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(54) Title: BUCKLE ASSEMBLY FOR ADJUSTING STRAPS FOR HEADGEAR

(57) Abstract

This invention relates to a buckle assembly (100, 200, 300, 400, 500) suitable for headgear such as swimming goggles of a type provided in combination with an elastic strap (115, 215, 215', 315, 415, 415', 515) having a set of equally spaced teeth, projections, transverse ridges (115a, 215a, 215a', 315a, 415a, 415a', 515a) or the like, arranged along the strap at least on the end portions of the strap, which enables easy adjustment of the length of the elastic strap. This invention also relates to a swimming goggle having such a buckle assembly.
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BUCKLE ASSEMBLY FOR ADJUSTING STRAPS FOR HEADGEAR

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to buckle assemblies for headgear adjustment straps, and in particular, to buckle assemblies for adjusting elastic straps for swimming goggles.

Description of the Prior Art

Currently available buckle assemblies for swimming goggles generally include a strap length-adjusting piece 17 which is formed on either, outer side portions of a lens frame 12 as shown in Fig. 1. Such strap length-adjusting piece 17 has at least two elongated openings through which ends of strap 15 pass. These through openings are disposed in a side-by-side relationship as shown in Fig. 2. Strap 15 is wrapped around a wall portion 17a between the two through openings. In order to enable strap 15 to be easily removed from the strap length-adjusting piece 17 to adjust length, the center portion of an outermost wall portion 17b is partially cut-out. Strap 15 is disposed in the strap length-adjusting piece 17 by passing a free end 15a of strap 15 through one of the openings which is adjacent to the lens part from the rear side of the piece, and then passing the same free end of the strap through the outermost opening.

A swimming goggle generally includes a lens assembly 13 having two lens frames 18 each having a lens part 11 fixed therein, with a nose bridge 14 connecting the inner sides of the lens frames. Head strap 15 connects the outer sides of the lens assembly 13. Each of the lens parts 11 generally has a silicon packing 12 provided on the wearer facing side thereof. Silicon packing 12 has a face engaging surface which is adapted to comfortably engage the wearer's face and compliantly follow the contour of the wearer's face due to its compressibility.

Accordingly, the wearer adjusts the length of the elastic strap by pulling one
end 15a of the elastic strap 15 which is wrapped around strap-supporting portion 17a of the strap length adjusting piece 17, usually before wearing the swimming goggle. Once worn, silicon packing 12 seals to the skin of the face so that water does not leak into the interior of each lens part. If the elastic strap is too tightly adjusted, silicon packing 12 presses excessively around the eyes, which may result in pain in the skin around the eyes. If elastic strap 15 is too loosely adjusted, water may leak into lens part 11 past the silicon packing 12. For these reasons, adjustments to the length of the elastic strap 15 is required before a swimming goggle is put on to apply adequate pressure to the face.

In swimming goggles having the above-described buckle assembly, a wearer cannot adjust the length of the elastic strap 15 while wearing the swimming goggle on his head. The wearer must take off the swimming goggle from his head to adjust the length of the elastic strap. This adjusting operation is often repeated several times which may be extremely inconvenient.

SUMMARY OF THE INVENTION

One object of the present invention is to overcome such problems with prior art buckle assemblies, and to provide a buckle assembly which makes tightening and loosening operations simpler, quicker and more convenient with a simple arrangement such that the operations may be accomplished with only one hand and ensures the highest functional reliability of the buckle assembly.

Another object of the present invention is to provide a swimming goggle provided with such a buckle assembly which enables the wearer to perform the tightening and loosening operations while wearing the swimming goggle on his head.

The invention achieves the above objects by providing a buckle assembly for releasably fixing a strap and having a plurality of width-wise ridges, comprising a buckle body further comprising a strap-supporting portion around which the strap is wrapped; a slider, slidable between a first position and a second position with respect to the strap-supporting portion; the slider further comprising a strap-pressing piece which presses down the strap against the strap-supporting portion in its first position; and wherein, when the strap is pulled, one of the ridges engages with the strap-pressing piece to move the slider to the second position and, when the strap is released, another one of the ridges is engaged with the strap-pressing piece to move the slider to the first position.

Other objects, features and advantages of the invention will be apparent from
the following detailed descriptions of the various embodiments taken in connection with the accompanying drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a perspective view of a prior art swimming goggle having a conventional strap length-adjusting piece.

FIG. 2 shows the prior art swimming goggle of Fig. 1 with its strap disengaged from the strap length adjusting piece.

