

DIVING MASK ENABLING PRESSURE EQUALISATION AT THE EARS

Background of the invention

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

This activity of snorkeling makes it possible to observe the seabed while swimming at the surface of the water. The snorkeler must thus be able to keep his head under water while breathing.

10 Generally, the snorkeler equips himself with a mask for viewing, and a snorkel for breathing. The snorkel is composed of a tube, the lower end of which is provided with a mouth portion which is housed in the mouth of the user, and an upper end allowing both the intake of fresh air and the expelling of exhaled air.

15 It is known that such an item of equipment has many drawbacks. Firstly, since the fact of breathing through the mouth is not natural, some people experience difficulty in breathing orally using a snorkel. Another is that it is not possible to speak underwater with a snorkel in one's mouth.

20 Yet another drawback, related to the use of the mask, is that the inner wall of the faceplate generally tends to become covered in condensation, which impedes visibility, and which obliges the user to clean his mask regularly. The appearance of condensation is due to the fact that the nose of the user opens onto the viewing chamber located between the faceplate and the eyes of the user, and in general to any hot air produced in the viewing chamber without being renewed by fresh air.

25 Thus, the use of this mask-and-snorkel device is not very comfortable.

To remedy this drawback, the document FR 3 020 620 B1 proposes a diving mask making it possible to breathe through the nose and the mouth.

30 However, this type of improved mask and tube does not allow the user to compensate for the pressure when he descends into the depths of the water. To perform this operation, it is necessary to pinch the nose in order to close the nostrils and balance the pressures on each of the ears (in particular between the outer ear and the middle ear of a given ear).

35 There is thus a need for a mask and snorkel making it possible to breathe interchangeably through the nose and/or the mouth and to avoid the formation of condensation in the viewing compartment, and making it possible to perform a pressure balancing operation as many times as necessary.

There is also a need for such a mask and snorkel that is light, easy to position on the face of the user, and comfortable.

Subject and summary of the invention

5 The present invention palliates the aforementioned problems in that it has for object a diving mask comprising:

- 10 a. A body provided with a faceplate comprising an upper part, and a flexible skirt including a partition delimiting an upper chamber for viewing from a lower chamber for breathing, the partition being arranged to be supported above the nose of the user in such a way that the mouth and the nose of the user are located in the lower chamber, while the eyes of the user are located in the upper chamber, the partition including at least one passage arranged to allow the circulation of fresh air between the upper chamber and the lower chamber during a phase of inhalation of the user,
- 15 b. a snorkel disposed in the extension of an upper part of the body, the snorkel comprising at least one air duct;
- 20 c. the body includes an exhaled air expelling device which forms a fluid connection of the lower chamber to the air duct of the snorkel.

Advantageously, the body comprises a flexible and deformable main nasal part, the upper edge of which is secured in a sealed manner to the lower edge of the upper part of the faceplate, and the main nasal part comprises a main housing at least partly receiving the nose, and configured in such a way as to allow the pinching of the nose of the user.

In addition, the skirt comprises an auxiliary nasal part, in the extension of the partition, said auxiliary nasal part comprises an auxiliary housing receiving the nose and configured in such a way as to allow the pinching of the nose of the user.

It will be understood that the faceplate is arranged so as to not cover the nose, and optionally the mouth of the user, so that the user can pinch his nose, by pinching the main housing of the main nasal part.

35 It will be understood that the snorkel is in fluid connection with the upper chamber. In this aim, the body advantageously includes a fresh air

intake device which is in fluid communication with the snorkel and with the upper air chamber.

Preferably, the upper edge of the main nasal part comprises a projection having a setback, particularly L-shaped, arranged such as to receive the lower edge of the upper part of the faceplate. In this case, the upper edge of the main nasal part grips the upper or lower face, and the face edge of the lower edge of the upper part of the faceplate.

The upper edge of the main nasal part can alternatively comprise a U-shaped projection receiving the lower edge of the upper part of the faceplate. In this case, the upper edge of the main nasal part is engaged with the upper and lower faces, and the face edge of the lower edge of the upper part of the faceplate.

Preferably, the flexible skirt is attached to the faceplate. In addition, the faceplate is at least partly transparent. Preferably, the faceplate has a transparent flat portion which is located facing the upper chamber.

Preferably, the flexible skirt comprises a sealing lip arranged to be supported by the face of the user.

