

DIVING MASK PROVIDED WITH A TELECOMMUNICATIONS DEVICE

Background of the invention

5 The present invention relates to the field of diving masks, and especially masks used for "snorkelling".

This snorkelling activity observes the seabed whilst swimming on the surface of the water. The snorkeller must be able to hold his head under water whilst breathing.

10 Generally, the snorkeller is equipped with a mask for viewing and a snorkel for breathing. The snorkel includes a tube whose lower end is equipped with a mouthpiece which fits into the user's mouth, and an upper end which allows both the intake of fresh air and the exhaust of expired air.

15 It is known that such equipment has numerous disadvantages. First, since breathing via the mouth is not natural, some persons have difficulty breathing orally through a snorkel. Another disadvantage is that it is not possible to talk underwater when wearing a snorkel.

Also, the use of this mask-snorkel device is therefore not very comfortable.

20 To overcome this drawback, document FR 2 720 050 proposes a diving mask with which it is possible to breathe through the nose and through the mouth.

Such a diving mask includes:

a frame fitted with a visor;

25 a flexible skirt including a partition delimiting an upper chamber for viewing from a lower chamber for breathing, the partition being arranged to bear upon the top of the user's nose so that the user's mouth and nose are positioned in the lower chamber, whilst the user's eyes are positioned in the upper chamber,

30 a breathing tube having a proximal end for linking the breathing tube to the frame, and a distal end opposite the proximal end, the breathing tube including at least one channel fluidically connected with the lower chamber.

35 By way of this mask, the user, who has his mouth free, can now speak. Document FR 2 720 050 further provides that the lower part of the visor of the mask has a wall a little more finely honeycombed so as to fulfil

the function of a membrane and allow the passage of sounds in water. Such an arrangement however does not allow communicating with other snorkellers several metres away, or else with a person remained on the shore, while having his head under water.

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Subject and summary of the invention

It is one objective of the invention to propose a diving mask of the above type for communicating comfortably with other snorkellers at a distance.

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The invention attains this objective through the fact that the mask further includes a telecommunications device which is mounted at least partially to the breathing tube.

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Breathing tube means especially, but not exclusively, a snorkel having an open distal end. The breathing tube can also be a tube connected to a compressed air source.

The breathing tube preferably extends from an upper part of the frame. However, according to a variant, said breathing tube extends from a lower part of the frame or the visor. According to another variant, the diving mask according to the invention includes several breathing tubes.

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Telecommunications device means an electronic device which transmits and/or receives a signal such as a radio signal or even ultrasound.

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By way of advantage, the telecommunications device according to the invention utilises wireless communication technology. Preferably, the telecommunications device utilises "Bluetooth®" technology known also, especially in the computing industry.

The inventors have noted that this technology lets snorkellers communicate between each other when apart by several tens of metres.

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According to a variant, this is ultrasound technology which makes it possible to communicate under water. According to another variant, at the same time the telecommunications device runs "Bluetooth®" technology and ultrasound technology, and does this to substantially improve the listening quality of the mask when the user is completely immersed.

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More preferably, the telecommunications device is arranged to permit communicating with several users at the same time.

An interest of the invention is that snorkellers fitted with masks according to the invention can communicate with each other at a distance; this results in moments of pleasure and sharing during snorkelling.

Another interest of the invention is that it enables safe snorkelling
5 with a child, where the child remains in permanent communication with the adult, irrespective of his/her location in the water.

The invention also has advantageous application in coaching snorkellers, with the instructor easily able to give instructions to a group of snorkellers.

10 Finally, the snorkeller equipped with the diving mask according to the invention can also stay in contact and communicate with a person remained on the shore or on a boat.

According to the invention, the telecommunications device is mounted at least partially to the breathing tube.

15 "Mounted" means that the telecommunications device is fixed at least partially to the breathing tube, detachably or not. This includes especially the case, non-limiting, wherein the telecommunications device is housed in the breathing tube during manufacturing of said tube. This includes especially the case, non-limiting, wherein a section of the
20 telecommunications device belongs to the breathing tube, whereas another section of the telecommunications device belongs to the frame or the visor of the mask.

This arrangement is advantageous as it avoids crowding the area of the mask located in front of the mouth of the user.

25 Yet another interest is that the telecommunications device is arranged near the surface of the water, for easy transmission and reception of the radio signal.

Another advantage of the invention is that the telecommunications device captures the sounds emitted by the user via the breathing tube, as
30 a result of which it is not necessary to place a microphone near the mouth of the user.

Advantageously, at least one part, the first part, of the telecommunications device is arranged at the proximal end of the breathing tube.

35 Proximal end means that of the two ends of the breathing tube which is the closest to the frame of the mask.

An interest of this arrangement is being able to place some electronic components most closely to the user so that the centre of gravity of the mask is not shifted towards the distal end of the breathing tube.

5 Another interest is being able to place some components, such as for example a microphone, as close as possible to the user.

