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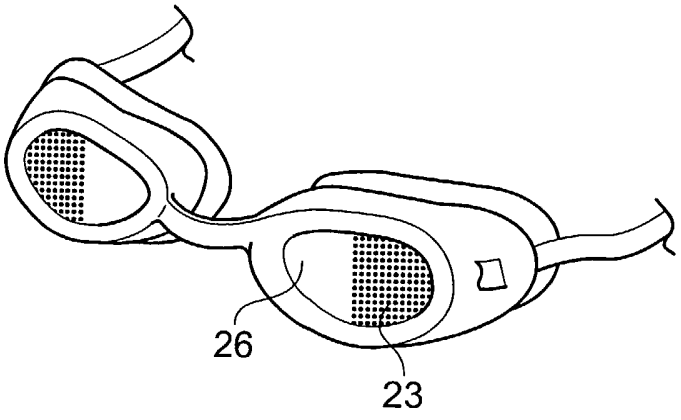
(54) Title: SWIMMING GOGGLES



(57) Abstract: Swimming goggles having left- and right-hand eye pieces (1) carry transparent flat lenses (2) which are tinted e.g. with a mirror tint to reduce their translucency for incident light. The tint is graded at different regions of the lens (2) to adapt for a swimmer's special needs. In particular goggles for a freestyle swimmer have a heavier tint at an outside region (23) of the lens than at an inside region (26) adjacent the nose. For breaststroke swimmers the tint can be heavier at the top than at the bottom of the lens.

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SWIMMING GOGGLES

This invention has to do with swimming goggles and masks. Preferred embodiments relate to conventional swimming goggles having two distinct eye portions linked by a flexible nose bridge. However the concept is also applicable with masks or goggles having a single face piece or window extending to cover both eyes, as will be apparent.

As the reader will be aware, conventional swimming goggles have eyepieces designed to be pressed firmly against the skin of the face around the eyes to effect a seal. Thus, the eyepiece is typically cup-shaped, with a forwardly-facing transparent flat lens or window mounted in a surrounding oblong frame having a rear sealing projection contoured to fit against the face. Often the rear projection includes or carries a flexible sealing lip to enhance comfortable sealing, but this is not always present. Indeed, one simple form of goggles provides the lens and frame as a single moulded cup-shaped unit of transparent resin e.g. polycarbonate. A tensionable retaining element such as a rubber or plastic (e.g. silicone) strap is connected to either side of the eyepieces to extend around the back of the head, preferably with a length adjustment, to press the goggles against the face.

The transparent lenses are usually colourless, but it is known for swimming goggles to have tinted lenses.

What we now propose are swimming goggles (or a swimming mask) having a transparent eyepiece including a lens portion, characterised in that different regions of the transparent eyepiece differ in translucency. Particularly, we prefer that translucency decreases

towards an edge of the transparent eyepiece, relative to the translucency at or towards an opposing edge. Preferably the regions of differing translucency are transparent regions. Preferably they are of the lens portion.

Regions of relatively reduced translucency are preferably provided by selective or graded tinting, darkening or reflectivity of those regions.

The translucent property relevant for present purposes is the transmissivity of visible light incident from the outside. To explain: the inventor has realised that when swimming, special issues arise concerning the reduction of bright light and glare. Swimmers are peculiarly subject to strong lighting from above and weak light from below. Also peculiar to swimmers are their horizontal bodily orientation, and a repeated change in the orientation of the face relative to the light, particularly for front strokes, during the movement of the stroke and especially when breathing. We have realised that for a swimmer, by selectively reducing the translucency of predetermined regions of the eyepiece, preferably of its transparent lens portion, taking into account the likely orientation of the swimmer's face relative to incoming light, it becomes possible to get a beneficial reduction in inconvenient glare without needlessly reducing the overall light reaching the eye for vision when facing away from the glare e.g. into the water.

Thus, for a swimmer using front crawl, undesirable glare from the sun or overhead lighting will be incident from the side of the face, according to the side on which they breathe. Conversely, for a swimmer using breast

stroke glare will be incident from above down the medial direction of the face.

Thus, in one embodiment the transparent portion of the eyepiece has lower translucency at the outside edge than at an adjacent region, e.g. at the centre and/or at the inside edge. Additionally or alternatively the translucency is lower at an upper edge than at a region below that, e.g. at the centre and/or at the lower edge.

Where the lower translucency is provided by tinted regions, the higher translucency regions may be less tinted or untinted. Thus, a lens portion may have a clear region and a tinted region. Note that the term tint is used here to encompass the use of partially-reflective treatments, unless the context indicates the contrary. Gradation of tint levels may be continuous or stepwise. For the visual comfort of the wearer it is preferred to grade the tint in more than one step, or continuously, thereby avoiding an apparent colour boundary in the field of view.