Preferably, the flexible skirt (and therefore said partition) and the main nasal part, and optionally the auxiliary nasal part defined below, are each made of a polymer material, which materials can be different or identical (in their composition, their appearance (shapes, colors etc.), their mechanical properties (mechanical tensile strength, tensile elongation at break etc.).

Said polymer material preferably has an elongation at break, particularly tensile, greater than or equal to 100%, still preferably greater than or equal to 300%, preferably greater than or equal to 400%.

Preferably, the polymer material is made of an elastomer.

The flexible skirt, the main nasal part, and optionally the auxiliary nasal part, are thus deformable and flexibly take the shape, on the one hand, of the face of the user, thus improving his comfort, and on the other hand, of the rigid or semi-rigid parts of the mask which improves the sealing.

In a variant, the exhaled air expelling device includes a first exhaled air expelling channel which extends along one of the two lateral edges of the body, in particular the first and second exhaled air channels extending on either side of the two lateral edges of the faceplate, the flexible skirt having a first lateral part which covers the first exhaled air expelling channel, and

optionally a second lateral part which covers the second exhaled air expelling channel.

5 The first exhaled air expelling channel, and optionally the second exhaled air expelling channel, preferably comprises (or comprise) two lateral walls and one back wall, in particular said walls form a U shape in the cross section of said first channel, and optionally of said second channel.

10 The first channel, and optionally the second channel, can thus be each composed of two adjacent ribs, which project from a first lateral edge of the faceplate, and optionally from a second lateral edge of the faceplate respectively.

The first exhaled air expelling channel, and optionally the second exhaled air expelling channel, can form a single part with the faceplate. Still preferably, both (sets of two) adjacent ribs form a single part with the faceplate.

15 The first exhaled air expelling channel, and where applicable the second exhaled air expelling channel, can be a different part or parts of the faceplate, secured, removably or otherwise, to one of the two lateral edges (or to the two edges) of the faceplate. Said part has a U-shaped cross-section.

20 The first lateral part, and where applicable the second lateral part, of the skirt includes a lateral edge in which is engaged the first (or second) air expelling channel in order to prevent the water from entering the first (or second) air expelling channel.

25 To do so, the lateral edge of the skirt includes an upper wall and at least one lateral wall, preferably two lateral walls. Said lateral wall (or walls) flanks (or flank) the rib (or two ribs) of the first (or second) expelling channel while the upper wall covers the first (or second) expelling channel in order to provide sealing.

30 Preferably, said lateral edge is located on the outer periphery of the sealing lip of the skirt which is arranged to be supported by the face of the user.

35 In an embodiment, the body of the mask further includes a band, in particular rigid or semi-rigid, that surrounds the faceplate. Preferably, the peripheral edge of the skirt (in particular the first lateral part and/or the second lateral part of the skirt) is clamped between the band and the first (or second) exhaled air expelling channel. This has the effect of preventing the

peripheral edge of the skirt from uncoupling from the first (or second) exhaled air expelling channel.

Preferably, the first exhaled air expelling channel, and optionally the second exhaled air expelling channel, comprises (or comprise) a lower end portion including at least one opening into the lower chamber, and optionally an upper end point in fluid connection with the snorkel.

In an embodiment, the exhaled air expelling device comprises a second exhaled air expelling channel equivalent to the first exhaled air expelling channel. The first and second exhaled air channels are preferably disposed on either side of the plane of symmetry of the mask.

It will be understood that in this text the term "plane of symmetry (S) of the mask" refers to any plane of the mask passing substantially through the sagittal section plane of the face of the user.

In a variant, the faceplate comprises a lower part, and the main nasal part comprises a lower edge secured in a sealed manner to the upper edge of the lower part of the faceplate.

Preferably, the lower part of the faceplate covers the chin of the user, at least partly, and, more preferably, the mouth.

Advantageously, the main nasal part extends, at least partly, between the lower edge of the upper part of the faceplate, and the upper edge of the lower part of the faceplate.

The main nasal part is therefore not pressed flat against, and stuck to the face of the user, in particular on the mouth or nose, which facilitates breathing.

In a variant, the faceplate comprises a central opening having an upper edge and a lower edge between which the main nasal part extends at least partly.

Preferably, the faceplate extends around the whole circumference of said central opening.

Preferably, the central opening is configured so as to cover the nose of the user.

In a variant, the faceplate, particularly the lower part of the faceplate, extends in front of the mouth of the user.

This disposition facilitates breathing through the mouth since the main nasal part is not pressed flat against the latter.

