the slits, so that the face shield has a desired tightness and remains in position on the wearer.

[0006] Another version of the face shield has a strap without pores. The pointed edges of the slit press into the surfaces of the strap, since they cannot enter pores.

[0007] In another version, face shields having slits are available without a strap attached.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 illustrates an embodiment of a disposable face shield of the present invention being worn by a user.

[0009] FIG. 2A is a top view of the embodiment of FIG. 1, removed from the user.

[0010] FIG. 2B is a schematic top view of the embodiment of FIG. 1 while being tightened on a user.

[0011] FIG. 3 is a view taken on view lines 3-3 in FIG. 2B, with the strap shifted and drawn as a phantom schematic, for descriptive clarity.

[0012] FIGS. 4A, 4B, 4C are sequential schematic cross-sectional views of the slit area in the embodiment of FIG. 3, rotated for clarity.

[0013] FIGS. 5A, 5B, 5C are illustrations of other embodiments.

[0014] FIG. 6 is similar to FIG. 4B, but illustrates another embodiment of a disposable face shield.

DETAILED DESCRIPTION OF THE INVENTION

[0015] With respect to FIG. 1, the head 5 of a wearer 6 has a disposable face shield 10 secured by a strap 12. The face shield 10 has a transparent member 14 and a flexible support member 16 made of foam and having relief cuts 18. The foam support member may be of many materials and configurations, as is already known in the art. The transparent member 14 may be a variety of flexible materials known in the art, such as, for example, polyethylene terephthalate (PET), with a thickness range of 0.20 to 0.24 mm.

[0016] FIGS. 2A and 2B are top views of the face shield 10 while removed, and while being worn. For purposes of describing face shield 10, directions, orientations, and centerlines will be used from the perspective of a wearer. There is an inner area 20, an outer area 22, a right side 24 and a left side 26 and rear 28 and back 30. An imaginary centerline 32 divides the transparent member 14 into a right half 34 and a left half 36. A right slit 38 in the right half divides the right half in to a right forward member 40 and a right end 42. A left slit 44 in the left half divides the left half into a left forward member 46 and a left end 48. The right slit 38 is visible in FIG. 1, but the left slit 44 is hidden from view. Only one of the two slits is necessary to practice the invention, although having both slits is preferred. In an embodiment without the second slit, the strap 12 may be secured to the transparent member 14 in some other manner, that may or may not be adjustable.

[0017] The strap has a right end 50, an opposing left end 52, an inner surface 54, an outer surface 56, and a width 58 (FIG. 3). When installed in the transparent member 14, the slits 38, 44 surround the strap proximal each opposing end, 50, 52. The slits divide the strap, (for descriptive purposes) into a right pull 60, a left pull 62, and a wrap section 64 between the right pull and left pull. As illustrated, the left and right pulls have an optional folded over section (not numbered) making the strap 12 easier for a wearer 6 to grip. The strap 12 may be plain as illustrated, or have a different shape.

[0018] The arrows in FIG. 2B indicate how a wearer 6 would use the right pull 60 and left pull 62 to comfortably tighten the face shield 10 once they have placed it around their head 5. As they tighten or loosen the face shield 10, the relative amount of strap 12 in the wrap section 64 and the right pull 60 and left pull 62 changes. This embodiment of the disposable face shield 10 has two slits 38, 44 rather than one. This is advantageous when tightening, because pulling equally with both hands to tighten the face shield 10 does not shift the transparent member 14 around the wearer's head 5. If instead only one slit was in the transparent member 14 surrounding only one end of the strap 12, and the other strap end was fixed (or not easily adjustable concurrent with the first strap end), then repositioning of transparent member 14 after tightening may be necessary.

