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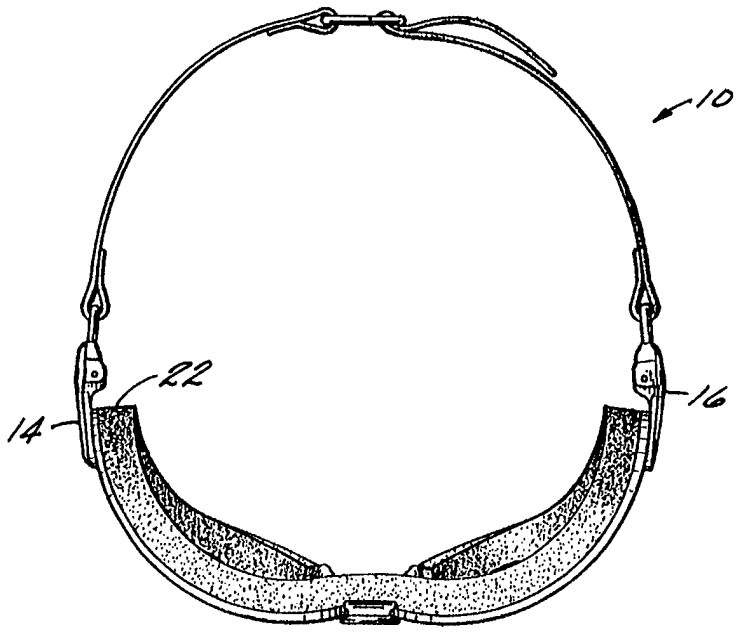
(54) Title: PROTECTIVE EYEWEAR WITH ADJUSTABLE STRAP

(57) Abstract

Safety eyewear (10) is presented which is provided with particulate sealing (22) around a frame containing lens/lenses and having temples (14, 16) that provide adjustment of the eyewear to a pantoscopic angle. The eyewear (10) is provided with an adjustable strap assembly for better fit to the wearer's head. The eyewear lens/frame includes a plurality of projections that define various pantoscopic angles. The temple and piece includes a set of recesses that engage the projections formed on the lens/frame which temple and piece is rotated relative to the lens/frame to set the pantoscopic angle. The adjustable strap assembly further adjust the fit of the eyewear and can be unbuckled for snaplocked attachment of the eyewear (10) directly to other safety equipment such as noise suppression ear muffs, communication head phones, breathing masks and the like. A plurality of ventilation channels is disposed on the frame to provide indirect ventilation.



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# PROTECTIVE EYEWEAR WITH ADJUSTABLE STRAP

## Field Of The Invention:

This invention relates generally to eyewear. More particularly, this invention relates both to plano (that is non corrective or zero power) and prescription eyewear for use in safety and recreational applications (i.e., sports and/or hostile environments) with adjustable strap temples which optionally permit the secure attachment of other safety equipment such as ear muffs or head phones.

## Background Of the Invention:

Protective eyewear, both prescription and plano (that is non corrective or zero power) is available in the market place for both safety and recreational (i.e., sports) applications. Such eyewear is exemplified in U.S. Patent Application Serial No.08/641,901 filed May 2, 1996, which is assigned to the assignee hereof, all of the contents of which are incorporated herein by reference. This eyewear comprises a pair of spectacles which includes a lens attached to a pair of temples. The lens has a surface which is created by rotating an aspheric shape about an axis which is offset from an axis of the aspheric shape. Preferably, the aspheric shape is an ellipse and more preferably the resultant lens will have a cross-section in the horizontal meridian which is a segment of an ellipse and a cross-section in the vertical meridian which is a

segment of a circle. This lens exhibits a high degree of wrap and so provides extensive protection without the need for side shields.

Of course, many other prior art protective eyewear is known, all of the eyewear generally utilizing a pair of rigid or semi-rigid temples which extend outwardly from the lenses or a lens frame. Examples of other protective spectacles of this type include U.S. Patent Nos. 4,867,550; 4,741,611; 4,674,851; 4,859,048; 5,381,192 and 5,032,017, all of the contents of these patents being incorporated herein by reference.

One perceived problem not addressed by the prior art is that the prior art protective spectacles do not sufficiently protect the eyes from particulates that exist in dusty, dirty work environments. This dusty and dirty problem is also present for some sport environments. Currently, it is known that most common eye injuries in the industrial workplace are a result of these aforementioned particulates entering the area immediately adjacent to the eye. Therefore, there is a perceived need to develop eyewear that will keep particulate matter away from the eye. Additionally, in hostile environments, there is often a need to wear safety eyewear in conjunction with other safety equipment such as noise suppression ear muffs or communication head phones without disrupting the particulate seal of the eyewear or the seal of the other safety device or devices. Therefore, there is an additionally perceived need for a method of attachment of the eyewear to other safety gear without affecting the seals of the individual safety items as is presently unavoidable with prior art temples associated with prior art safety and protective spectacles.

Summary Of The Invention:

The above discussed and other drawbacks and deficiencies are overcome or alleviated by the eye wear of the present invention. An eye wear having a frame, a lens defeatably attached to the frame and a strap assembly is disclosed. The frame and lens form at least one opening to allow ventilation. A resilient flange is provided along the periphery of the flange. In one embodiment, a plurality of L-shaped channels are provided to provide indirect ventilation. An end piece having a cylindrical extension

defeatably attaches the strap lens and frame. A head disposed on the cylindrical extension rotates to contact the frame and urge the outer periphery of the lens against a protrusion on the frame to retain the lens on the frame.

The above-discussed and other features and advantages of the present invention will be appreciated and understood by those skilled in the art from the following detailed description and drawings.

Brief Description Of The Drawings

Referring to the Figures wherein like elements are numbered alike in the several Figures:

FIGURES 1-6 are respective top plan view, front elevation view, left side elevation view, right side elevation view, back elevation view and bottom plan views of the protective eyewear with adjustable strap in accordance with the present invention;

FIGURE 7 is an enlarged side elevation cross-sectional view taken along the line 7-7 of FIGURE 6;

FIGURES 8A - 8B are respective exploded enlarged top plan view and side elevation views of the strap holding temple prior to assembly of the protective eyewear with adjustable strap in accordance with the present invention of FIGURES 1 - 6;

FIGURE 8C is an enlarged view of a portion of the protective eyewear lens;

FIGURES 9A - 9B are respective partial exploded top plan view and side elevation views of the connective buckle and strap portions of the adjustable strap in accordance with the present invention of FIGURES 1 - 6;

FIGURE 10 is a perspective view of the protective eyewear with adjustable strap of FIGURES 1 - 6 combined with a set of protective ear muffs and/or head phones snap locked respectively to each ear muff and/or head phone;

FIGURE 11 is a perspective view of the protective eyewear with adjustable strap of FIGURES 1 - 6 combined with a set of protective ear muffs and/or head phones snap locked to the headband of the protective ear muffs and/or head phones;

FIGURE 12 is a top view of the protective eyewear in an alternative embodiment of the invention;

FIGURE 13 is a rear view of the protective eyewear of FIGURE 12;

FIGURE 14 is a perspective view of another embodiment in accordance with the present invention;

FIGURE 15 is a front view of the frame of the device of FIGURE 14 prior to assembly;

FIGURE 16 is a perspective view of the frame prior to assembly;

FIGURE 17 is a right side view of the frame prior to assembly;

FIGURE 18 is an exploded view of channels disposed on the frame;

FIGURE 19 is a top view of the frame with the resilient flange attached thereto;

FIGURE 20 is a rear view of the frame with the resilient flange attached thereto;

FIGURE 21 is a front view of the lens;

FIGURE 22 is an enlarged view of a slot disposed on the lens;

FIGURE 23 is an exploded assembly view of the assembly of an end piece, lens and frame; and

FIGURE 24 is a side view of a temple for use with the end piece in an alternative embodiment.

Description Of The Preferred Embodiment:

Referring jointly to Figures 1-6, the protective eyewear with adjustable strap is shown generally at 10. Device 10 is comprised of three main sections including an eyewear lens 12 (shown generally in Figure 5), a pair of strap holding temples 14 and 16 (best shown in Figures 1, 3, 4 and 6), and an adjustable strap assembly 18 (best shown also in Figures 1 and 6).

Lens 12 includes a resilient gasketing flange 22 which provides sealing around the periphery of the lens 20. Gasketing 22 is preferably a resilient foam. Lenses 12 are preferably the unitary, plano lenses depicted in Figures 13-15 of the aforementioned USSN 08/641,901. However, it will be appreciated that lenses 12 may consist of any

other suitable protective lenses (having an alternative shape) including but not limited to the lenses depicted in Figures 1-6 and 11-12 of USSN: 08/641,901 or the lenses in the aforementioned U.S. Patent Nos. 4,867,550; 4,741,611; 4,674,851; 4,859,048; 5,381,192 and 5,032,017. Similarly, while in the preferred embodiment of the invention, no frames are provided for lenses 12, alternatively, the present invention may include a frame surrounding all or a portion of the lenses.

As discussed in detail in aforementioned USSN 08/641,901, lens 12 is preferably a plano lens wherein the plano lens comprises a front surface curvature which is created by rotating an aspheric shape about an axis which is offset from an axis of the aspheric shape. In a preferred embodiment, the aspheric shape is an ellipse or at least is an aspheric shape, a segment of which has an elliptical arc. This elliptical arc is rotated about an axis spaced (offset) some distance from a major or minor axis of the ellipse. In a more preferred embodiment, the ellipse is rotated about an axis spaced from and parallel to the major or minor axis of the ellipse, but in the same plane as the ellipse. The resulting surface of this preferred lens configuration will have a cross-section in the horizontal meridian which is a segment of an ellipse, and a cross-section in the vertical meridian which is a segment of a circle. A significant feature of the preferred lens configuration is that the surface generated is rotationally symmetric. Additionally, while plastic lenses are preferred, eyewear made of safety glass or any other suitable material can be utilized in conformance with this invention.