Where the lenses are tinted towards the side edges (for front crawl as mentioned above) they are preferably symmetrical, i.e. both tinted more towards the outside edge away from the nose. This then gives equal effect for breathing to either side. The benefit is not lost for the lower eye when breathing, since the lower convexity of the face masks it from downward glare.

Lenses with graded tint are known as such. For example sunglasses with a heavier tint at the top have been done before. US 5453100 describes one way of making lenses with a graded tint e.g. for skiing and snowboarding goggles, but there is no suggestion of the special utility now found for swimming in particular.

This new concept may be implemented in any kind of swimming goggles. One preferred embodiment uses lenses with a graded tint fitted in discrete frames which may in themselves be conventional; translucent or non-translucent. However the concept can also be implemented in one-piece eyepieces. Selective tinting may if wished be applied in relation to the rearwardly-extending portions of these, as well as or instead of the lens portions.

Examples of the inventions are now described in more detail with reference to the accompanying drawings, in which

Fig. 1 shows goggles adapted for use in the front crawl stroke;

Fig. 2 shows a different adaptation for front crawl, and

Fig. 3 shows goggles adapted for use in breast stroke.

Note that in this description the terms "front" and "rear" are used in relation to the face, meaning away from and towards the face respectively. The terms "inside" and "outside" are used laterally in relation to the nose, so that the "inside edge" of a lens is that edge region of the lens near to the nose or medial line of the face.

Fig. 1 shows goggles of a generally conventional layout, including a one-piece moulded plastic frame unit 1 including left and right frame portions 14 defining central openings for discrete lenses 2, a central flexible nose bridge 4, rearward extensions 15 to enclose a sealed space between the lens 2 and the wearers face, and integral flexible sealing lips 12 extending around the rear edge of the rearward extensions 15. The outer

parts 11 of the rearward extensions are prolonged rearwardly, at the sides of the face, and include anchors 13 for the ends of a length-adjustable rubber strap 3 which may take any conventional form, e.g. a double-looped strap with a sliding buckle.

This is just one possible (and conventional) construction. The skilled reader will be aware that many other frame constructions are available, e.g. having discrete seals on relatively rigid frame projections 15, whereas the present embodiment uses a generally deformable polymer e.g. polycarbonate, silicone, TPR, PVC or ABS for the entire frame unit 1.

The distinctive feature here is the lenses 2. These may be of conventional material, e.g. uniform thickness layers of cellulose ester (acetate, propionate) or other suitable polymer. Each lens 2 is tinted, e.g. with a conventional violet or other coloured tint, in such a way that the outer region 22 of the lens is more deeply tinted than the inner region 25 which is scarcely tinted. There is a continuous or multi-stage gradation of tint from the inner to the outer region. The lenses are symmetrical top-to-bottom, to reduce alignment complications during assembly, and the left and right lenses 2, 2′ are arranged symmetrically about the nose so that each has its most deeply tinted region towards the outside of the face. When a swimmer using the front crawl stroke comes up to breathe, in an indoor pool with strong lighting directed from above, such of that light as might reach the eye directly is reduced in intensity by the heavier tinting at the outer edge of the lens on the upper eye. The lower eye is not affected, being shielded from the light by the curve of the face.

Fig. 2 shows a variant with a simpler adaptation: an outer region (approximately half) of the area of the lens 23 is tinted (which may be a mirror tint, as mentioned) to a uniform degree, while an inner region 26 is entirely untinted.

Fig. 3 shows a further embodiment for use by breast stroke swimmers. Here, each lens has an upper region 24 more intensely tinted than a lower region 27. As in the embodiment of Fig. 1 the gradation of tinting is essentially continuous, but of course other modes of gradation can be used. As the swimmer lifts their head to breathe, light coming from above with greatest tendency to reach the eye directly, namely light coming through the upper part of the lens, is selectively reduced in intensity by the selective tinting so that the swimmer experiences less glare. At the same time, the other regions of the lens admit light relatively freely so that overall reduction in vision is minimised.

The lenses may be produced by any conventional process. One suitable process for the preparation of lenses, according to one embodiment in which the regions of relatively reduced translucency are provided by mirror tinted regions, is now described. The lens to be mirror tinted is first ultrasonically cleaned. A hard urethane coating is then applied to the lens surface and the coated lens cured. The curing can be effected by heating the lens in a oven at about 100°C for a period of 8-12 hours. The cured lenses are then masked to the appropriate angle for the desired graduated tinting. In the described process the application of the mirror tinting is then carried out using a coating machine. The coating machine typically comprises a vacuum chamber containing a metallic solution (e.g. sulphate, chromate).

On heating the metallic solution evaporates and is deposited onto the lens surface. The application of the mirror tinting takes about 4-12 hours depending on the extent of tinting required. Once the mirror coating has been applied the masking may be removed.