[0019] The slits 38 and 44 and their interactions with the strap 12 will be further described with reference to FIGS. 3-5,
that detail the right slit. This description applies equally to a second or any other slit, for example the left slit 44. Slit 38 is made by cutting the transparent member 14 in a zigzag pattern to form forward teeth 66 on a forward edge 68 on the right forward member 40, and rear teeth 70 on a rear edge 72 on the right end 42. In this embodiment each of the teeth 66 and 70 has a point 73, although in other embodiments the teeth may not be pointed. The zigzag cut is typically made by a die, and it may be the same die that cuts the transparent member 14 from a larger expanse of material. The illustrated embodiment is of a zigzag along a straight axis rather than a non-straight axis, although another embodiment may have an axis that is not straight. “Axis” is used herein to mean the general path of a line connecting the zigzag and the zigzag in a longitudinal direction. The material is cut rather than punched. The term “punched” is used herein to mean a process that results in material being removed and typically discarded. Since no material is removed from the transparent member 14, edge 68 abuts edge 72. The teeth 66, 70 have a width 74 and a pitch 76. Because the illustrated teeth are a zigzag, the width 74 and pitch 76 are the same value, but that need not be the case. Other slits, for example 200 (FIG. 51) may have teeth in which a pitch 78 is different than a width 80. The slit 38 has a width 82 and relief holes 84 at either end. The relief holes 84 are punched out to prevent a crack propagating through the material, as is well known in the art.

[0020] The illustrated strap 12 has a strap width 58 less than the slit width 82, but greater than the tooth width 74. As can be seen in the illustration and understood with further discussion, the strap 12 need not be as wide as slit 38. However the invention may have a slit that is wider (not shown), because the distance (not numbered) along the zigzag path is greater than the straight line width 82 along the axis, and a wide strap can at least partly conform in the zigzag path. This allows a variety of straps to be used in combination with a variety of slits. In a preferred embodiment, the strap width 58 is approximately 20 mm, the tooth width 74 is approximately 4 mm, and the slit width is approximately 17 mm.

[0021] As schematically shown in FIGS. 3 and 4A, strap 12 is a woven fabric having pores 88 in the form of spaces between threads 90 and transverse threads 92. As the strap 12 is pulled (FIG. 2B), and FIG. 4A) it stretches longitudinally. Cage 88 form between transverse threads 92 while the forward teeth 66 and rear teeth 70 bend and allow the wrap section 64 to travel through the slit 38, becoming the right pull 60. As longitudinal tension applied by the wearer 6 is released (FIG. 4B), and the elastic tension in the wrap section 64 pulls back on the right end 50, at least one rear tooth 70 enters a pore 88 and engages a transverse thread 92 to prevent further loosening. In FIG. 4C, the aft teeth 70 and the forward teeth 66 engage the strap 12, allowing the elasticity of strap portion 64 and resilience of flexible support member 16 to keep the transparent member 14 stably positioned on the wearer’s head 5.

[0022] The figures describe the actions of the teeth of transparent member 14 in a simple schematic way, however one should realize that a series of opposing teeth in a flexible thin material may not consistently and align in the same way each time they are moved. Factors such as sequence of pull, direction and magnitude of pull, strap fold-over, and other factors may make the teeth orient in varying positions. However in total, the teeth 66, 70 keep the strap 12 at a longitudinal position in the slit 38, as well as allow the strap to be pulled to another selected longitudinal position, within the slit 38.

[0023] Although the direction of the strap 12 in the transparent member 14 is shown in a preferred way, with the pulls 60 and 62 outside (22) to the wrap portion 64 so that the wearer can easily feel and grab the pulls, that need not be the case. The present invention will also work if the strap is threaded in the opposite direction, with the wrap portion 64 outside the right end 42 and left end 48. It will also perform sufficiently if the threading is done in one direction on the right side 24, and the other direction on the left side 26. The present invention, therefore, is robust and not dependent upon a consistent strap path.