Resilient flange 22 may be comprised of one or a plurality of strips which are adhesively applied along the periphery of lenses 12 or may be directly molded onto the lens. The flange 22 may be a single strip in which case it can be run along the entire periphery of the lens including those portions of the nosepiece and the hinge. Preferably, however, as shown in FIGURE 7, the flange is broken at the hinges of the temples for ease of closing the temples during storage (the flange may also be broken at the nosepiece as shown in FIGURE 5 since it may not be required in that area).

The foam flange 22 provides an important feature and advantage to the eyewear of the present invention. In particular, the foam flange 22 tends to minimize the

probability of exposure of the wearer's eyes to particulates in a dusty, dirty work environment and/or in a similar dirty or dusty sports environment such as on a beach. Currently, the most common eye injury in the industrial workplace is the result of particulates in the eye. The use of the foam flange 22 will substantially reduce those incidences of eye damage caused by floating particulates for people who wear the eyewear of FIGURES 1-6. Of course as mentioned, the foam flange depicted in FIGURES 1-6 could also be used in connection with protective eyewear having a frame. Still another feature provided by the resilient flange of the present invention is that the flange, particularly by tailoring the softness and other characteristics of the foam, will improve the wearer's comfort, especially when the eyewear of this invention is worn for long periods of time.

The eyewear of the present invention allows the user to hold the eyewear securely to the head by means of a unique adjustable strap or to use this adjustable strap to conveniently and securely attach the eyewear to another piece of safety equipment such as noise suppression ear muffs or communication head phones. FIGURES 8A-8B and FIGURE 7 show the adjustable strap holding element 28. Strap holding element 28 includes a temple hinge 32. The temple hinge 32 is pivotally coupled to the end piece 24 (shown best in FIGURE 7 and FIGURES 8A-8B) with a pin 34 (best seen in FIGURE 8B) inserted through hinge element 36 to form a pivotable joint between end piece 24 and strap holding element 28. The pivotable joint between end piece 24 and strap holding element 28 allows the temples 14,16 to fold one upon the other to enable the eyewear to take up minimum space when eyewear 10 is stored or not in use. This pivotal joint also acts to enhance the fit of the eyewear to the user's head by appropriately conforming the strap and eyewear as required. The material used for end piece 24 and strap holding element 28 is preferably a suitable moldable plastic. In a preferred embodiment, strap holding temples 14, 16 are connected directly to the upper, outer edges of the lens 12 (best seen in FIGURE 7). Of course, as already mentioned it will be appreciated that lens 12 could just as well be connected to a frame instead of

directly to a lens; in which case temples 14, 16 could be attached either to the lenses or to the frame.

The end piece 24 includes a post shown generally at 102 including a cylindrical neck 104 and a head 106. The end piece 24 includes recesses 26 that engage projections 52 formed on the exterior surface of the lens 12 (shown in FIGURE 8D). A groove 108 is formed in the head 106 and a portion of the neck 104. The groove 108 has a v-shape where the width of the groove at one end is greater than the width of the groove at the other end. It is understood that alternative geometries may be used for groove 108. The groove 108 is formed generally perpendicular to the longitudinal axis of head 106 and extends across the entire head 106.

As shown in FIGURE 8C, the lens 12 includes a slot 50 and projections 52 which cooperate with the end piece 24 to provide adjustment of the pantoscopic angle of the eyewear. Slot 50 is generally oval shaped and has a center circular area 51. Projections 52 are formed on the surface of the lens 12 and extend away from the lens surface. The recesses 26 engage projections 52 formed on lens 12. It is understood that projections may be formed on the end piece 24 and recesses formed in the lens 12.

The end piece 24 is coupled to the lens 12 by inserting the post 102 through slot 50 and rotating the end piece 24. To adjust the pantoscopic angle of the eyewear, the wearer rotates the end piece 24 and aligns one pair of the recesses 26 with the projections 52 formed on the lens 12. The groove 108 allows the distal ends 110 and 112 along the longitudinal axis of the head 106 to flex away from the lens 12. This allows the end piece 24 to rotate within the lens 12 more easily. This is particularly useful when the end piece 24 is first rotated upon insertion of the end piece into the lens 12 and when the pantoscopic angle is adjusted. The end piece 24 is made from a resilient material and the distal ends 110 and 112 of the head 106 apply pressure to the lens 13 and hold the end piece 24 at the desired pantoscopic angle.

The pantoscopic angle features of the present invention are preferably identical to the pantascopic angle features of commonly assigned U.S. Patent Application Serial No. 08/770,920 filed December 20, 1996 (all of the contents of which are incorporated

herein by reference) except that the temple length adjustment housing 70 and temple tip 80 are replaced by the strap holding elements 28 and strap assembly 18 in the present invention. Therefore, reference is made to the application USSN: 08/770,920 for a additional details of the pantoscopic angle feature. The pantoscopic adjustment features assure for snug and comfortable fit especially when the protective eyewear of the present invention is combined with other safety devices.

Strap holding element 28 has a smooth loop 38 sized to accept adjustable strap assembly 18. Adjustable strap assembly 18 (see FIGURES 9A-9B) is comprised of a right hand buckle and strap assembly generally shown at 40 and a left hand buckle and strap assembly generally shown at 42. Right hand buckle and strap assembly 40 is comprised of a suitable length of strap 44 and a snap-in female portion of buckle 46. Likewise, left hand buckle assembly 42 is comprised of a suitable length of strap 48, the male portion of snap-in buckle 50 which mates with the female portion of buckle 46 and a known strap tightening fastener 52 for adjusting the left hand strap 48 to the desired position for a secure mounting of the eyewear on a person's head to assure a snug and comfortable fit.

Strap portion 44 and strap portion 48 are suitably sized as is known in the industry and is preferably of known stretchable materials. Half buckle 46 and half buckle 50 and strap tightening fastener 52 are commercially available and should be of such material and finish as required by the environment where used. Both half buckle 46 and half buckle 50 have known snap connectors that snap into detents that exist on the outside of the safety ear muffs, head phones or any other safety device used in conjunction with the present invention eyewear.

It should be noted that strap 48 is longer than strap 44 because the extra length of strapping is needed to provide adequate adjustment of the adjustable strap assembly 18. It should be further noted that the end 104 of right hand strap 44 is folded over the loop 106 of buckle (half) 46 and extends a suitable distance and is assembled to a portion of strap 44 by known methods such as adhesives, welding or other known means.

FIGURE 10 is a perspective view of the protective eyewear with adjustable strap 10 of FIGURES 1-6 in accordance with the present invention shown combined with a set of noise protective ear muffs and/or head phones generally shown at 56. Right hand buckle and strap assembly 40 has been unbuckled from left hand buckle and strap assembly 42. This allows right hand buckle and strap assembly 40 to be snap lockedly secured to the right ear muff of protective ear muff and/or head phones 56 and, likewise, left hand buckle and strap assemble 42 to be snap lockedly secured to the left ear muff of protective ear muff and/or head phones 56. Its can be seen that this arrangement provides for a secure and comfortable fit without breaking the seal of the protective ear muffs as would be the case with ordinary protective eyewear equipped with conventional temples. It should be further noted that other protective gear such as a breathing mask could be added to this arrangement with no problems. In an alternative embodiment shown in FIGURE 11 the protective eyewear is snap lockedly secured to the headband 58 of the protective ear muff and/or head phones 56. It is understood that the protective eyewear 10 can be snap lockedly secured to any portion of the protective gear as long as the spatial relationship between the eyes and other portions of the wearer's head are maintained.

FIGURE 12 is a top view of the protective eyewear in an alternative embodiment of the invention. As shown in FIGURE 12, the major portions of the protective eyewear are similar to those described above. In particular, the lens 12, temples 14, 16 and adjustable strap assembly 18 are the same as those described above with references to FIGURES 1-6. The gasketing 22, however, has been removed. FIGURE 13 is a rear view of the protective eyewear of FIGURE 12. The above described advantages of the temples 14 and 16 and the adjustable strap assembly 18 are still provided by the protective eyewear shown in FIGURES 12 and 13.

In accordance with a preferred embodiment of this invention, an anti-fog coating is applied to the inner surface of lenses 12 to enhance optical viewing. In the past, attempts to create such seal against particulate matter entry to the eye area have failed because of inability of the prior art to resolve the problem of fogging when the

eyewear was worn for any length of time. Of course, any suitable anti-fog coating can be used in accordance with this invention; however a preferred anti-fog coating is commercially sold by Aearo Corporation of Southbridge, Massachusetts under the DX trademark.

Referring now to FIGURE 14, another embodiment of the device is generally shown at 200. Device 200 includes lens 202, frame 204 and an adjustable strap assembly 18. It is to be appreciated that the adjustable strap assembly 18 is of the type previously described herein. Frame 204 includes opposed sides 208 and 210. Lens 202 is retained on side 208 and resilient flange 212 (FIGURES 19 and 20) is attached to side 210. Frame 204 includes a plurality of ventilation channels 214 to allow ventilation into the device during use to prevent fogging of lens 202 and to provide comfort for the user. A lip 216 is provided along portions of frame 204 to prevent dust and other unwanted particles from entering device 200 during use.

Referring now FIGURES 15-18, side 208 receives lens 202 and faces away from the user during use. Side 208 includes opposed protrusions 218 and 220 disposed at bridge portion 222 to locate and retain lens 202 on side 208. Temple portions 224 and 226 include upper and lower protrusions 228 and 230 which locate lens 202 on side 208 and retain lens 202 by the contact of head portions 232 which face inward over lens 202 when assembled. Frame 204 is preferably made of plastic and is resilient for ease of assembly. Preferably, protrusions 218 and 220 also include head portions 232 which fit over lens 202 to assist in a precise fit.

