Description

Title of the invention: Diving mask with a pressure balancing means

Technical field

[0001] The present invention relates to the field of diving masks, and in particular masks used for snorkeling.

Prior art

[0002] Generally, the snorkeler is equipped with a mask for vision and with a snorkel for breathing. The snorkel consists of a tube, the lower end of which is provided with a buccal portion which is received in the mouth of the user, and an upper end allowing both the intake of fresh air and the exhaust of expired air.

[0003] It is known that such equipment has many drawbacks. First, because breathing through the mouth is not natural, some people find it difficult to breathe orally using a snorkel. Another drawback is that it is not possible to speak underwater when you have a snorkel in your mouth.

[0004] Also, the use of this mask-snorkel device is not very comfortable. To overcome this drawback, document FR 3 020 620 proposes a diving mask that allows breathing through the nose and through the mouth.

[0005] This diving mask includes: a body provided with a visor and a flexible skirt, said flexible skirt including a partition delimiting an upper chamber for the vision and a lower chamber for breathing, the partition being arranged to bear above the user's nose so that the user's mouth and nose are located in the lower chamber, while the user's eyes are located in the upper chamber, the partition including at least a passage arranged to allow a flow of fresh air between the upper chamber and the lower chamber during a phase of inspiration of the user; a snorkel disposed in the extension of an upper portion of the body, the snorkel comprising at least one air duct; in which the body includes an expired air exhaust device which fluidly links the lower chamber with the air duct of the snorkel.

[0006] This mask also includes a snorkel provided with several channels and a plate which includes check valves in order to close off the air outlet channels during an

[0034] Preferably, the mask includes a body delimiting the inside of the mask relative to the outside, the body comprising:

- a frame surrounding the user's face,
- a visor surrounded by the frame,
- a flexible skirt fixed to the frame, the skirt including a partition delimiting an upper chamber for the vision and a lower chamber for breathing, the partition being arranged to bear above the user’s nose such that the user’s mouth and nose are located in the lower chamber, the partition including at least one passage arranged to allow circulation of inspired air directed from the upper chamber to the lower chamber during a phase of inspiration of the user,

wherein the frame, in particular the rigid frame, comprises at least a first duct for the expired air, said first duct having an upper end opening inside the snorkel, and a lower end fluidly communicating with the lower chamber.

[0035] Preferably, the snorkel has an inspired air intake channel and at least a first expired air exhaust channel, said snorkel being the extension of an upper portion of the frame, the inspired air intake channel opening into the upper chamber while the first expired air exhaust channel communicates with the lower chamber, and wherein the first duct of the frame has an upper end opening into the expired air exhaust channel.

[0036] According to another aspect, a snorkel for a diving mask as described above is also proposed, the snorkel comprising a valve including:

- a valve orifice intended to allow fluid circulation between the outside of the snorkel and the inside of the snorkel, and,
- a valve closure member, for example a float, which can move between an open position in which the valve orifice is open and a closed position in which the valve orifice is closed by the valve closure member,

wherein the snorkel also includes a balancing means for limiting a pressure difference between the internal pressure of the snorkel and the external pressure, the balancing means being configured to allow fluid circulation between the outside of the snorkel and the inside of the snorkel when the mask is used by a user and when the closure member is in the closed position. Particularly, the balancing means is configured to allow fluid circulation, in this case a circulation of water and/or outside air, from outside the snorkel to inside the snorkel, when

CLAIMS

[Claim 1] A diving mask comprising a snorkel with a valve, the valve including:

- a valve orifice intended to allow fluid circulation, in particular of air, between the outside of the snorkel and the inside of the snorkel, and
- a valve closure member, for example a float, which can move between an open position in which the valve orifice is open and a closed position in which the valve orifice is closed by the valve closure member,

wherein the mask also includes a balancing means for limiting a pressure difference between the internal pressure of the mask and the external pressure, the balancing means being configured to allow fluid circulation from the outside of the mask to the inside of the mask when the mask is used by a user and when the closure member is in the closed position.

[Claim 2] The mask according to claim 1, wherein the balancing means is mounted on the closure member .

[Claim 3] The mask according to claim 1 or 2, wherein the valve also includes a body in which the valve orifice is provided, and wherein the balancing means is mounted on the valve body.

[Claim 4] The mask according to any one of claims 1 to 3, wherein the snorkel also includes a wall delimiting the inside of the snorkel relative to the outside, and wherein the balancing means is mounted on the wall of the snorkel, for example wherein the snorkel includes a proximal portion and a distal portion, and the balancing means is mounted on the wall of the distal portion of the snorkel.

[Claim 5] The mask according to any one of claims 1 to 4, also including a body delimiting the inside of the mask relative to the outside, and wherein the balancing means is mounted on the body of the mask.

[Claim 6] The mask according to any one of claims 1 to 5, wherein the balancing means has a shape, for example a tubular shape, configured to allow fluid circulation through the balancing means only when the pressure difference is greater than a determined value.

[Claim 7] The mask according to any one of claims 1 to 6, wherein the balancing means also includes a valve element, for example a flexible membrane, configured to allow fluid circulation through the balancing means only when the pressure difference is greater than a determined value.

[Claim 8] The mask according to claim 6 or 7, wherein the determined pressure difference value for which the balancing means is configured to allow circulation of a liquid between the outside of the mask and the inside of the mask, is greater than the determined pressure difference value for which the balancing means is configured to allow air circulation between the outside of the mask and the inside of the mask.

[Claim 9] The mask according to any one of claims 1 to 8, wherein the balancing means comprises a through channel.

[Claim 10] The mask according to any one of claims 1 to 9, wherein the ratio of the area of the valve orifice to the area of the balancing means is greater than 1, preferably comprised between 1 and 1,000,000, more preferably comprised between 10 and 100,000, and more preferably comprised between 100 and 10,000.

[Claim 11] The mask according to any one of claims 1 to 10, including a body delimiting the inside of the mask relative to the outside, the body comprising:

- a frame surrounding the user's face,
- a visor surrounded by the frame,
- a flexible skirt fixed to the frame, the skirt including a partition delimiting an upper chamber for the vision and a lower chamber for breathing, the partition being arranged to bear above the user’s nose such that the user’s mouth and nose are located in the lower chamber, the partition including at least one passage arranged to allow circulation of inspired air directed from the upper chamber to the lower chamber during a phase of inspiration of the user,

wherein the frame, in particular the rigid frame, comprises at least a first duct for the expired air, said first duct having an upper end opening inside the snorkel, and a lower end fluidly communicating with the lower chamber.

[Claim 12] The mask according to claim 11, wherein the snorkel has an inspired air intake channel and at least a first expired air exhaust channel, said snorkel being the extension of an upper portion of the frame, the inspired air intake channel opening into the upper chamber while the first expired air exhaust channel communicates with the lower chamber, and wherein the first duct of the frame has an upper end opening into the expired air exhaust channel.

[Claim 13] A snorkel for a diving mask according to any of claims 2 to 4, comprising a valve including:

- a valve orifice intended to allow fluid circulation between the outside of the snorkel and the inside of the snorkel, and
- a valve closure member, for example a float, which can move between an open position in which the valve orifice is open and a closed position in which the valve orifice is closed by the valve closure member,

wherein the snorkel also includes a balancing means for limiting a pressure difference between the internal pressure of the snorkel and the external pressure, the balancing means being configured to allow fluid circulation from the outside of the snorkel to the inside of the snorkel when the mask is used by a user and when the closure member is in the closed position.