FIG. 3 is a perspective view of the swimming goggle provided with a buckle assembly according to the first embodiment of the present invention.

FIG. 4 is an exploded perspective view of the different components of the swimming goggle shown in Fig. 3.

FIGS. 5 and 6 are elevated side views of a portion of the present swimming goggle for illustrating the operations of the buckle assembly according to a first embodiment of the present invention. Fig. 5 illustrates the fixed state of the buckle assembly after the length of the elastic strap has been adjusted, and Fig. 6 illustrates the released state allowing the adjustment of the length of the strap.

FIG. 7 is a cross-sectional view taken along line VII-VII in Fig. 5, depicting the slider in its first position.

FIG. 8 is a cross-sectional view taken along line VIII-VIII in Fig. 6, depicting the slider in its second position.

FIGS. 9 and 10 show the relative movements of the slider with respect to the buckle body of the buckle assembly of the first embodiment. Fig. 9 shows the first position of the slider, and Fig. 10 shows the second position of the slider.

FIGS. 11A, 11B and 11C are side, plan and bottom views, respectively, of the buckle body of the buckle assembly.

FIGS. 12A, 12B and 12C are side, plan and bottom views, respectively, of the slider of the buckle assembly.

FIG. 13 is a bottom view of a lens frame of the buckle assembly according to the first embodiment of the present invention.

FIG. 14 is a perspective view of a swimming goggle having a buckle assembly according to a second embodiment of the present invention.

FIG. 15 is an exploded perspective view of the different components of the swimming goggle shown in Fig. 14.

FIG. 16 is a perspective view of a swimming goggle having a buckle assembly
according to a third embodiment of the present invention.

FIG. 17 is an exploded perspective view of the different components of the swimming goggle shown in Fig. 16.

FIG. 18 is a perspective view of a swimming goggle having a buckle assembly according to a fourth embodiment of the present invention.

FIG. 19 is an exploded perspective view of the different components of the swimming goggle shown in Fig. 18.

FIG. 20 is a perspective view of a swimming goggle having a buckle assembly according to a fifth embodiment of the present invention.

FIG. 21 is an exploded perspective view of the different components of the swimming goggle shown in Fig. 20.

DETAILED DESCRIPTION OF THE INVENTION

Various embodiments of the present invention will be described with reference to the accompanying drawings. The buckle assembly is described with particular reference to embodiments which are applied to swimming goggles. However, it should be understood that the buckle assembly of the present invention can also be used in combination with any strap which has to be repeatedly tightened and loosened for adjusting its length.

The term "longitudinal" referred to herein is used to indicate the circumferential direction of a fully assembled swimming goggle as shown in Fig. 3. The term "transverse" referred to herein is used to indicate the direction perpendicular to the "longitudinal" direction.

First Embodiment

Figs. 3 and 4 illustrate perspective and exploded views of a swimming goggle having a buckle assembly 100 of the first embodiment of the present invention.

The swimming goggle comprises a lens assembly 113 comprised of a pair of lens parts 111 and a pair of lens frames 118 each combining a lens part 111 therein, and an elastic strap 115 for holding the swimming goggle on a person's head.

According to this embodiment, the buckle assembly 100 is detachably attached on each outer side portion of the lens assembly 113 to connect the lens assembly 113 and the elastic strap 115. In order to fasten the buckle assembly 100 on the outer side portion of the lens assembly 113 as shown in Fig. 4, fastening means such as spaced
apart projections 118a are provided on each outer side portion of the lens parts 111. Between these projections 118a are press fitted spaced ribs 118b (Fig. 13) integrally formed on the bottom side of the lens frame 118, which will be further described hereinbelow. In this manner, the slider 117 can be maintained in a slidable relationship with respect to the buckle body 119 between the outer side portion of a lens part 111 and a lens frame 118.

The buckle assembly 100 of this embodiment comprises a buckle body 119 including a strap-supporting portion 119a around which a strap 115 is wrapped, and a slider 117 which is slidable between a first position and a second position with respect to the strap-supporting portion 119a and which also has a strap-pressing piece 117b (Fig. 12C) integrally formed on its bottom side for pressing down strap 115 against the strap-supporting portion 119a when the slider 117 is in its first position. The lens frame 118 is fastened on the outer side portion of the lens assembly 113 by means of the spaced ribs 118b so as to prevent the buckle body 119 and the slider 117 from being removed from the lens assembly 113.