Frame 204 includes openings 234 and 236. A contoured lip 216 is disposed along part of the upper portion 238 and lower portion 240 of side 208. Lip 216 extends outward from side 208 and tapers to its top 242. Lens 202 rests against lip 216 at its outer periphery along a portion of its top and bottom. A plurality of ventilation channel 214 are formed along inner side 244 of lip 216 and surface 246 of side 208. Preferably ventilation channel 214 comprise L-shaped recesses disposed along surface 246 of side 208 and inner side 244 of lip 216. The L-shape of ventilation channels 214 provides indirect ventilation to the face (and eyes) when device 200 is worn. Ventilation

channels 214 include recessed walls 248 and surface 246 which are separated by divider walls 250. Similarly recessed walls 252 are separated by divider walls 253. Thus, air may enter from side 208 of frame 204 when lens 202 is assembled to frame 204 by entering ventilation channel 214 at recessed wall 252 and then traveling generally along recessed wall 248. Thus, ventilation occurs indirectly. In this manner, dust and other particles cannot fall between the lens 202 and the wearer's face because lip 216 extends beyond lens 202. Thus, ventilation is achieved while protection from dust and unwanted particles is optimized. It will be appreciated to those of ordinary skill in the art from reading this disclose that the precise shape of the opening may be varied to allow for indirect ventilation.

Each temple portion 224 and 226 includes an arcuate body portion 254 connecting upper temple portion 256 and lower temple portion 258. Arcuate body portions 254 include inner arcuate surfaces 260. As described in more detail below, inner arcuate surfaces 260 form a defeatable attachment together with head 106 of end piece 24 on strap assembly 18. As head 106 is turned, it contacts arcuate surface 260 to force respective ends 300 and 302 of lens 202 against respective protrusions 228 and 230 to retain lens 202 onto side 208 by the contact of lens 202 against protrusions 228 and 230 (and respective heads 232).

Referring to FIGURES 19 and 20, frame 204 is preferably contoured to conform to the pantoscopic angle of the eyewear. Resilient flange 212 is attached to side 210 of frame 204, preferably with an adhesive. Resilient flange 212 extends from temple portion 224 along top portion 262 of frame 204 to temple portion 226. Gasket 212 is also attached long bottom portion 264 and contours with frame 204 at nose portion 266 from temple portion 224 to temple portion 226. The gasket 212 is resilient and is positioned at the nose portion 266 thereby eliminating the need for a separate nose piece.

Referring now to FIGURES 21-23, lens 202 of the type previously described herein includes slots 304 disposed adjacent ends 300 and 302. Slot 304 is generally oval shaped and includes a center circular area 305. Projections 308 are formed on the

surface of lens 202 and extend away from the lens surface (recesses 26 in end piece 24 as described previously engage projections 308 when head 106 is rotated in the assembled position). To assemble device 200, head 106 (on end piece 24 of strap assembly 18) is inserted through slot 304. Lens 204 is placed on side 208 of frame 204 so that it is contained within protrusions 328 and 330, 218 and 220 and lip 216. As head 106 is turned it nestles against arcuate body portion 254 along inner arcuate surface 260. As head 106 is rotated to be fully aligned with arcuate surface 260 (and thereby place projections 308 within recesses 26 of end piece 24) a toggle action is formed between the contact of head 106 against arcuate body portion 254 at arcuate surface 260 which urges the contact of ends 300 and 302 of lens 202 against projections 228 and 230 at each temple portion 224 and 226. By rotating head 106 back to an unaligned position, the toggle action is defeated and device 200 may be unassembled. The advantages of such an arrangement include the ability to replace lens 202 as desired. Any degradation to the anti-fog coatings applied to lens 202 caused by adhesively attaching flange 212 directly to lens 202 is avoided altogether. In addition, if the foam flange 212 becomes worn, the frame 204 alone may be replaced salvaging the lens 202. It will be appreciated to those of ordinary skill in the art from reading this disclosure that the precise method of attaching the end piece (for a strap or temple) may be varied to achieve a defeatable attachment of the lens, frame and strap assembly.

In another embodiment, a temple 500 as shown in FIGURE 24 may be attached to the end piece 24 as opposed to the strap holding element 28. Temple 500 includes a hinge box 70 and a temple tip 80 and attaches to end piece 24 through a hinge pin. Additional detail of the temple 500 is described in U.S. Patent Application serial number 08/806,832 the contents of which are incorporated herein by reference. It will be appreciated that device 200 may also be secured to the head band of a protective ear muff and/or head phones as described above.

While preferred embodiments have been shown and described, various modifications and substitutions may be made thereto without departing from the spirit

and scope of the invention. Accordingly, it is to be understood that the present invention has been described by way of illustrations and not limitation.

What is claimed is:

CLAIM 1. Eyewear comprising:

a lens;

a hinge connected to said lens; and

a strap attached to said hinge for retaining the lens in position about the head of a wearer.

CLAIM 2. The eyewear of claim 1 further comprising a resilient sealing flange along at least a portion of the periphery of the lens.

CLAIM 3. Eyewear comprising:

a lens;

an end piece, including a hinge, connected to said lens; and

a strap attached to said end piece for retaining the lens in position about the head of a wearer.

CLAIM 4. The eyewear of claim 3 further comprising:

a resilient sealing flange along at least a portion of the periphery of the lens.

CLAIM 5. The eyewear of claim 3 wherein:

one of said lens and said end piece has at least one projection formed on the surface thereof; and

said end piece is movably connected to said lens and the other one of said lens and said end piece includes recesses formed on the surface thereof, wherein the pantoscopic angle of the eyewear is set by positioning said projection in one of said recesses.

CLAIM 6. The eyewear of claim 5 wherein:

said end piece comprises a post including a head having a groove formed therein.

CLAIM 7. The eyewear of claim 6 wherein:

said groove is formed generally perpendicular to a longitudinal axis of said head.

CLAIM 8. The eyewear of claim 6 wherein:

said post further comprises a neck and said groove is formed in a portion of said neck.

CLAIM 9. The eyewear of claim 6 wherein:

said groove has a v-shape.

CLAIM 10. The eyewear of claim 3 wherein:

said lens comprises a slot and said end piece comprises a post which engages said slot to movably connect said lens to said end piece.

CLAIM 11. The eyewear of claim 5 wherein:

said recesses comprise a plurality of pairs of recesses, each pair of recesses defining a respective pantoscopic angle.

CLAIM 12. The eyewear of claim 11 wherein:

said projection comprises a pair of projections that engage a pair of said recesses.

CLAIM 13. In eyewear having a strap for securing to the wearer's head, the improvement comprising;

hinges attaching the strap to the eyewear.

CLAIM 19. Eyewear as in claim 18, further comprising:

a resilient sealing flange attached to said second side and along at least a portion of the periphery of said frame.

CLAIM 20. Eyewear as in claim 18, wherein:

said ventilation channel is a plurality of ventilation channels.

CLAIM 21. Eyewear as in claim 18, wherein:

said ventilation channel is L-shaped.

CLAIM 22. Eyewear as in claim 18, wherein:

said first side includes a lip extending outward therefrom, said lip being adjacent to the outer periphery of said lens when said lens is attached to said frame.

CLAIM 23. Eyewear as in claim 18, further comprising:

a strap holding element hingedly attached to said end piece.

CLAIM 24. Eyewear as in claim 18, wherein:

said first side of said frame includes a surface; and

said ventilation channel is formed by a channel disposed on said surface.

CLAIM 25. Eyewear as in claim 18, wherein:

said first side includes a lip extending outward therefrom, said lip being adjacent to the outer periphery of said lens when said lens is attached to said frame, said lip having a first surface adjacent to said outer periphery, said first side further including an outer surface;

said ventilation channel comprising two channel portions, said first channel portion being disposed on said first surface of said lip and said second channel portion being disposed on said outer surface of said first side, said first channel portion communicating with said second channel portion.

CLAIM 26. Eyewear as in claim 25, wherein:

said ventilation channel is a plurality of ventilation channels.

CLAIM 27. Eyewear as in claim 17, wherein:

said lens includes opposed ends, each of said ends having a slot thereon.

CLAIM 28. Eyewear as in claim 27, further comprising:

a temple hingedly attached to said end piece.

CLAIM 29. Eyewear as in claim 18, wherein:

one of said lens and said end piece has at least one projection formed on the surface thereof;

said end piece is movably connected to said lens; and

the other of said lens and said end piece includes recesses formed on the surface thereof, wherein said the pantoscopic angle of the eyewear is set by positioning said projection in one of said recesses.

CLAIM 30. Eyewear as in claim 28, wherein:

said end piece includes a first engagement portion.

CLAIM 31. Eyewear as in claim 30, wherein:

said frame includes a second engagement portion and a protrusion extending from said frame.

CLAIM 32. Eyewear as in claim 31, wherein:

said first engagement portion of said end piece contacts said second engagement portion to move a periphery portion of said lens against said protrusion and provide a defeatable attachment of said lens to said frame.

CLAIM 33. Eyewear as in claim 32, wherein:

said end piece includes a post including a head, said head defining said first engagement portion.

CLAIM 34. Eyewear as in claim 33, wherein:

said frame includes an arcuate body portion, said arcuate body portion defining said second engagement portion, wherein said head contacts said arcuate body portion and urges the periphery portion of said lens against said projection.

CLAIM 35. Eyewear as in claim 34, wherein:

said projection includes a head portion.

CLAIM 36. Eyewear as in claim 35, wherein:

said projection is at least two projections disposed at each said end of said frame.