In a variant, the main nasal part comprises at least one lateral projection projecting along one side of the plane of symmetry S of the mask, preferably two lateral projections projecting on either side of the plane of symmetry S of the mask.

5 Preferably, said lateral projection(s) extends (or extend) under the housing at least partly receiving the nose.

Preferably, said lateral projection(s) extends (or extend) over the outer face of the faceplate, particularly over the outer face of the lower part of the faceplate.

10 In a variant, said at least one lateral projection of the main nasal part comprises a distal end secured in a sealed manner along a lateral edge of the faceplate, in particular said lateral edge is disposed between the upper and lower parts of the faceplate.

The lateral end can comprise a U-shaped or L-shaped projection as
15 defined above with reference to the projection disposed along the upper edge and/or the lower edge of the main nasal part.

Preferably, the mask comprises a first lateral projection comprising a first distal end, and a second lateral projection comprising a second distal end. The first lateral end is secured in a sealed manner along a first lateral edge of
20 the faceplate, and the second lateral projection is secured in a sealed manner along a second lateral edge of the faceplate.

More preferably, the first and second lateral edges of the faceplate are disposed on either side of the plane of symmetry S of the mask.

Preferably, the first and second lateral edges are disposed between the
25 upper and lower parts of the faceplate.

In a variant, the main nasal part, and/or the auxiliary nasal part defined below, comprises (or comprise) an outer face and an inner face, the inner face being oriented facing the breathing chamber, and the main nasal part, and/or the auxiliary nasal part defined below, comprises (or comprise) two
30 protuberances projecting from said inner face and disposed on either side of the plane of symmetry S of the mask.

The outer face of the main nasal part opens into the outside of the mask and is therefore accessible to the user when the mask is worn.

The two protuberances of the main nasal part, and/or the auxiliary
35 nasal part defined below, are arranged to delimit between them said main

housing, and/or said auxiliary housing defined below, at least partly receiving the nose.

The two protuberances of the main nasal part, and/or the auxiliary nasal part defined below, comprise first and second lateral walls between
5 which the corresponding walls of the nose are housed.

The two protuberances preferably are substantially wing-shaped, in particular triangle-shaped in their longitudinal section plane.

Preferably, the main housing, and/or the auxiliary housing defined below, receiving the nose does not comprise any lower wall abutting the lower
10 edge of the nose of the user, which facilitates breathing.

Preferably, the main housing, and/or the auxiliary housing defined below, is/are in fluid communication with the lower chamber.

In a variant, at least one of the two protuberances has a thickness increasing from its upper portion toward its base.

Advantageously, the base being thicker than the upper part, the
15 pinching of the nose is facilitated by pressing the two bases of the two protuberances against the nostrils.

In a variant, the main nasal part, and/or the auxiliary nasal part defined below, comprises (or comprise) an outer face and an inner face, the inner
20 face being oriented facing the breathing chamber, and the main nasal part, and/or the auxiliary nasal part defined below, comprises (or comprise), along its outer face, two recesses disposed on either side of the main, and/or auxiliary housing(s), for the nose.

This disposition guides the placing of the fingers of the user for
25 pinching the nose.

In a variant, the main nasal part is overmolded on the upper part of the faceplate, and optionally on the lower part of the faceplate and/or on the lateral edges of the faceplate.

Advantageously, the upper edge, lower edge and optionally the lateral
30 end(s) of the lateral projection(s), are overmolded on the corresponding edges of the faceplate (and therefore engaging with this latter in a sealed manner).

The term "overmolding" is understood to mean that the main nasal part is obtained by a method of injection (molding) (or extrusion molding), in
35 particular on an opening arranged in the faceplate.

In a variant, the main nasal part comprises a plate portion projecting under the main housing and extending against the faceplate, particularly on the outer face of the faceplate, in particular extending between said two lateral projections.

5 Preferably, said plate portion extends under the housing at least partly receiving the nose.

More preferably, the plate portion extends over the outer face of the lower part of the faceplate.

10 In a variant, the lower edge of the main nasal part is disposed between the main housing for the nose and the plate portion.

In a variant, the skirt and the main nasal part are two separate parts.

This disposition facilitates the manufacturing of the mask according to the invention.

15 In a variant, the auxiliary nasal part comprises an auxiliary plate portion extending under the auxiliary housing at least partly receiving the nose, said plate being secured to the faceplate, in particular to the lower part of the faceplate.