You will appreciate that other patterns of selective tinting may be developed in accordance with swimmer's styles and preferences. For example, the lenses may have a peripheral ring or part ring of tinting (e.g. right around the lens edge, or around the top and outside edge of the lens) bordering a less tinted or untinted central region.

CLAIMS:

1. Swimming goggles having a transparent eye piece including a lens portion (2), characterised in that different regions of the transparent eye piece differ in translucency.

2. Swimming goggles according to claim 1 in which the translucency at one edge of the lens portion (2) differs from that at an opposing edge of the lens portion.

3. Swimming goggles according to claim 1 or claim 2 in which the transparent portion of the eye piece (1) has lower translucency at the outside edge region than at an adjacent inside region.

4. Swimming goggles according to claim 1 or claim 2 in which the transparent portion of the eye piece (1) has lower translucency at an upper edge region than at a lower region.

5. Swimming goggles according to any one of the preceding claims comprising respective cup-shaped eye pieces in which flat lenses (2) are mounted in a surrounding oblong frame having a rear sealing projection (12) to fit against the face.

6. Swimming goggles according to claim 5 in which the rear sealing projection carries a flexible sealing lip (12).

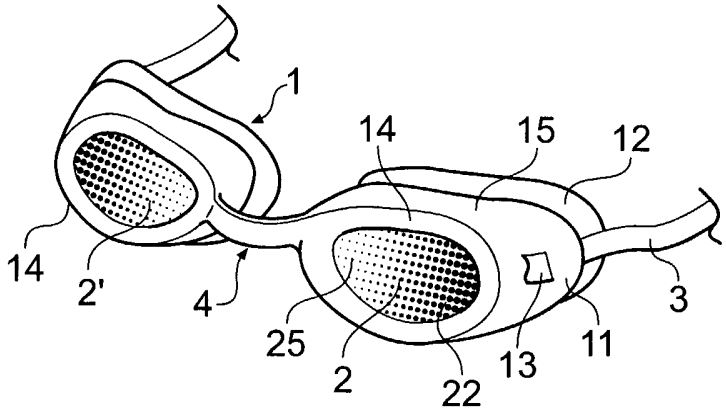

Fig. 1

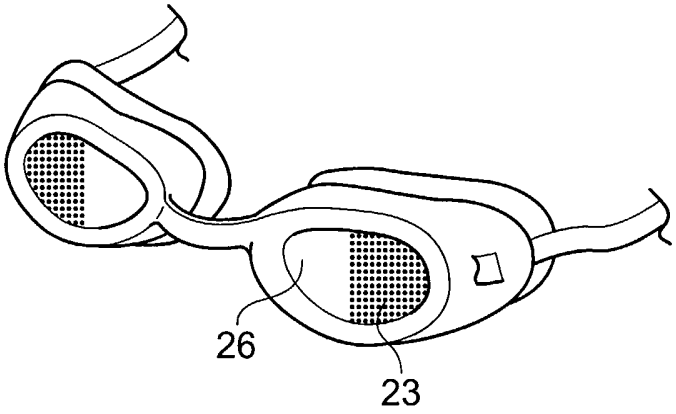

Fig. 2

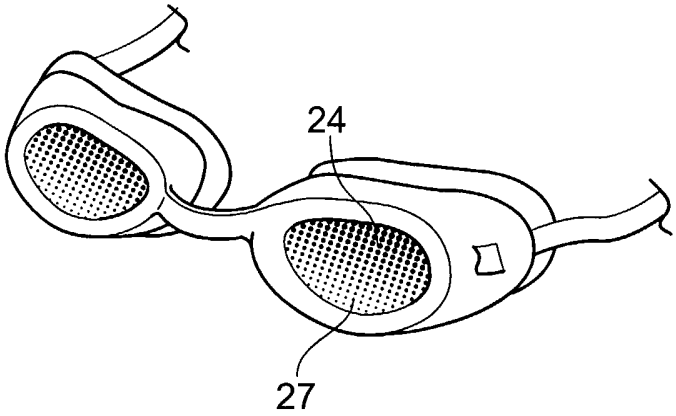

Fig. 3

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A63B33/00

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)
IPC 7 A63B B63C D06P G02C

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 practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 195 961 A (BEUCHAT PAUL) 8 March 1974 (1974-03-08) the whole document	1-4
Y	US 6 247 811 B1 (RHOADES JAMES ET AL) 19 June 2001 (2001-06-19) the whole document	1-6
Y	US 5 453 100 A (SIELOFF RONALD F) 26 September 1995 (1995-09-26) cited in the application the whole document	1-6
A	US 5 975 695 A (IORI GIUSEPPE ET AL) 2 November 1999 (1999-11-02) the whole document	1

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

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
30 June 2003	07/07/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Knoflacher, N

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 791 722 A (AHLBERG C ET AL) 12 February 1974 (1974-02-12) figure 10 -----	1

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Information on patent family members

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