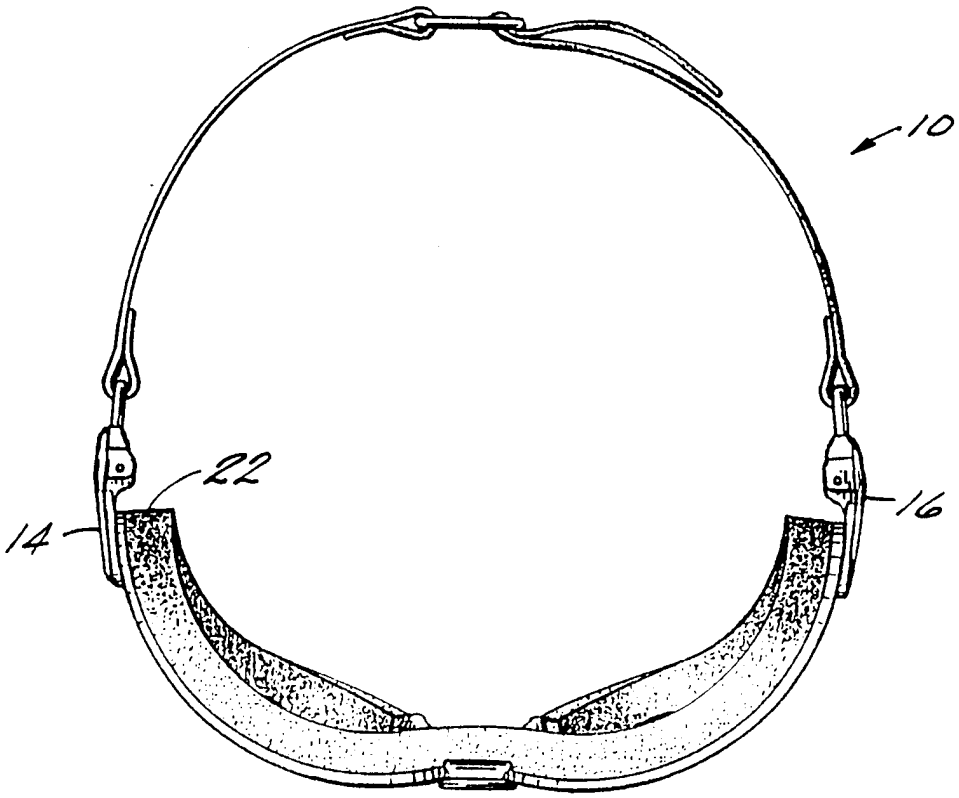


FIG. 1

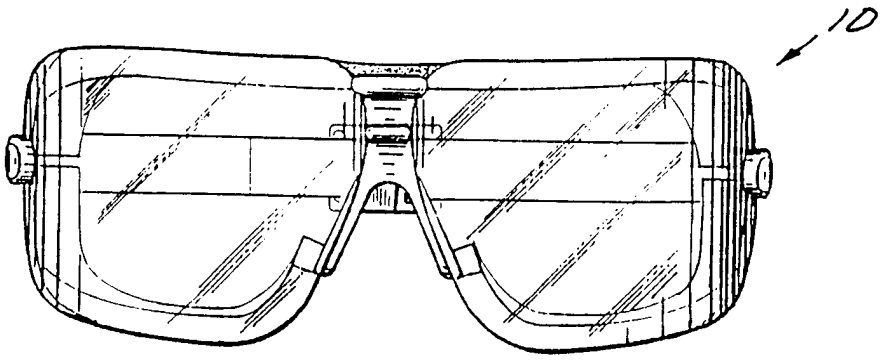


FIG. 2

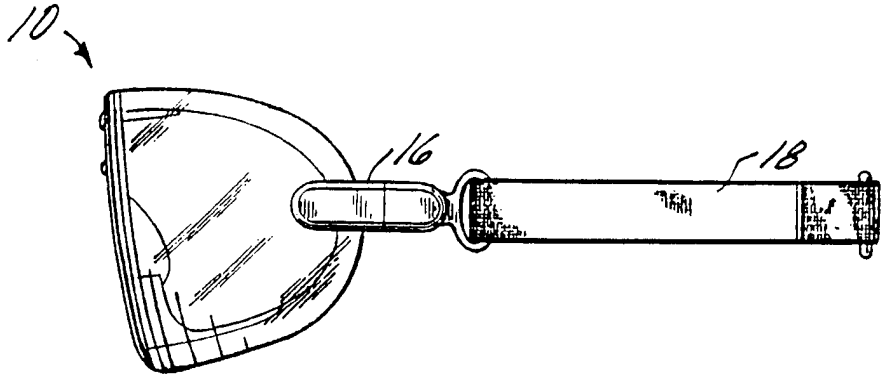


FIG. 3

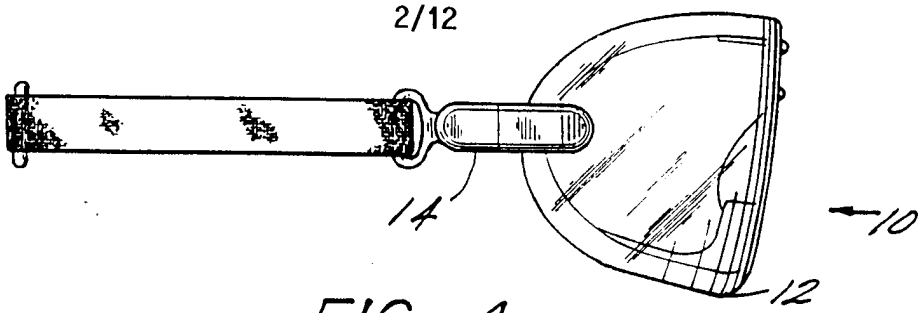


FIG. 4

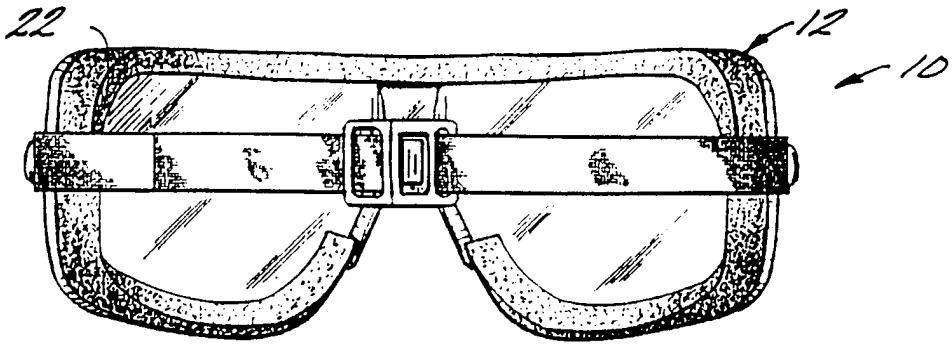


FIG. 5

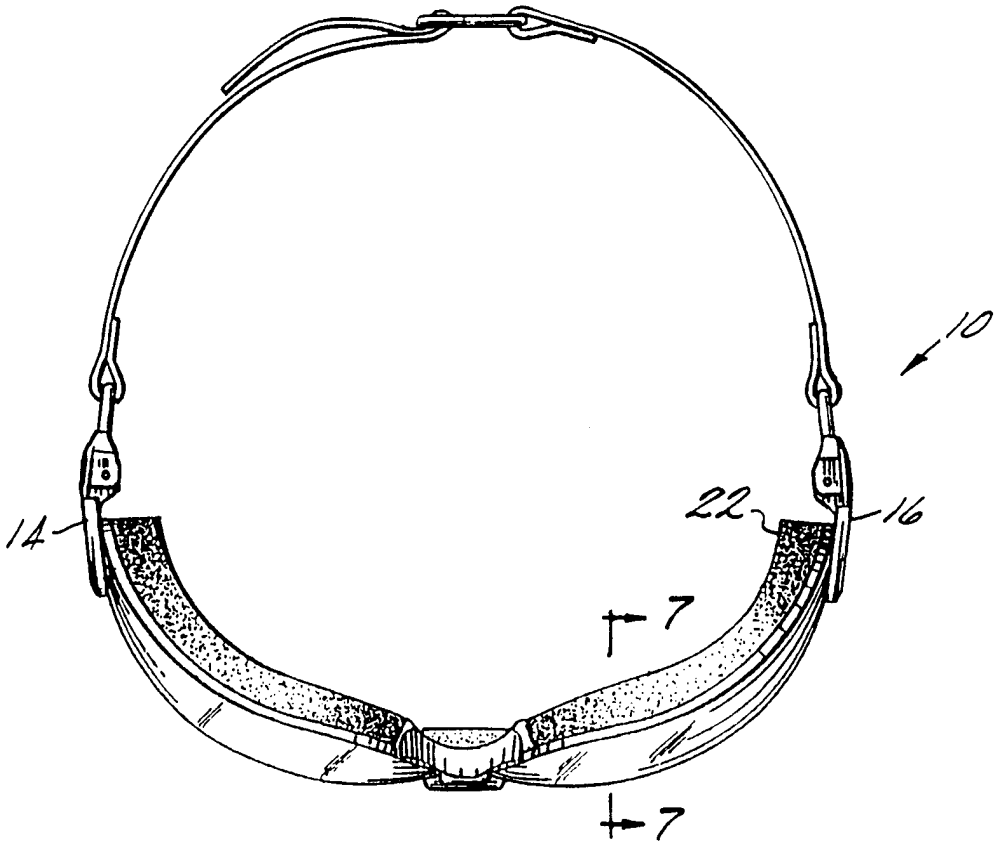


FIG. 6