Preferably, the plate portion extends over the inner face of the lower part of the faceplate.

20 More preferably, the upper edge of the lower part of the faceplate is disposed between the plate portion of the main nasal part and the plate portion of the auxiliary nasal part.

25 Preferably, the auxiliary plate is secured to the lower part of the faceplate using a rigid or semi-rigid attaching part secured, in particular snap-fitted or clipped onto the lower part of the faceplate, the auxiliary plate being disposed at least partly between said attaching part and the lower part of the faceplate.

30 Advantageously, this attaching part makes it possible to secure the auxiliary nasal part to the faceplate in a sealed manner. Thus, the air exhaled by the nose and/or the mouth does not flow toward the upper viewing chamber.

Preferably, the rigid attaching part is substantially V-shaped, still preferably the tip of the V is oriented toward the lower part of the faceplate.

35 In a variant, the auxiliary housing of the auxiliary nasal part at least partly receiving the nose is nested into the main housing at least partly receiving the nose of the main nasal part.

This disposition improves comfort and facilitates the pinching of the nose.

In a variant, the auxiliary nasal part comprises an outer face and an inner face, the inner face being oriented facing the breathing chamber, and
5 the auxiliary nasal part comprises two protuberances projecting from said inner face and disposed on either side of the plane of symmetry S of the mask.

These protuberances of the auxiliary housing can repeat all or part of the features defined above with reference to the protuberances of the main
10 housing.

The auxiliary housing can also comprise two recesses arranged on either side of the plane of symmetry of the mask.

In a variant, the main nasal part is made of a polymer material different from or identical to the polymer material of the main auxiliary nasal
15 part.

The polymer material of the main nasal part can be different from the polymer material of the main auxiliary nasal part by virtue of its nature, its thickness, its appearance (color(s), pattern(s), relief marking(s) or otherwise) or else its Shore A hardness.

20 The polymer material can be a silicone polymer or an elastomer of SEBS type (styrene-butylene-ethylene) or of any equivalent polymer.

In an embodiment, the main nasal part is made of a polymer material having a Shore A hardness greater than or equal to the Shore A hardness of the main auxiliary nasal part.

25 In a variant, the main nasal part has a thickness (mm) greater than the thickness of the main auxiliary nasal part, in particular said thicknesses are measured outside the auxiliary and main housings. In a variant, the upper edge of the lower part of the faceplate is disposed between the main nasal part and the auxiliary nasal part, in particular between the main plate portion
30 and the auxiliary plate portion.

In a variant, the skirt and the main nasal part are made of one and the same part. Preferably, in this case, the mask does not comprise any auxiliary nasal part.

35 In a variant, the skirt comprises at least first and second separate parts, a first part providing the sealing of the first and/or second air expelling channel(s) and contributing to the sealing with the face of the user, and a

second part providing the sealing with the face of the user, particularly comprising the sealing lip. The second part comprises the auxiliary nasal part and the partition separating the upper and lower chambers.

In this case, the mask does not comprise any auxiliary nasal part.

5 In a variant, the exhaled air expelling device includes at least a first check valve arranged to permit a flow of exhaled air directed from the lower chamber toward the air duct of the snorkel during a phase of exhalation of the user, the first check valve being closed during a phase of inhalation of the user.

10 Preferably, the first check valve is located on the body of the mask.

Preferably, the first check valve is arranged to blank off the exhaled air expelling device during an inhalation phase.

During an inhalation phase, the closing of the first check valve has the effect of the fresh air not flowing via the air expelling device. One advantage
15 is to avoid the inhalation of the air that has just been exhaled and which is still located in the exhaled air expelling device or in the air duct of the tube.

Advantageously, the first check valve is arranged to seal said at least one opening (of the first exhaled air expelling channel) during a phase of inhalation of the user.

20 Preferably, the first check valve comprises at least one flexible membrane located inside the first exhaled air expelling channel, facing said opening.

According to an embodiment, said at least one flexible membrane is composed of a part of the flexible skirt.

25 Preferably, the lower end portion of the first or second exhaled air expelling channel comprises two adjacent openings which can be blanked off by one or more flexible membranes of the first check valve.

In a variant embodiment, the snorkel includes a single air duct which is in fluid communication with the lower chamber and the upper chamber.

30 This disposition makes it possible to simplify the design and manufacturing of the snorkel by comparison with snorkels of the prior art including several channels. Advantageously, the entire inner volume of the snorkel is available during the inhalation and exhalation phases which makes it possible to substantially increase the incoming and outgoing air flow rate,
35 thus improving comfort and facilitating breathing through the mouth and nose.