The buckle body 119, the slider 117 and the lens frame 118 adapted for the buckle assembly 100 of this embodiment will next be described in greater detail.

Referring to Figs 11A, 11B and 11C, side, plan and bottom views of the buckle body 119 according to this embodiment are shown. As shown in Fig. 11B, the buckle body 119 is comprised of a generally rectangular flat plate member having an elongated first guide rail 119b which extends longitudinally along a center line of the plate member and projects outwardly therefrom, and a pair of second guide sections 119i extending parallel to and on both sides of the first guide rail 119b. On one side end of the buckle body 119, a rectangular opening 119c is provided to define the strap-supporting portion 119a. The outwardly directed latch hook 119d is provided at the distal end of the first guide rail 119b for interengagement with the lens frame 118. Intermediate of the first guide rail 119d, a raised boss 119e is provided. The raised boss 119e has an angled or chamfered surface 119f on the side facing the latch hook 119d. A pair of first stoppers 119h are protruded from the outside corner at one end of each second guide section 119i. The pair of first stoppers 119h define the slider's first position. At the corner of the other end of each second guide section 119i, a pair of second stoppers 119g are formed opposite to the pair of first stoppers 119h. The pair of second stoppers 119g define the slider's second position. An upper surface of the body between the first stoppers 119h and the second stoppers 119g defines a sliding surface over which the slider described hereinafter slides.

Referring to Figs. 12A, 12B and 12C, side, plan and bottom views of the slider
117 which slides on the above-described buckle body 119, are shown. Referring to
Fig. 12C illustrating the bottom side of the slider 117, the slider 117 comprises a pair
of first sliding elements 117a sliding on the second guide sections 119i between the
first position (Fig. 9) in which the sliding elements 117a abut against the pair of first
stoppers 119h, and the second position (Fig. 10) in which the sliding elements 117a
abut against the pair of second stoppers 119g with the first guide rail 119b guiding the
sliding motion of the slider 117. The slider 117 also comprises a center second sliding
element 117c sliding along the first guide rail 119b of the buckle body 119. An arched
common portion 117d interconnects the pair of first sliding elements 117a and the
second sliding element 117c. When the slider 117 is slidably located on the buckle
body 119, the first sliding elements 117a of the slider 117, slide on the second guiding
sections 119i between the pair of first and second stoppers. From the bottom side of
a slider 117, an integrally formed strap-pressing piece 117b extends downwardly at a
position facing the strap-supporting portion 119a when the slider 117 is positioned in
the first position with respect to the buckle body 119.

Referring to Fig. 12A, it is shown that the arched common portion 117d
interconnects outer ends of the pair of first sliding elements 117a and a second sliding
element 117c. As shown in Fig. 5, the arched portion 117d is shaped to mate with the
lens frame 118 in a fully assembled buckle assembly. When the lens frame 118 is
positioned onto the slider 117, the outer surface of a lens frame 118 forms a smooth
curved surface together with that of the arched common portion 117d, thereby
providing a simple and functional design, which is preferable for a swimming goggle.
Additionally, a triangular projection 117e may be provided on the outer surface of the
common portion 117d which may be engaged by a finger of a user. This triangular
projection 117e may enhance friction between the outer surface of the common portion
117d and the finger of the user, and thus, may assist in sliding the slider 117.

In the first position, the sliding elements 117a abut against the pair of first
stoppers 119h (Fig. 9). In the second position, the sliding elements 117a abut against
the pair of second stoppers 119g (Fig. 10).

In the first position shown in Fig. 9, the strap-pressing piece 117b integrally
formed on the bottom side of the slider 117 is positioned opposite to the strap-
supporting portion 119a with a distance to press more than a half width of the strap
115. In this position, the strap 115 wrapped around the strap-supporting portion 119a
is pressed against the strap-supporting portion 119a by the strap-pressing piece 117b
as shown in Fig. 7. In addition, when the length of the strap 115 is loosened, the
slider 117 can be moved to slide to a second position as shown in Fig. 10. In this
position, the clearance between the strap-pressing piece 117b and the strap-supporting portion 119a becomes larger, thus the strap 115 can move more easily therebetween.