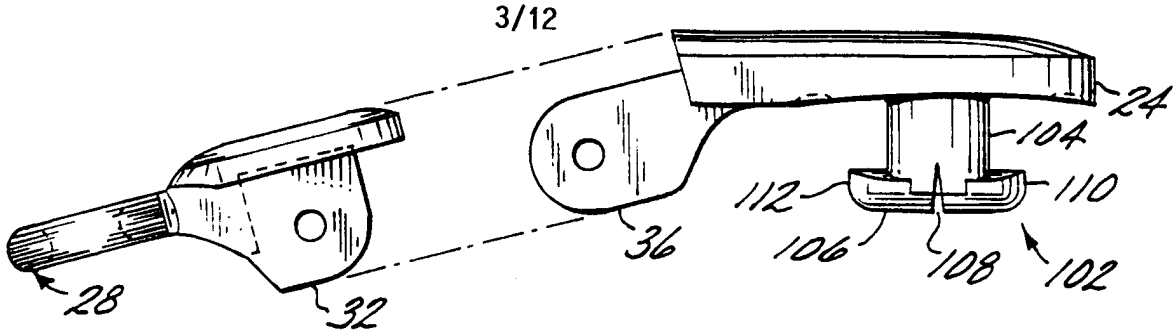


FIG. 8A

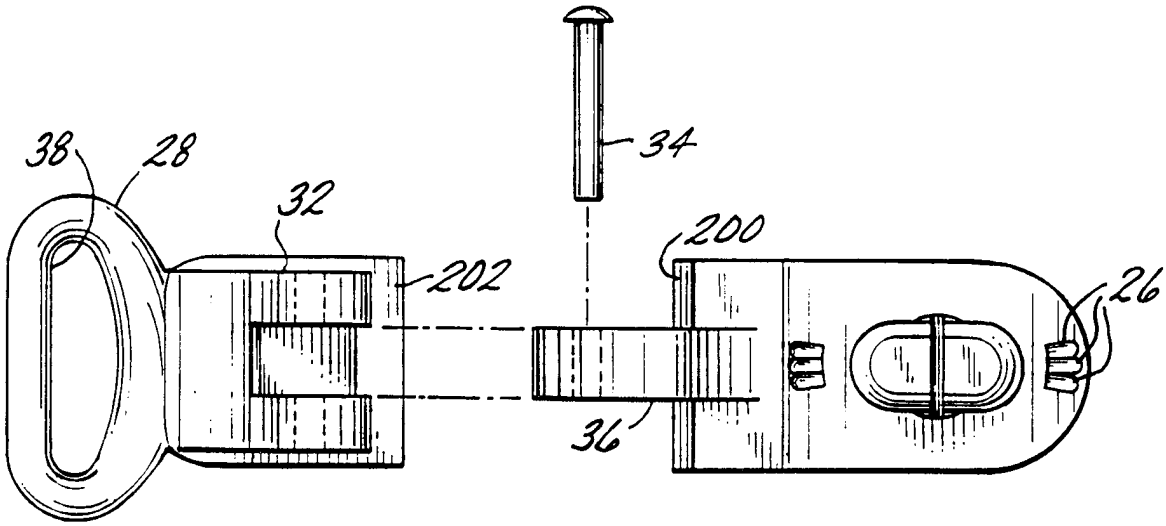


FIG. 8B

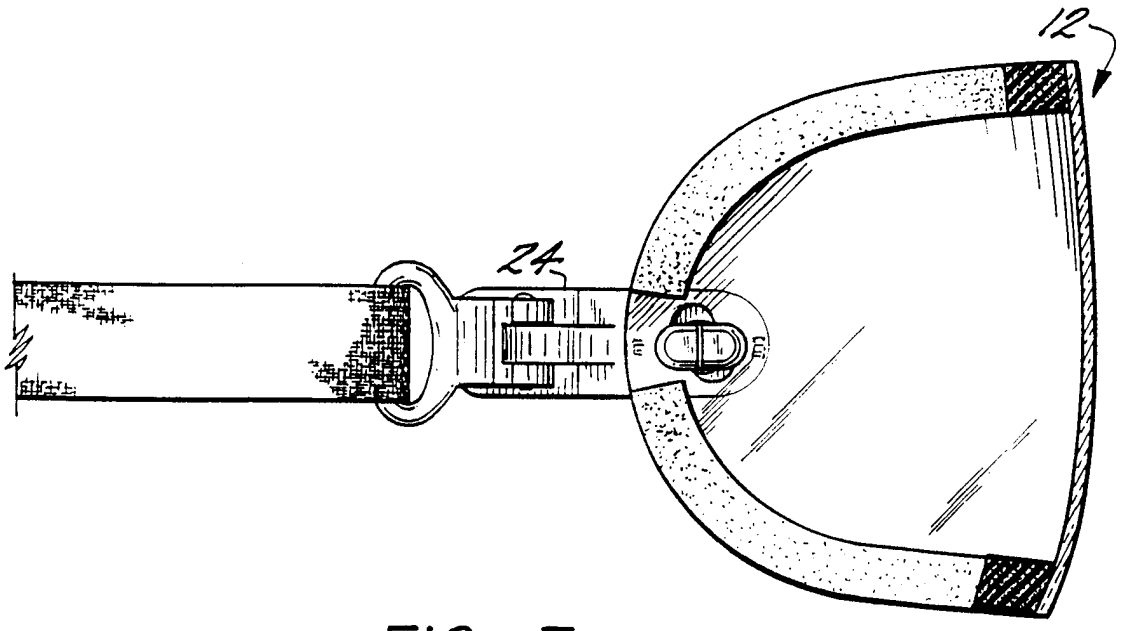


FIG. 7

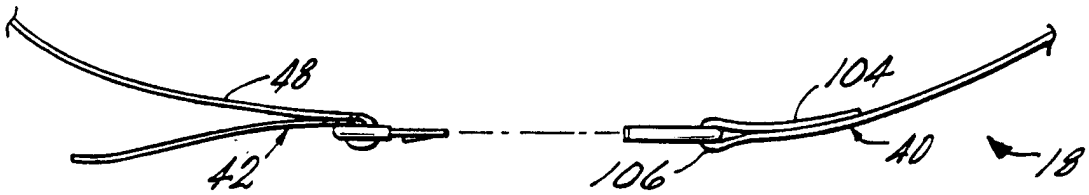


FIG. 9A

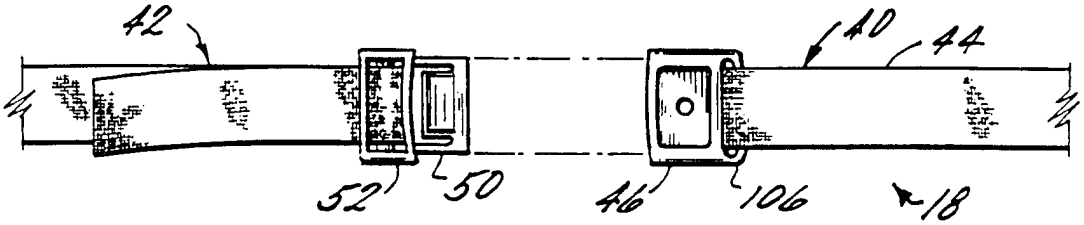


FIG. 9B

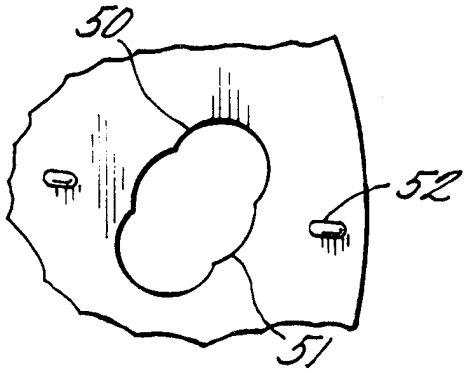


FIG. 8C

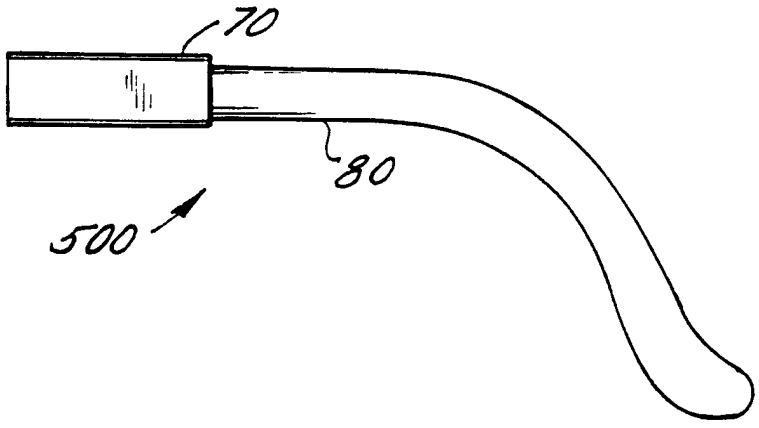