According to an embodiment, the telecommunications device is housed in a case which is mounted with the breathing tube, for example by clipping, or any other detachable fastening means.

10 Preferably, the first part includes a microphone and/or a loudspeaker.

Due to the proximal arrangement of the microphone, the latter more easily captures the sound waves originating from the mouth of the user and which move in the breathing tube.

15 To improve the quality of the sound information sensed by the microphone, the first part includes a microphone which leads in the channel.

Also, a proximal arrangement of the loudspeaker ensures hearing comfort.

20 Advantageously, at least one part, the second part, of the telecommunications device is arranged at the distal end of the breathing tube.

25 Distal end means the end of the breathing tube which is opposite the proximal end. This is therefore the end of the breathing tube which is away from the frame and which generally surfaces when the breathing tube is a snorkel.

Preferably, the second part includes an antenna.

30 As the distal end of the breathing tube is most often surfaced, the same applies for the antenna, which favours transmission and reception of radio signals.

Preferably, though not exclusively, the second part further includes transmitter and/or receiver modules for transmitting and/or receiving radio signals.

35 Advantageously, at least one part, the third part, of the telecommunications device is mounted to the frame.

The third part can also be mounted to the visor.

According to a preferred embodiment, the third part is integrated to the frame or the visor and is electrically connected to the first part and/or to the second part of the telecommunications device. More preferably, when the third part is present, the breathing tube forms one and the same
5 piece with the frame or the visor.

Preferably, the third part includes at least one control button of the telecommunications device. The button can be an on/off button, or can be a button for adjusting the sound volume. The third part preferably includes several buttons and control elements linked to said buttons for
10 controlling the telecommunications device.

In an embodiment, the third part includes at least one loudspeaker which can be integrated to the frame or the visor. However, the loudspeaker is preferably connected to the frame by a linking arm so that the loudspeaker can be placed as close as possible to one of the ears of
15 the user. According to a variant, a second loudspeaker is provided, preferably connected to the frame by another linking arm so that the second loudspeaker is arranged near the other ear of the user.

According to another embodiment, the telecommunications device includes at least one loudspeaker shifted relative to the body of the breathing tube so as to be placed near at least one of the ears of the user.
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According to another variant, the telecommunications device includes one – preferably two – shifted loudspeaker(s) consisting of an intra-auricular earpiece connected to the breathing tube by a flexible cable which is preferably, though not exclusively, detachable from the
25 breathing tube.

According to a first embodiment of the invention, the breathing tube forms one and the same piece with the frame. In this first embodiment, the breathing tube is not detachable from the frame or of the visor. If appropriate, it can easily have cables pass through it to
30 connect the first or second part of the telecommunications device mounted to the breathing tube with the third part of the telecommunications device mounted to the frame or to the visor.

In this first embodiment, the breathing tube preferably extends, but not exclusively, from an upper part of the frame, and the
35 telecommunications device includes an antenna arranged in the lower part of the frame. More preferably, this antenna arranged in the lower part of

the frame is an ultrasound antenna configured to transmit and/or receive ultrasound. As the lower part of the frame is most often immersed, the ultrasound antenna is also immersed, ensuring transmitting and receiving of ultrasound by the telecommunications device.

5 According to a second embodiment of the invention, the breathing tube is detachable from the frame, and wherein the breathing tube includes the telecommunications device.

In this second embodiment, the whole telecommunications device is preferably integrated into the breathing tube.

10 An interest is to reduce the bulk of the mask when it is not being used. Another interest is to be able to easily change the telecommunications device, for example in case of breakdown or during a technological evolution, without having to change diving mask. Yet another interest is being able to change the mask size while keeping its
15 breathing tube fitted with the telecommunications device.

Preferably, the antenna is arranged at the distal end of the breathing tube.

 According to a third embodiment of the invention, said diving mask further includes a detachable connector arranged to be mounted to the
20 breathing tube and to the frame such that the detachable connector, when it is mounted to the breathing tube and the frame, forms a fluidic connection at least between the lower chamber and the channel of the breathing tube, the detachable connector being detachable from the frame and the breathing tube, and wherein the detachable connector
25 includes the telecommunications device.

 This detachable connector constitutes an intermediate piece to be inserted between the frame of the mask and the breathing tube. It is understood that when the detachable connector is mounted to the breathing tube the telecommunications device is also mounted to the
30 breathing tube, according to the invention.

The detachable connector ensures passage of air between at least the lower chamber and the breathing tube.

By way of advantage, the telecommunications device includes a loudspeaker housed in the detachable connector.

35 However, according to a preferred variant, the telecommunications device includes at least one shifted loudspeaker which is arranged to be

disposed facing one of the ears of the user. An interest is to improve the hearing quality by having the loudspeaker as close as possible to the ear of the user. To improve the hold of the loudspeaker the frame includes a fastening element for holding the shifted loudspeaker.