In the following, the details of the lens frame 118 will be described. The lens frame 118 is fastened in the above-described spaced apart projections 118a provided on the outer side portion of the lens part 111 with the buckle body 119 and the slider 117 interposed therebetween. On the bottom side of the outer side portion of the lens frame 118, a mounting piece for press-fitting between the projections 118a is provided as shown in Fig. 13. The mounting piece is shaped as spaced ribs 118b so as to be relatively flexible to the more rigid projections 118a. A groove 118c in which the second sliding element 117c engages when a slider 117 slides over a buckle body 119 in a fully assembled state, extends longitudinally on the bottom side of the outer side portion of the lens frame 118. In addition, a recess 118d is formed in the groove 118c at a position where the raised boss 119e provided on the center rail 119b is located. A mating portion 118f which engages the latch hook 119d in a mechanical interlocking engagement is formed between the spaced ribs 118d.

On both ends of the elastic strap 115, a plurality of transverse ridges 115a are equally spaced on the surface opposing the strap-pressing piece 117b. When at least one end of the elastic strap 115 is pulled in a tightening direction, one of the ridges on the stretching strap engages the strap-pressing piece on the bottom side of the slider and moves the slider to its second position. When the strap is released, the strap contracts and simultaneously one of the other ridges pushes the strap-pressing piece 117b to move the slider 117 to its first position. These ridges 115a have a height sufficient to be engaged by the strap-pressing piece. While the strap-pressing piece 117b moves by engagement with one of the ridges 115a on the contracting strap 115, the slider 117 having the strap-pressing piece 117b integrally formed on the bottom side thereof slides from its second position to its first position. In the first position of the slider, the length of the elastic strap 115 is fixed since the strap-pressing piece 117b is pressed against the strap-supporting portion 119a.

Same parts may be used to provide two opposite buckle assemblies, for example to the right and to the left of the swimming goggle. The parts employed for each of the buckle assembly are substantially identical to each other.

When the strap is used to tighten the lens assembly to the head of a wearer, for example in a swimming goggle, the strap contacts the head with its smooth face. Teeth, projections, ridges or the like are provided only on a predetermined portion at both ends of the strap.

The wearer may perform the tightening and loosening operations while wearing
the swimming goggle of this embodiment on his head, in a simpler, quicker and more convenient way.

Second Embodiment

Referring to Figs. 14 and 15, a swimming goggle having a buckle assembly 200 according to a second embodiment of the present invention is shown in perspective and exploded views, respectively.

As shown in the drawings, two straps 215 and 215' each of which having a plurality of width-wise ridges 215a and 215a' are coupled to each end of respective lens part 211. Each of the elastic straps 215 and 215' is wrapped around respective first and second strap-supporting portions 219a and 219a' both formed in a single buckle assembly 200. The buckle assembly 200 of this embodiment is separately formed from the lens assembly 213.

The buckle assembly 200 of this embodiment comprises a buckle body 219 having the first and a second strap-supporting portions 219a and 219a' wrapped around by the first and second straps 215 and 215', respectively. A first and a second sliders 217 and 217' are slidable between the first position and second position with respect to a first and a second strap-supporting portions 219a and 219a', respectively. The first and second sliders 217 and 217' have the first and second strap-pressing pieces 217b and 217b' integrally formed on each of their bottom side in order to press first and second straps 215 and 215' against the first and second strap-supporting portions 219a and 219a' when first and second slider 217 and 217' are in their first positions, such that straps 215 and 215' are prevented from being released in their loosening direction. The buckle assembly 200 further comprises a slider cover 218 which prevents the first and second sliders being disengaged from the buckle body 219.

The buckle body 219 is generally a rectangular flat plate member. Two openings 219c and 219c' are formed at both ends of the buckle body 219 to provide the first and second strap-supporting portions 219a and 219a' around which the first and second straps 215 and 215' are wrapped, respectively. A guide section 219b extends longitudinally along the center of the buckle body 219 between the two openings 219c and 219c'. A pair of first stoppers 219h are formed on both sides at one end of the guide section 219b. These first stoppers 219h have a height higher than that of the guide section 219b. A second stopper 219g is formed on the other end of the guide section 219b. The range of the sliding motion of the first slider 217 is defined between the first stopper pair 219h and the second stopper 219g.

As shown in Fig. 15, the first slider 217 comprises a longitudinally extending
body 217a having a surface facing the guide section 219b of the buckle body 219, a first transverse extension 217c provided on one end of the body 217a, and a second transverse extension 217c' provided on the other end of the body 217a. The first transverse extension 217c abuts against the second stopper 219g in its first position and against the first stopper pair 219h in its second position. The second transverse extension 217c' abuts against the first stopper pair 219h in its first position, and has a height higher than the other portions of the first slider 217. In addition, the first strap-pressing piece 217b is integrally formed on the bottom side of the first transverse extension 217c, and the second strap-pressing piece 217b' is integrally formed on the bottom side of the second transverse extension 217c'.