FIG. 24

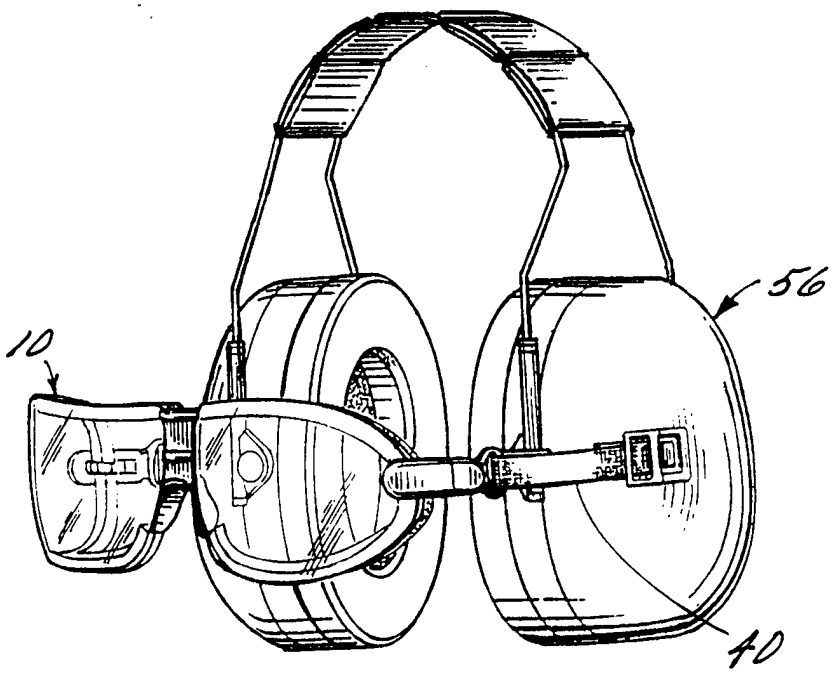


FIG. 10

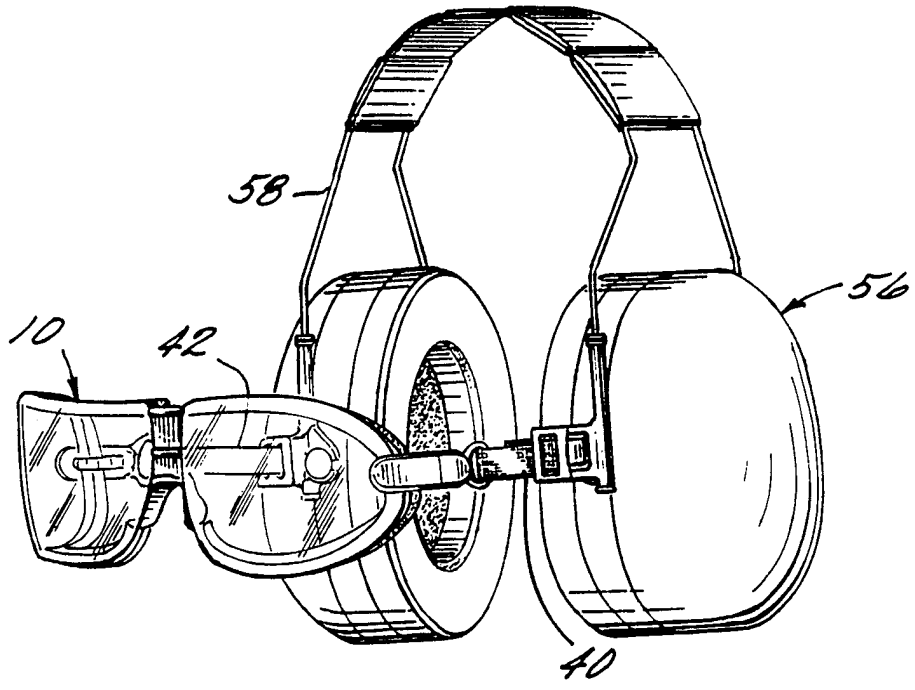


FIG. 11

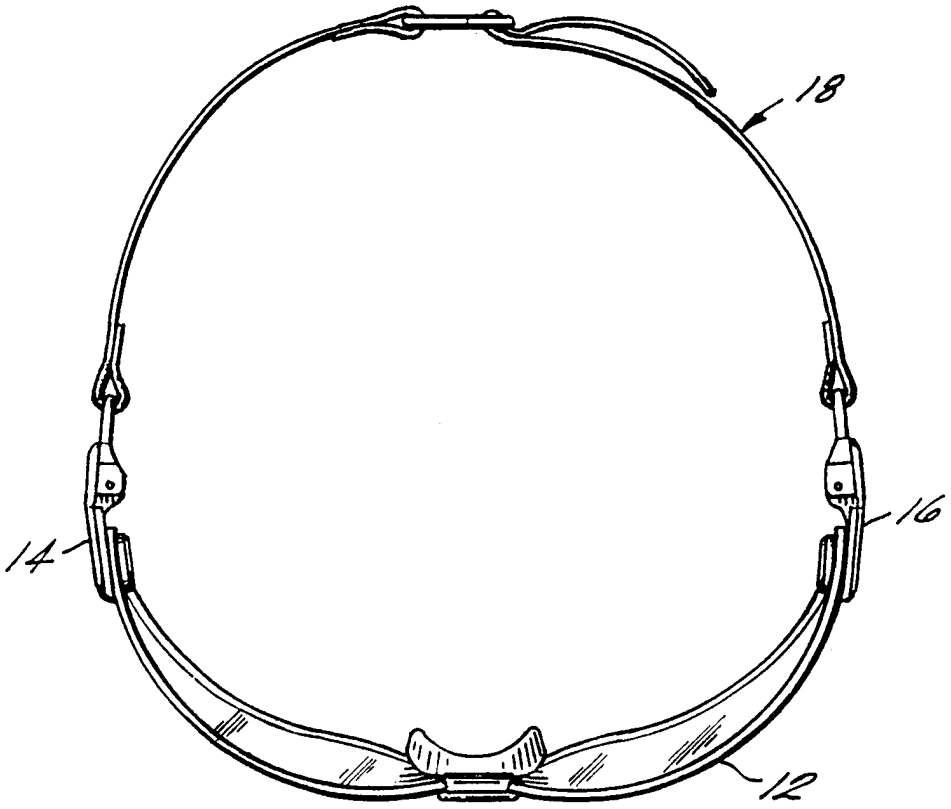


FIG. 12

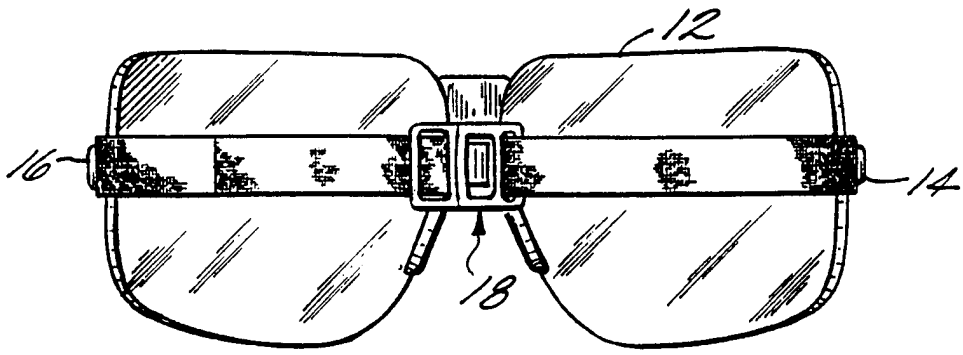


FIG. 13

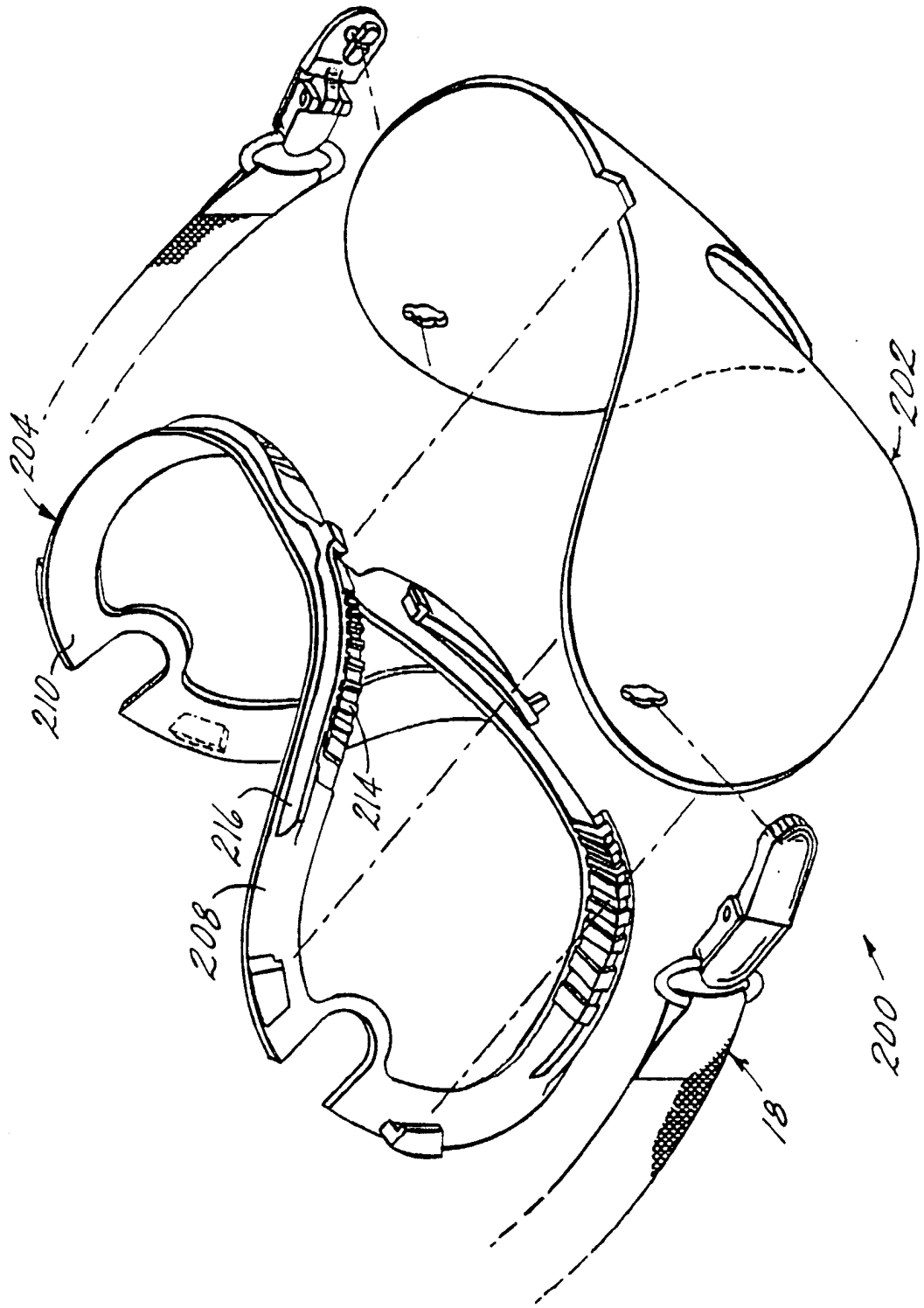


FIG. 14

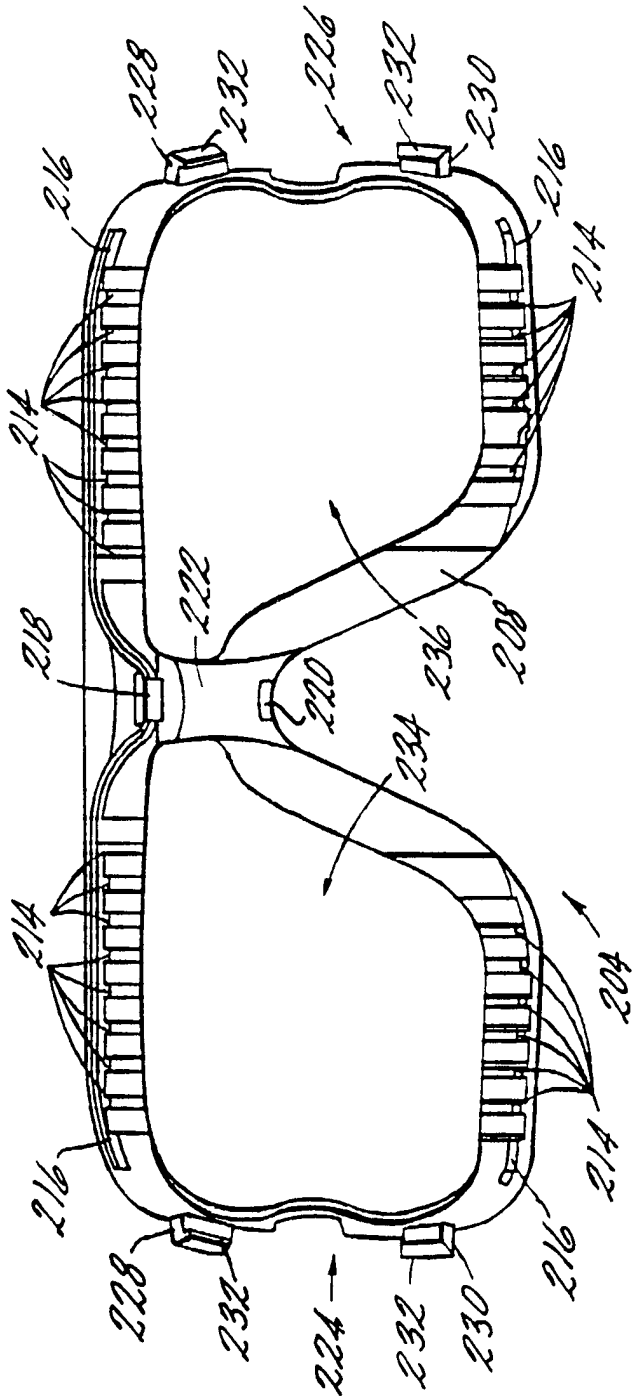