The single air duct is therefore in fluid communication with the exhaled air expelling device, and also with the fresh air intake device.

Preferably, the single air duct is in fluid communication with the first and second exhaled air expelling channels.

5 Alternatively, the snorkel implemented in the mask according to the invention can comprise several channels although this is not preferred.

In a variant, the partition includes at least one check valve, arranged to permit only a flow of fresh air directed from the upper chamber toward the lower chamber during a phase of inhalation of the user.

10 It will be understood that the check valve opens during a phase of inhalation and closes during a phase of exhalation.

The check valve thus has the function of preventing the exhaled air from flowing toward the upper chamber, thus preventing the appearance of condensation on the lower face of the upper part of the faceplate.

15 According to an embodiment, the check valve includes a flexible flap composed of a part of the flexible skirt.

Preferably, the flexible flap of the check valve is formed by a portion of the partition.

20 The flexible flap is preferably delimited between a free edge of the partition and a cut made in the partition.

This cut gives the flexible flap mobility, allowing it to bend during an inhalation phase in such a way as to open the passage and to allow the fresh air to enter into the lower chamber.

25 Preferably, during an exhalation phase, the flexible flap bears against the faceplate in order to close said passage.

The present invention also has for object, according to a second aspect, a method for manufacturing a diving mask, as defined according to any of the variants defined above with reference to a first aspect of the invention.

30 Said method comprises the following steps:

- a) injecting a faceplate comprising a central opening,
- b) overmolding at least one main nasal part as defined with reference to a first aspect of the invention, engaging at least with the upper and lower edges of the central opening,
- 35 c) assembling a skirt as defined with reference to a first aspect of the invention, on the assembly obtained after step b),

d) obtaining a diving mask.

Brief description of the drawings

- The invention and its advantages will be better understood on reading
 5 the detailed description of a particular embodiment, given by way of example
 entirely without limitation, and illustrated by the appended drawings wherein:
- figure **1** is a front view of the mask according to the invention;
 - figure **2** is a rear view of the mask of figure 1;
 - figure **3** is an exploded view of the mask of figure 1;
 - 10 - figure **4** is a section view of the mask along the section plane IV-IV
 shown in figure 1, corresponding to the plane of symmetry S of the
 mask, illustrating the superimposition of the main nasal part and the
 auxiliary nasal part;
 - figure **5** is a section view of the mask along the section plane IV-IV
 15 shown in figure 1, without faceplate or tube;
 - figure **6** shows the lower part of the mask once the flexible skirt and
 the faceplate are assembled;
 - figure **7A** is a front view of the main nasal part of the mask of
 figure 1;
 - 20 - figure **7B** is a rear view of the main nasal part of the mask of figure
 1.

Detailed description of the invention

Figure **1** illustrates a first example of a diving mask **1** comprising a
 25 body **10** provided with a faceplate **20** comprising at least one upper part **21**,
 and a flexible skirt **30** including a partition **40** delimiting an upper chamber
45 for viewing from a lower chamber **50** for breathing, the partition **40** being
 arranged to be supported above the nose of the user in such a way that the
 nose, and in this specific example also the mouth, of the user are located in
 30 the lower chamber **50**, while the eyes of the user are located in the upper
 chamber **45**, the partition **40** including at least one passage **55** to allow the
 circulation of fresh air between the upper chamber **45** and the lower chamber
50 during an phase of inhalation of the user.

The faceplate **20** is made of a rigid and transparent material, for
 35 example polycarbonate.

The flexible skirt **30** is made of a flexible material, for example silicone elastomer.

The body **10** includes a band **25** which is shaped to surround the faceplate **20**. This band **25** has the function of providing, or at least
5 improving, the attachment of the skirt **30** to the faceplate **20**.

The upper part **21** of the faceplate **20** covers the upper viewing chamber **45** and comprises a transparent flat portion **19** intended to be located substantially level with the eyes of the user.

A snorkel **70** is disposed in the extension of an upper part **10a** of the
10 body, the snorkel **70** comprising at least one air duct **72**, in this specific example a single air duct. In this example, the snorkel **70** is mounted on the body **10** removably.