When the first slider 217 slides along the guide section 219b, the body 217a of the first slider 217 passes between the first stopper pair 219h and slides until it abuts against the second stopper 219g.

The second slider 217' is a generally rectangular frame composed of four frame elements, two longitudinal frame elements and two transverse frame elements. Opposing surfaces of a pair of longitudinal elements 217a' support both ends of the first transverse extension 217c of the first slider 217. One of the transverse frame element has a cut-out portion 217d dimensioned in such a way as to allow the passage of the body 217a of the first slider 217 while preventing the passage of the first transverse extension 217c therethrough. After the first slider 217 is positioned on the buckle body 219, the second slider 217' is placed on the first slider 217 such that the first transverse extension 217c cannot pass through the cut-out portion 217d of the second slider 217' while sliding to their second positions.

In addition, the slider cover 218 holds the first and second sliders 217 and 217' in their assembled state with respect to the above-described buckle body 219. The slider cover 218 in this embodiment is a tube like element having a rectangular cross-section. In one of its four sides, a longitudinal cut-out 218b extending the entire length is formed. This longitudinal cut-out 218b may be elastically opened apart, for the receipt of the buckle body 219 and the first and second sliders 217 and 217'.

The swimming goggle of this embodiment also enables the wearer to tighten and loosen adjustments while wearing the swimming goggle on his head.

Third Embodiment

Referring to Figs. 16 and 17, a swimming goggle having a buckle assembly 300 according to the third embodiment of the present invention is shown in a perspective view and an exploded perspective view, respectively.
In this embodiment, a strap-supporting portion 319a is formed on each end of a lens part 311, together with two spaced projections 318a for fastening a lens frame thereto, as shown in Fig. 17.

A pair of parallel guideways 317c are formed on an outer side portion of the lens frame 318 for guiding the sliding motion of the slider 317 between its first and second positions. A slider 317 comprises a pair of leg portions 317e slidable along the guideways 317c with each of leg portions inserted therein. A strap-pressing piece 317b is separately formed from the slider 317, and is coupled to the leg portions 317e of the slider 317 inserted into the guideways 317c. Strap-pressing piece 317b is adapted to press the strap 315 against the strap-supporting portion 319a when the slider 317 is in its first position.

When the elastic strap 315 is pulled, the strap stretches and simultaneously one of said ridges 315a engages with said strap-pressing piece 317b to move said slider 317 to said second position, and when the elastic strap 315 is released, the strap contracts and simultaneously another one of the ridges 315a engages with the strap-pressing piece 317b to move the slider 317 to the first position. Thus, strap 315 is automatically fixed in the adjusted length when the strap 15 is released.

Fourth Embodiment

Referring to Figs. 18 and 19, a swimming goggle having a buckle assembly 400 according to a fourth embodiment of the present invention is shown in a perspective view and an exploded perspective view, respectively.

As depicted in the drawings, two straps 415 and 415’ each of which has a plurality of width-wise ridges 415a and 415a’ are coupled to each end of respective lens part 411. Each of the elastic straps 415 and 415’ is wrapped around respective first and second strap-supporting portions 419a and 419a’ both formed in a single buckle assembly 400. The buckle assembly 400 of this embodiment is separately formed from the lens assembly 413.

A swimming goggle of this embodiment comprises a lens assembly 413 comprised of a pair of lens parts 411 and a pair of lens frames 418 each of which is coupled to respective lens part 411, two elastic straps 415 and 415’ each of which is coupled to an end of respective lens part 411 and has a plurality of width-wise ridges 415a and 415a’, and a buckle assembly 400 to which two straps 415 and 415’ are connected.

A buckle body 419 of the buckle assembly 400 comprises a flat plate, a slider guiding plate 419k extending in a spaced, parallel relationship with respect to the flat
plate, and a post 419j maintaining the flat plate and the slider guiding plate 419k in such a spaced relationship. The slider guiding plate 419k is provided with a pair of longitudinal first guideways 417c and a pair of longitudinal second guideways 417c' guiding the sliding motions of the first and second sliders 417 and 417' between their first position and second positions, respectively.

A first slider 417 comprises a pair of first leg portions 417e slidable along the first guideways 417c with each of the first leg portions inserted therein. A second slider 417' comprises a pair of second leg portions 417e' along the slidable second guideways 417c' with each of the second leg portions inserted therein.