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FIG. 15

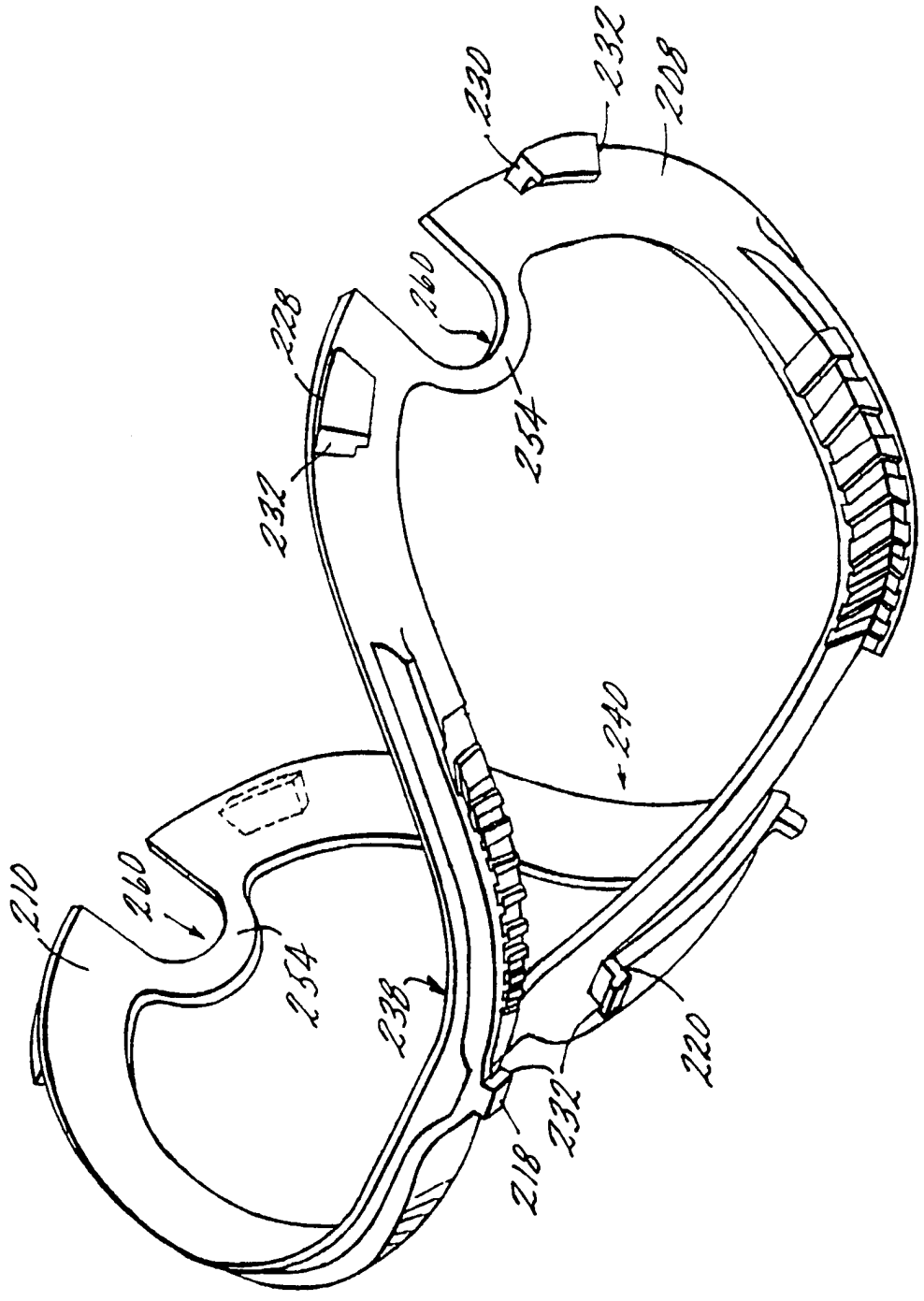


FIG. 16

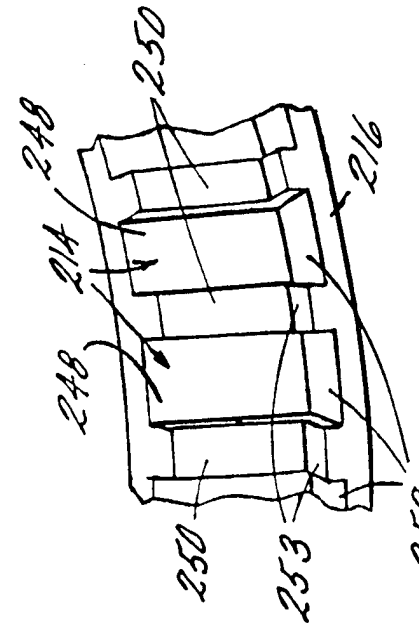
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FIG. 18

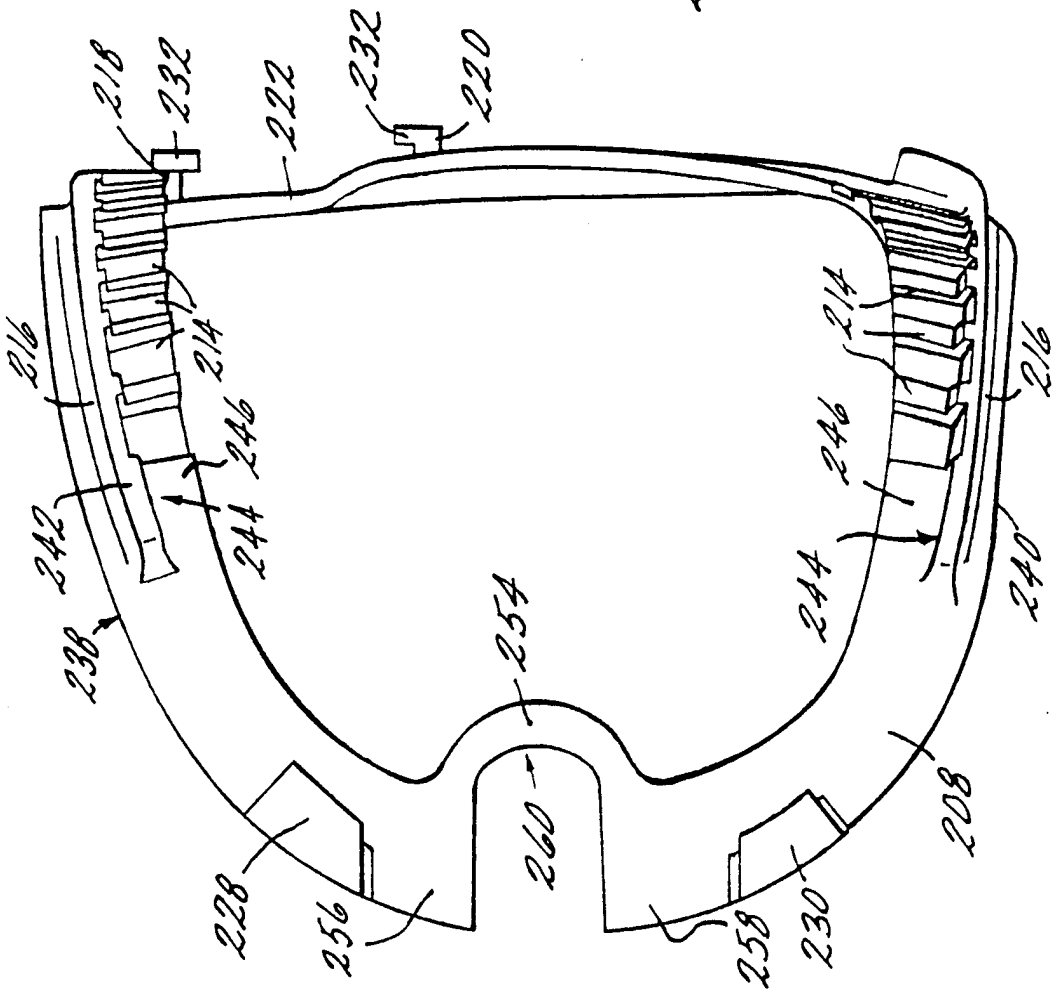
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FIG. 17