The body **10** includes an exhaled air expelling device **80** which forms a fluid connection of the lower chamber **50** to the air duct **72** of the snorkel
15 **70**. The body **10** comprises a flexible and deformable main nasal part **15** the upper edge **15a** of which is secured in a sealed manner to the lower edge **21a** of the upper part **21** of the faceplate **20**.

In this example, the upper edge **15a** of the main nasal part **15** comprises a projection **8** shown in figure **4** having a recess, particularly L-shaped, arranged so as to receive the lower edge **21a** of the upper part **21** of
20 the faceplate **20**.

The main nasal part **15** comprises a housing **16** receiving the nose and configured in such a way as to allow the pinching of the nose of the user.

The main nasal part **15** comprises two lateral projections **17,18**
25 projecting on either side of the plane of symmetry **S** of the mask **1**.

The faceplate **20** comprises a lower part **22**, and the main nasal part **15** comprises a lower edge **15b** secured in a sealed manner to the upper edge **22a** of the lower part **22** of the faceplate **20**.

The lateral projections **17** and **18** each comprise a distal end
30 respectively **17a** and **18a** secured in a sealed manner to either side of the faceplate, along its lateral edges including the lateral edge **20d** shown in figure **3**. Said lateral edges (including the lateral edge **20d**) are disposed between the upper **21** and lower **22** parts of the faceplate **20**.

The main nasal part **15** comprises an outer face **13** and an inner face
35 **14**, the inner face **14** being oriented facing the breathing chamber **50**. The main nasal part **15** comprises two protuberances **5** and **6** projecting from said

inner face **14** and disposed on either side of the plane of symmetry S of the mask **1**.

In this specific example, the two protuberances **5** and **6** (see figures **7A** and **7B**) have a thickness increasing from their bases **5a** and **6a** toward
5 their upper portions **5b** and **6b**.

The main nasal part **15** comprises, along its outer face **13**, two recesses **31**, **32** disposed on either side of the main housing **16** for the nose. The main nasal part **15** is overmolded on the upper part **21** of the faceplate **20**, and where applicable on the lower part **22** of the faceplate **20** and/or the
10 lateral edges **20d** of the faceplate **20**.

The faceplate **20** thus comprises a central opening **4** having an upper edge **4a** and a lower edge **4b** between which the main nasal part **15** extends.

The faceplate **20** is arranged so that the lower part **22** covers the chin and the mouth of the user.

15 The main nasal part **15** further comprises a plate portion **35**, in particular extending between said two lateral projections **17** and **18**. The skirt **30** and the main nasal part **15** are two separate parts.

The skirt **30** comprises an auxiliary nasal part **60**, in the extension of the partition **40**. Said auxiliary nasal part **60** comprises an auxiliary housing
20 **62** receiving the nose and configured in such a way as to allow the pinching of the nose of the user.

The auxiliary nasal part **60** comprises a plate portion **65** projecting under the auxiliary housing **62**, said plate portion **65** being secured to the faceplate **20**, in particular to the lower part **22** of the faceplate **20** by an
25 attaching part **66**. The attaching part **66** is secured, for example clipped, to attaching tabs **67** projecting from the inner face of the lower part **22** of the faceplate **20**.

The plate portion **65** comprises two orifices **68** and **69** which engage with the attaching tabs **67** before the positioning of the attaching part **66**,
30 which also comprises two orifices for cooperating with the attaching tabs **67**.

Advantageously, the auxiliary housing **62** is configured to be nested into the main housing **16**.

Preferably, the auxiliary housing also comprises two protuberances **62** **90** and **91** projecting over the inner face of the auxiliary nasal part **60**, facing
35 the lower breathing chamber **50**. In this specific example, the protuberances

90 and **91** each have a thickness increasing from its upper part toward its base.

The upper edge **22a** of the lower part **22** of the faceplate **20** is thus disposed between the main plate portion **35** overmolded on the outer face of the faceplate **20**, and the auxiliary plate portion **65** attached to the inner face of the faceplate **20** by way of the attaching part **66**.

The main nasal part **15** can be made of a polymer material different from or identical to the polymer material of the auxiliary nasal part **60**.

Advantageously, the exhaled air expelling device **80** includes at least a first check valve **43** arranged to permit a flow of exhaled air directed from the lower chamber **50** toward the air duct **72** of the snorkel **70** during a phase of exhalation of the user, the first check valve **43** being closed during a phase of inhalation of the user.