First and second strap-pressing pieces 417b and 417b' are separately formed from the first and second sliders 417 and 417' and are coupled to the first and second leg portions 417e and 417e' of the first and second sliders 417, 417' inserted into respective first and second guideways 417c and 417c'.

Each of the first and second slider 417 and 417' slides along respective first and second guideways 417c and 417c' between a first position and a second position, respectively. When the first and second sliders 417 and 417' are in their first positions, their first and second strap-pressing pieces 417b and 417b' press the straps 415 and 415' against the first and second strap-supporting portions 419a and 419a' and fix the length of the straps, respectively.

Fifth Embodiment

Referring to Figs. 20 and 21, a swimming goggle having a buckle assembly 500 according to a fifth embodiment of the present invention is shown in a perspective view and an exploded perspective view, respectively.

According to this embodiment, a strap-supporting portion 519a is formed on an outer side end of a lens part 511. On an outer side portion of the lens part 511, a post 519b for sliding along an elongated guiding slot 517c of a slider 517 is provided. From an end of the guiding slot 517c, an integrally formed band pressing piece 517b extends downwardly and is adapted to press the strap 515 wrapped around the band supporting portion 519a against the strap-supporting portion 519a. A lens frame 518 is adapted to be snap fitted on each lens part 511. A slider 517 is placed between the lens frame 518 and an outside surface of the lens part 511.

The above description clearly shows the advantages of the present invention. The advantageous effects are the simplicity and easiness of the tightening and loosening operations. Moreover, the considerable simplicity of the parts comprising the buckle
assembly contributes to operational reliability and extended life, as well as simplicity for the buckle assembly itself. The parts comprising the buckle assembly may all be manufactured as molded plastic parts made of a durable material, generally little affected by influences of external factors such as chlorine, salt water and the like. However, the materials used to fabricate the buckle assembly may also be of other types, depending on the field of use. Such alternate materials are considered within the scope and spirit of the present disclosure.

From the foregoing, it is also appreciated that the buckle assemblies are not confined to be used with any particular types of straps. Rather, specific materials for particular purposes can be used for the straps. By way of example, an elastic strap was shown.

In addition, the buckle assemblies of the present invention do not have excessive space or volume requirements and can be advantageously used in an article such as a swimming goggle having limited space for buckle assembly attachment. A buckle assembly according to the present invention can be fabricated of a size at least equal to or slightly smaller than usual buckle assemblies.

Although the buckle assembly of the present invention is described for use in combination with a swimming goggle, its use is not limited thereto, and may be provided on any article in combination with any strap which has to be repeatedly tightened and loosened.

The invention is not intended to be limited to the embodiments described and illustrated herein and may be greatly varied especially with regard to construction without departing from the guiding principles disclosed above and claimed below.
What Is Claimed Is:

1. A buckle assembly (100; 300; 500) for releasably fixing a strap (115; 315; 515) and having a plurality of width-wise ridges (115a; 315a; 515a), comprising:
   a buckle body (119; 319; 519) further comprising a strap-supporting portion (119a; 319a; 519a) around which said strap (115; 315; 515) is wrapped;
   a slider (117; 317; 517), slidable between a first position and a second position with respect to said strap-supporting portion (119a; 319a; 519a);
   said slider (117; 317; 517) further comprising a strap-pressing piece (117b; 317b; 517b) which presses down said strap (115; 315; 515) against said strap-supporting portion (119a; 319a; 519a) in its first position; and
   wherein, when said strap (115; 315; 515) is pulled, one of said ridges (115a; 315a; 515a) engages with said strap-pressing piece (117b; 317b; 517b) to move said slider (117; 317; 517) to said second position and, when said strap (115; 317; 517) is released, another one of said ridges (115a; 315a; 515a) is engaged with said strap-pressing piece (117b; 317b; 517b) to move said slider (115; 315; 515) to said first position.