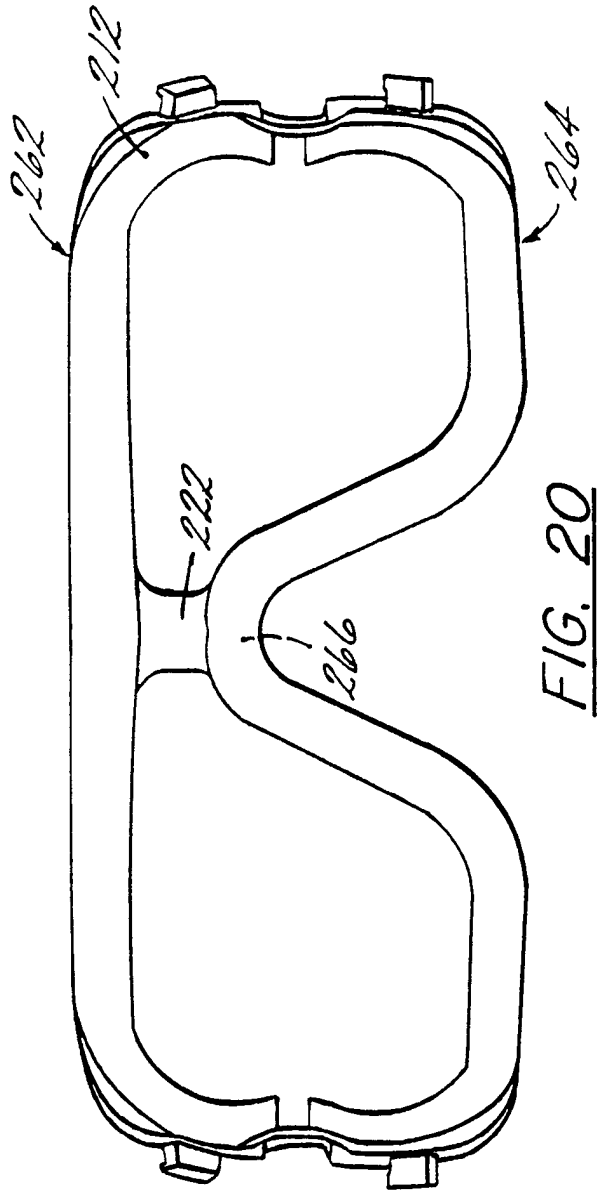


FIG. 20

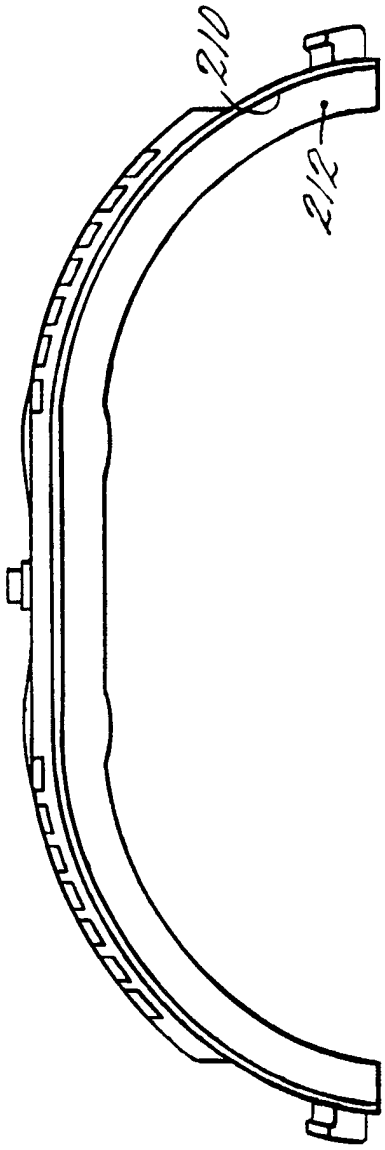


FIG. 19

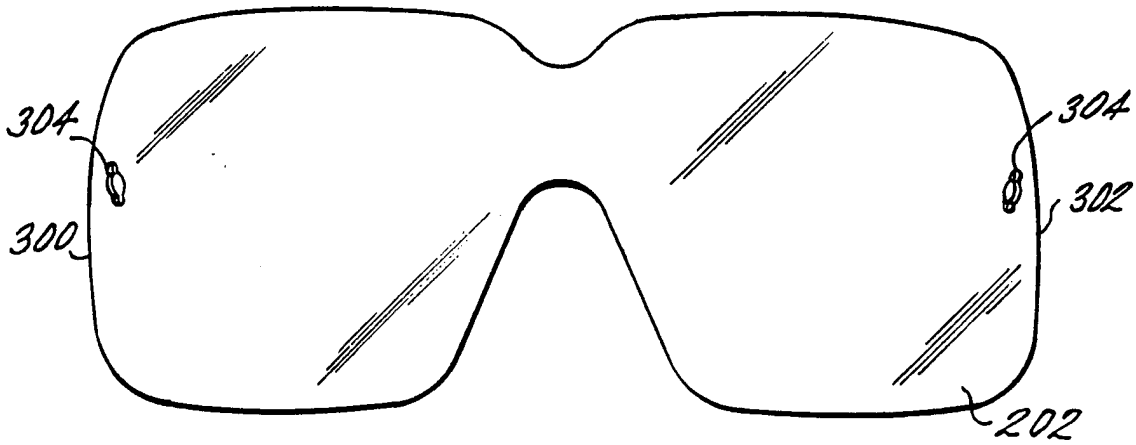


FIG. 21

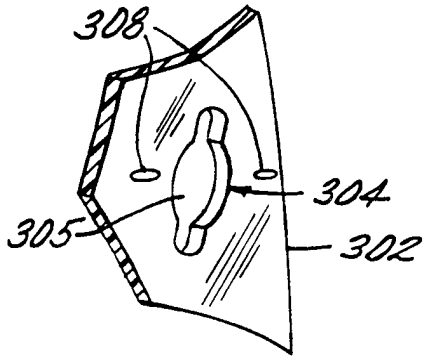


FIG. 22

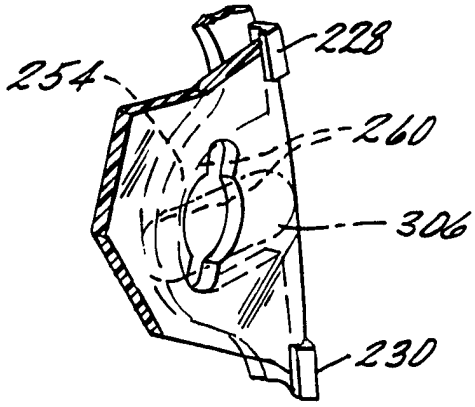


FIG. 23

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/03766

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :G02C 3/00, 5/14
US CL :Please See Extra Sheet.
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)

U.S. : 351/156, 120, 140, 142, 148, 149; 2/451, 452, 453

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)

APS
search terms: eyewear, spectacles, eyeglasses, goggles, lens, adjust?, strap, pantoscopic anglere, silient sealing

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X<br>---<br>Y | US 5,511,251 A (BRAKAS) 30 April 1996 (30.04.96), Figs. 1,2, column 3, line 1 through coulmn 4, line 35. | 1-4,11,14<br>---<br>5-8,10,12, 13 |
| X | US 4,683,587 A (SILVERMAN) 28 July 1987 (28.07.87), Figs. 1,2, column 2, lines 23-63. | 15-18,28,2 9,31-37 |
| X | US 4,977,627 A (METCALFE et al) 18 December 1990 (18.12.90), Figs. 1-4,6-11. | 19-27 |
| X<br>---<br>Y | US 3,708,224 A (LINDBLOM) 02 January 1973 (02.01.73), see entire document. | 19<br>---<br>30 |

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

| | | | |
|---|---|---|---|
| * | Special categories of cited documents: | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
| "A" | document defining the general state of the art which is not considered to be of particular relevance | "X" | document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone |
| "E" | earlier document published on or after the international filing date | "Y" | document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| "L" | document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "&" | document member of the same patent family |
| "O" | document referring to an oral disclosure, use, exhibition or other means | | |
| "P" | document published prior to the international filing date but later than the priority date claimed | | |

| | |
|---|---|
| Date of the actual completion of the international search<br>27 MAY 1998 | Date of mailing of the international search report<br>23 JUN 1998 |
| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br>Facsimile No. N/A | Authorized officer<br>HUY MAI<br>Telephone No. (703) 308-4874 |

Form PCT/ISA/210 (second sheet)(July 1992)*

**INTERNATIONAL SEARCH REPORT**

International application No.
PCT/US98/03766

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y,P | US 5,659,381 A (SIMIONI) 19 August 1997 (19.08.97), see entire document. | 5-8,10,12,13,30 |

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/03766

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

351/156, 62, 120, 140, 142, 148, 149, 158; 2/436, 437, 451, 452, 453