Preferably, the first check valve **43** comprises a flexible membrane **142** which, in this specific example, is composed of a portion of the flexible skirt **30**. As can be seen in figure **6**, the first lateral part of the peripheral edge **124** of the skirt **30** includes an upper wall **126** and two lateral walls, of which only the lateral wall **128** is clearly visible. The lateral walls, including the lateral wall **128**, flank the two ribs, including the visible rib **105**, of the first exhaled air expelling channel **81** in order to provide the sealing. The flexible membrane **142** appears in the form of a substantially rectangular shape which protrudes from an inner face of the upper wall **126**. In figure **6**, the first check valve **43** is illustrated in solid lines in the closed position, and in dotted lines in the open position.

The exhaled air expelling device **80** also includes a first air expelling channel **81** and a second exhaled air expelling channel **82** which extend respectively along a first lateral edge **2** and a second lateral edge **3** of the body **10**, in particular on either side of the two lateral edges of the faceplate **20**.

The first check valve **43** also includes a valve seat **144** arranged to cooperate with the flexible membrane **142**, the valve seat being incorporated into the faceplate **20**. In the closed position, the flexible membrane **142** is supported by the valve seat **144** to seal said at least one opening arranged in the first exhaled air expelling channel **81**.

The exhaled air expelling device **80** moreover comprises a second check valve **160**, similar to the first check valve **43**, which is arranged to

permit a flow of exhaled directed from the lower chamber **50** toward the air duct **72** of the snorkel **70** during a phase of exhalation of the user. The second check valve **160** operates like the first check valve **43**.

The flexible skirt **30** has first **51** and second **52** lateral parts arranged
5 so as to cover in a sealed manner the first and second exhaled air expelling channels **81** and **82**.

In operation, the user disposes the mask **1** on his face, which mask can comprise attaching means such as elastic straps of adjustable length. When the user inhales, the inhaled fresh air crosses the duct **72** of the snorkel **70**
10 and comes out in the upper viewing chamber **45** then passes into the passage arranged by means of the check valve **55** in the partition **40** to come out in the lower breathing chamber **50** in which the nose and the mouth of the user are located. The check valve **55** is configured to allow the inhaled air to travel from the viewing chamber **45** toward the breathing chamber **50** and prevent
15 any return of exhaled air in the opposite direction. During an exhalation phase, the passage of air in the partition **40** is sealed so that the air is forced through the first and second air expelling channels **81** and **82** disposed along the lateral edges **2** and **3** of the body **10**, in particular disposed along the lateral edges of the faceplate **20** and closed in a sealed manner by the
20 corresponding lateral edges of the flexible skirt **30**.

The first and second exhaled air expelling channels **81** and **82** are in fluid connection in their upper parts with the snorkel **70**, in particular with the single air duct **72**.

The exhaled air is therefore evacuated toward the snorkel **70** without
25 passing through the upper viewing chamber **45**.

In order to balance the pressures, the user pinches his nose, by lodging his fingers in the recesses **31** and **32** of the main housing **16**. The auxiliary housing **62** being nested into the main housing **16**, the pressure exerted on the main housing **16** is transmitted to the auxiliary housing **60**, which
30 transmission is facilitated due to the protuberances **5** and **6** of the main housing pressing against the protuberances **90** and **91** of the auxiliary housing **60**.

The nesting together of the main **16** and auxiliary **62** housings facilitates the pinching of the nose.

35 In addition, the arrangement of the faceplate **20** in front of the mouth, along with the overmolding of the main nasal part **15** on the opening **4**, and

its arrangement with respect to the auxiliary nasal part **60** allow the nasal parts **15** and **60** not to be located against the mouth of the user which facilitates breathing.

5 The main nasal part **15** being overmolded on the lower edge **21a** of the upper part **21** of the faceplate **20** on the one hand, and on the upper edge **22a** of the lower part **22** of the faceplate **20** on the other hand, and where applicable on the lateral edges **20d** of the faceplate **20**, there is no risk when the user handles it that it will detach from the faceplate **20**.

10 The mask **1** according to the invention thus makes it possible to combine the advantages of an anti-condensation mask allowing breathing interchangeably through the nose and mouth, while being able to balance the pressures on the ears.