[0024] FIGS. 5A, 5B, and 5C illustrate embodiments having different slits. Slit 100 is an embodiment having an aft edge 102 with two aft teeth 104 with points 73 and a forward edge 106 that does not have points 73. Instead there is a straight portion 108 on the forward edge 106, and a corresponding straight portion 110 on the aft edge 102. Slit 200 is an embodiment in which the rear edge 202 has at least one tooth 266 with a point 73 and forward edge 206 has at least one tooth 270 with a point 73. Slit 300 is an embodiment having truncated teeth 366 and 370 like the teeth 66, 70 in FIG. 3, except that sharp points 73 are cut off. This may be done, for example, at the same time as the punching of the relief holes 84, or may be done at a different time in the manufacturing process. A reason for truncated teeth 366, 370 will become apparent with discussion of different strap materials, that follows.

[0025] FIG. 6 illustrates a face shield 400 having teeth 66 and 70, but rather than a strap having pores 88; instead strap 402 may be made of a material without pores. The strap material may be, for example, foam or film having an inside surface 402 and an outside surface 404. As seen in FIG. 6, the points 73 of teeth 66, 70 hold the strap 402 at a selected position by poking and depressing surfaces 404 and 406. Pores 88 are not necessary. Because the teeth do not need to be sized to enter pores, they may instead be truncated teeth 366, 370 as in FIG. 5C, or rounded, or any other shape. An optimum shape may be chosen based on the characteristics of the selected strap 402, and the desired holding and release characteristics. The optimum shape may be determined experimentally, or by relationship to strap diameter, hardness, flexibility, or the like.

[0026] While the present invention has been illustrated by the description of the embodiments thereof, and while the embodiments have been described in considerable detail, it is not the intention of the applicant to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details of the representative apparatus and method, and illustrative examples shown and described. Accordingly, departures may be made from such details without departure from the spirit or scope of applicant’s general inventive concept.

What is claimed is:

1. A face shield comprising:
   an elastic strap having opposing ends;
   a flexible transparent member having at least one slit formed therethrough surrounding the elastic strap proximal an opposing end, said at least one slit having opposing edges with at least one point from one of the opposing edges configured to enter the pores; and
   a flexible forehead support member disposed on said flexible transparent member.
2. The face shield of claim 1 having two slits, one on each side of a vertical centerline of the flexible transparent member.

3. The face shield of claim 1 having at least one point from one opposing edge and at least one point from another opposing edge.

4. The face shield of claim 3 wherein the slit is configured in the shape of a zigzag.

5. The face shield of claim 4 wherein the zigzag has a straight axis.

6. A face shield comprising:
   an elastic strap having opposite surfaces and opposing ends;
   a flexible transparent member having at least one slit formed therethrough surrounding the elastic strap proximal an opposing end, the at least one slit having opposing edges with at least one point on at least one opposing edge configured to press into an opposite surface; and
   a flexible forehead support member disposed on said transparent member.

7. The face shield of claim 6 having two slits formed therethrough, each of the two slits surrounding the elastic strap proximal an opposing end, each of the two slits having opposing edges with at least one point on at least one of the opposing edges configured to press into at least one opposite surface.

8. The face shield of claim 6 having at least one point from one opposing edge and at least one point from the other opposing edge.

9. The face shield of claim 8 wherein the slit is configured in the shape of a zigzag.

10. The face shield of claim 9 wherein the zigzag has a straight axis.

11. The face shield of claim 6 wherein the at least one point is truncated.

12. A face shield comprising:
    a flexible transparent member having at least one slit formed therethrough, the at least one slit configured to surround an elastic strap proximal an opposing end of said strap, said at least one slit having opposing edges with at least one point from one of the opposing edges.

13. The face shield of claim 12 having two slits, one on each side of a vertical centerline of the flexible transparent member.

14. The face shield of claim 12 having at least one point from one opposing edge and at least one point from the other opposing edge.

15. The face shield of claim 14 wherein the slit is configured in the shape of a zigzag.

16. The face shield of claim 15 wherein the zigzag has a straight axis.