2. A swimming goggle comprising:
   a lens assembly (113) further comprised of a pair of lens parts (111) and a pair of lens frames (118) each of which is coupled to said respective lens part (111);
   an elastic strap (115) having a plurality of width-wise ridges (115a);
   a buckle assembly (100) such as substantially defined in Claim 1 connecting said lens assembly (113) and said elastic strap (115);
   a means (118a) for fastening said lens frame (118) formed on an outer side portion of each of said lens parts (111);
   said buckle body (119) further comprising a first guide section (119b) longitudinally extending along a center line on an upper surface thereof, a pair of second guide sections (119i) extending parallel to and on both sides of said first guide section (119b), a first stopper (119h) formed on one end of said second guide section (119b) to define said first position of said slider (117), and a second stopper (119g) formed on the other end of said second guide section (119i) and facing said first stopper (119h) to define said second position of said slider (117); and
   said slider (117) further comprising a pair of first sliding elements (117a) slidable over said second guide sections (119i), said first sliding elements abutting against said first stopper in said first position and abutting against said second stopper
in said second position, and a second sliding element (117c) slidable over said first guide section (119b).

3. A swimming goggle comprising:

a lens assembly (313) comprised of a pair of lens parts (311) and a pair of lens frames (318) each of which is coupled to said respective lens part (311);

an elastic strap (315) having a plurality of width-wise ridges (315a);

a buckle assembly (300) substantially as defined in Claim 1 connecting said lens assembly (313) and said elastic strap (315);

a means (318a) for fastening said lens frame (318) and said buckle body (319), formed on an outer side portion of each said lens parts (311);

said lens frame (318) having a pair of longitudinal guideways (317c) formed on an outer side portion thereof for guiding the sliding motion of said slider (317) between said first position and second positions; and

said slider (317) comprising a pair of leg portions (317e) slidable along said guideways (317e) with each leg portion inserted therein.

4. The swimming goggle as claimed in Claim 3, wherein said strap-pressing piece (317b) is separately formed from said slider (317) and is coupled to said leg portions (317e) of said slider (317) and inserted into said guideways (317c).

5. A buckle assembly (200; 400) for releasably fixing a first and a second elastic straps (215 and 215; 415 and 415'), each of which has a plurality of width-wise ridges (215a and 215a; 415a and 415a'), comprising:

a buckle body (219; 419) comprised of a flat plate having a first and a second strap-supporting portions (219a and 219a; 419 and 419a') around which said first and second elastic straps (215; 415) are respectively wrapped, on both side-ends thereof;

a first and a second slider (217 and 217'; 417 and 417'), slidable between a first position and a second position with respect to said first and second strap-supporting portions (219a and 219a; 419 and 419a'), respectively;

said first and second sliders (217 and 217'; 417 and 417') including a first and a second strap-pressing piece (217b and 217b; 417b and 417b') which presses down said first and second straps (215 and 215; 415 and 415') against said first and second strap-supporting portions (219a and 219a; 419 and 419a'), respectively, in their first position;

wherein, when said first elastic strap (215; 415) is pulled, said strap is stretched
and simultaneously one of said ridges (215a; 415a) engages said first strap-pressing piece (217b; 417b) to move said first slider (217; 417) to its second position and, when said first elastic strap (215; 415) is released, said strap contracts and simultaneously another one of said ridges (215a; 415a) engages said first strap-pressing piece (217b; 417b) to move said first slider (217; 417) to said first position; and

wherein, when said second elastic strap (215′; 415′) is pulled, said strap is stretched and simultaneously one of said ridges (215a′; 415a′) engages said second strap-pressing piece (217b′; 417b′) to move said second slider (217′; 417′) to said second position and, when said second elastic strap (215′; 415′) is released, said strap contracts and another one of the ridges (215a′; 415a′) engages said second strap-pressing piece (217b′; 417b′) to move said second slider (217′; 417′) to its first position.

6. A swimming goggle comprising:

a lens assembly (213) comprised of a pair of lens parts (211) and a pair of lens frames (218) each of which is coupled to said respective lens part (211);

two elastic straps (215 and 215′) each of which is coupled to an end of said respective lens part (211) and has a plurality of width-wise ridges (215a and 215a′);

a buckle assembly (200) substantially as defined in Claim 5 to which said two straps (215 and 215′) are connected;

said buckle body (219) comprising a guide section (219b) longitudinally extending along a center line on an upper surface of said flat plate, a pair of first stoppers (219h) protruded from both sides at one end of said guide section (219b) and having a height higher than that of said guide section (219b), and a second stopper (219g) protruded from the other end of said guide section (219b);

said first slider (217) comprising a longitudinally extending body (217a) having a surface facing said guide section (219b) of said buckle body (219), a first transverse extension (217c) provided on one end of said body (219) to abut against said second stopper (219g) in its first position and against said first stopper (219h) in its second position, and a second transverse extension (217c′) provided on the other end of said body (217a) to abut against said first stopper (219h) in its first position;

said second slider (217′) being in the form of a generally rectangular frame composed of four frame elements, opposing surfaces of a pair of longitudinal frame elements (217a′) supporting both ends of said first extension (217c) of said first slider (217), and one of said transverse frame elements having a cut-out portion (217d) dimensioned such that it allows the passage of the body (217a) of said first slider (217)
while preventing the passage of said first extension (217c) therethrough; and
further comprising a slider cover (218) slidably retaining said first and second
sliders (217 and 217') against said buckle body (219).