CLAIMS

1. A diving mask (1) comprising:

- 5 a. A body (10) provided with a faceplate (20) comprising an upper part (21), and a flexible skirt (30) including a partition (40) delimiting an upper chamber (45) for viewing from a lower chamber (50) for breathing, the partition (40) being arranged to be supported above the nose of the user in such a way that the nose, and optionally the mouth, of the user are located in the lower chamber (50), while the eyes of the user are located in the upper chamber (45), the partition (40) including at least one passage arranged (55) to allow the circulation of fresh air between the upper chamber (45) and the lower chamber (50) during a phase of inhalation of the user,
- 10 b. a snorkel (70) disposed in the extension of an upper part (10a) of the body (10), the snorkel (70) comprising at least one air duct (72);
- 15 c. the body (10) includes an exhaled air expelling device (80) which forms a fluid connection of the lower chamber (50) to the air duct (72) of the snorkel (70);
- 20 **characterized in that** the body (10) comprises a flexible and deformable main nasal part (15), the upper edge (15a) of which is secured in a sealed manner to the lower edge (21a) of the upper part (21) of the faceplate (20), in that the main nasal part (15) comprises a main housing (16) receiving the nose and configured in such a way as to allow the pinching of the nose of the user, and in that the skirt (30) comprises an auxiliary nasal part (60), in the extension of the partition (40), said auxiliary nasal part (60) comprises an auxiliary housing (62) receiving the nose and configured in such a way as to allow the pinching of
- 25 the nose of the user.
- 30

2. The mask (1) according to claim **1**, characterized in that the auxiliary housing (62) at least partly receiving the nose of the auxiliary nasal part (60) is nested into the main housing (16) at least partly receiving the nose of the main nasal part (15).
- 35

3. The mask (1) according to one or the other of claims **1 and 2**, characterized in that the faceplate (20) comprises a lower part (22), and in that the main nasal part (15) comprises a lower edge (15b) secured in a sealed manner to the upper edge (22a) of the lower part (22) of the faceplate (20).
5
4. The mask (1) according to any one of claims **1 to 3**, characterized in that the faceplate (20) comprises a central opening (4) having an upper edge (4a) and a lower edge (4b) between which the main nasal part extends at least partly (15).
10
5. The mask (1) according to any one of claims **1 to 4**, characterized in that the faceplate (20), particularly the lower part (22) of the faceplate (20), extends in front of the mouth of the user.
15
6. The mask (1) according to any one of claims **1 to 5**, characterized in that the main nasal part (15) comprises at least one lateral projection (17,18) projecting along one side of the plane of symmetry S of the mask (1).
20
7. The mask (1) according to any one of claims **1 to 6**, characterized in that the main nasal part (15) comprises an outer face (13) and an inner face (14), the inner face (14) being oriented facing the breathing chamber (50), and in that the main nasal part (15) comprises two protuberances (5,6) projecting from said inner face (14) and disposed on either side of the plane of symmetry S of the mask (1).
25
8. The mask (1) according to any one of claims **1 to 7**, characterized in that the main nasal part (15) comprises an outer face (13) and an inner face (14), the inner face (14) being oriented facing the breathing chamber (50), and in that the main nasal part (15) comprises, along its outer face (13), two recesses (31,32) disposed on either side of the main housing (16) for the nose of the main nasal part (15).
30

- 5 9. The mask (1) according to any one of claims **1** to **8**, characterized in that the main nasal part (15) is overmolded on the upper part (21) of the faceplate, (20), and optionally on the lower part (22) of the faceplate (20) and/or on the lateral edges of the faceplate (20).
- 10 10. The mask (1) according to any one of claims **1** to **9**, characterized in that the main nasal part (15) comprises a plate portion (35) projecting under the main housing (16) and extending against the faceplate (20), in particular extending between said two lateral projections (17,18).
- 15 11. The mask (1) according to claim 10, characterized in that the lower edge (15b) of the main nasal part (15) is disposed between the main housing (16) for the nose and the plate portion (35).
- 20 12. The mask (1) according to any one of claims **1** to **11**, characterized in that the skirt (30) and the main nasal part (15) are two separate parts.
- 25 13. The mask (1) according to claim **1**, characterized in that the auxiliary nasal part (60) comprises a plate portion (65) projecting under the auxiliary housing (62), said plate portion (65) being secured to the faceplate (20), in particular to the lower part (22) of the faceplate (20).
- 30 14. The mask (1) according to claim **3**, characterized in that the upper edge (22a) of the lower part (22) of the faceplate (20) is disposed between the main nasal part (15) and the auxiliary nasal part (60), in particular between the main plate portion (35) and the auxiliary plate portion (65).
15. The mask (1) according to any one of claims **1** to **14**, characterized in that the skirt and the main nasal part (15) are made of one and the same part.