7. A swimming goggle comprising:
a lens assembly (413) comprised of a pair of lens parts (411) and a pair of lens
frames (418) each of which is coupled to said respective lens part (411);
two elastic straps (415 and 415') each of which is coupled to an end of said
respective lens part (411) and has a plurality of width-wise ridges (415a and 415a');
a buckle assembly (400) substantially as defined in Claim 5 to which said two
straps (415 and 415') are connected;
said buckle body (419) comprising a slider guiding plate (419k) extending in a
spaced, parallel relationship with respect to said flat plate of the buckle body (419) and
a post (419j) maintaining said flat plate and said slider guiding plate (419k) in such a
spaced relationship, said slider guiding plate (419k) being provided with a pair of
longitudinal first guideways (417c) and a pair of longitudinal second guideways (417c')
guiding the sliding motions of said first and second sliders (417 and 417') between their
first position and second positions, respectively;
said first slider (417) comprising a pair of first leg portions (417e) slidable
along said first guideways (417c) with each of said first leg portions inserted therein;
and
said second slider (417') comprising a pair of second leg portions (417e')
slidable along said second guideways (417c') with each of said second leg portions
inserted therein.

8. The swimming goggle as claimed in Claim 7, wherein said first strap-
pressing piece (417b) is separately formed from said first slider (417), and is coupled
to said first leg portions (417e) of said first slider (417) inserted into said first
guideways (417c), and
said second strap-pressing piece (417b') is separately formed from said second
slider (417'), and is coupled to said second leg portions (417e') of said second slider
(417') inserted into said second guideways (417c').
Fig. 11A

Fig. 11B

Fig. 11C
Fig. 12A

Fig. 12B

Fig. 12C
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC²: A 63 B 33/00; A 61 F 9/02

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)

IPC²: A 63 B 33/00; A 61 F 9/00

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

Electronic database consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 4607398 A (FAULCONER), 26 August 1986 (26.08.86), fig.2-5; abstract.</td>
<td>1-3,5-7</td>
</tr>
<tr>
<td>A</td>
<td>US 5727259 A (KAWAMATA), 17 March 1998 (17.03.98), abstract; fig.2,9-12; description to these figures.</td>
<td>5-8</td>
</tr>
<tr>
<td>A</td>
<td>US 4527292 A (KASAMA), 09 July 1985 (09.07.85), abstract; fig.3,9-11; description to these figures.</td>
<td>1-3</td>
</tr>
<tr>
<td>A</td>
<td>US 5657493 A (FERRERO), 19 August 1997 (19.08.97), abstract; fig.1,5-8; claims 1,5,7,11-17.</td>
<td>1,2</td>
</tr>
<tr>
<td>A</td>
<td>US 5410763 A (BOLLÉ), 02 May 1995 (02.05.95), abstract; fig.2.</td>
<td>2,3</td>
</tr>
</tbody>
</table>

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Name and mailing address of the ISA/AT
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<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
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<tr>
<td></td>
<td></td>
<td>CA A1 1252251</td>
<td>11-04-1989</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP A2 61050573</td>
<td>12-03-1986</td>
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<tr>
<td>US A 4527229</td>
<td>09-07-1985</td>
<td>none</td>
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<td></td>
<td></td>
<td>FR A1 2720950</td>
<td>15-12-1995</td>
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<tr>
<td></td>
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<td>FR B1 2720950</td>
<td>14-08-1998</td>
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<td>IT A0 951180</td>
<td>06-06-1995</td>
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<td>IT A1 951180</td>
<td>11-12-1995</td>
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<td></td>
<td>IT A 1275319</td>
<td>05-08-1997</td>
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<tr>
<td></td>
<td></td>
<td>JP A2 8108888</td>
<td>30-04-1996</td>
</tr>
<tr>
<td>US A 5410763</td>
<td>02-05-1995</td>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>

PCT/ISA/210 (patent family annex) (July 1998)