5 According to another variant, the detachable connector includes a linking arm supporting the shifted loudspeaker, the linking arm extending according to a lateral side of the diving mask. Preferably, the linking arm has the same curvature as the lateral side of the mask and borders the frame so as not to oppose hydrodynamic resistance.

10 According to another variant, the telecommunications device includes one – preferably two – shifted loudspeaker(s) including an intra-auricular earpiece connected to the detachable connector by a flexible cable which is preferably, though not exclusively, detachable from the detachable connector.

15 By way of advantage, the telecommunications device includes an antenna which is disposed in a joining element configured to extend along the breathing tube, said joining element having an end arranged to be fixed to the distal end of the breathing tube.

20 The joining element includes an electrical linking wire connecting the antenna to the other electronic components of the telecommunications device arranged in the detachable connector.

25 Advantageously, the breathing tube includes a fastening member, while the frame includes a fastening device arranged to be able to be detachably fixed to the fastening member of the breathing tube so as to be able to form a sealed connection between the breathing tube and the frame, and wherein the detachable connector includes a first fastening part arranged to be detachably fixed with the fastening member of the breathing tube, and a second fastening part arranged to be able to be detachably fixed with the fastening device of the frame, so as to be able to form a first sealed connection between the breathing tube and the detachable connector, and a second sealed connection between the frame and the detachable connector.

30 It is understood therefore that the breathing tube can be directly connected to the frame of the diving mask when the detachable connector is detached, due to which the diving mask according to the invention can also be used without the telecommunications device.

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According to a preferred embodiment of the diving mask, the partition includes at least one passageway for enabling a circulation of inspired air directed from the upper chamber towards the lower chamber during an inspiration phase of the user, and wherein the breathing tube
5 has an inspired air intake channel and at least one first expired air exhaust channel, such that when said breathing tube is fluidically connected with the frame, the inspired air intake channel is fluidically connected with the upper chamber, while the first expired air exhaust channel is fluidically connected with the lower chamber.

10 Such an arrangement evacuates humidity out of the upper chamber, due to which the appearance of condensation on the inner wall of the visor is advantageously avoided.

According to a variant of the third embodiment, the detachable connector includes an inspired air intake duct and at least one first expired
15 air exhaust duct, and when the detachable connector, the breathing tube and the frame are mounted together, the inspired air intake duct of the detachable connector fluidically connects the inspired air intake channel of the breathing tube to the upper chamber, while the first expired air exhaust duct of the detachable connector fluidically connects the lower
20 chamber to the first expired air exhaust channel.

The invention further relates to a detachable connector of a diving mask according to the invention, said connector including at least one duct, wherein, when the detachable connector is fixed to the diving mask, the duct fluidically connects the breathing tube to the lower chamber, and
25 the detachable connector includes a telecommunications device.

The detachable connector is advantageously that of the third embodiment of the diving mask.

The invention finally relates to a detachable breathing tube of a diving mask according to the second embodiment of the invention, the
30 breathing tube including a fastening part for its detachable fastening to the frame of the mask, and a telecommunications device.

The telecommunications device of the detachable connector and of the detachable breathing tube includes the technical characteristics defined earlier.

Brief description of the drawings

The invention will be more clearly understood from the following description of embodiments of the invention given by way of non-limiting examples, in reference to the appended drawings, wherein:

- 5 - Fig. **1** is a perspective view of a diving mask according to the first embodiment of the invention, wherein the breathing tube is a snorkel which extends from the lower part of the frame;
- Figs. **2A** and **2B** illustrate a variant of the mask of Fig. **1**, the snorkel extending from the upper part of the frame;
- 10 - Fig. **3** illustrates a variant of the mask of Fig. **2A**, wherein the loudspeaker and control buttons are shifted on a side edge of the mask;
- Figs. **4A** and **4B** illustrate a variant of the first embodiment wherein the mask includes an ultrasound antenna arranged in
- 15 the lower part of the frame;
- Fig. **5** illustrates a diving mask according to a second embodiment of the invention;
- Figs. **6A** to **6C** illustrate a breathing tube according to the invention integrating a telecommunications device for the diving
- 20 mask of Fig. **5**;
- Fig. **7** is a variant of the detachable breathing tube of Fig. **6B**;
- Fig. **8** is a perspective view of a diving mask according to the third embodiment the invention;
- Fig. **9** is an exploded view of the diving mask of Fig. **8**;
- 25 - Fig. **10** is a rear view of the flexible skirt of the mask of Fig. **8**;
- Fig. **11** is a plan view of the flexible skirt of Fig. **10**;
- Fig. **12** is a frontal view of the flexible skirt of Fig. **11** assembled with the frame;
- Fig. **13** illustrates the breathing tube of the mask of Fig. **8**,
- 30 viewed from its lower end;
- Fig. **14** is a plan view of the flexible skirt assembled with the frame;
- Fig. **15** is a detailed view of the connection of the top sleeve of the flexible skirt of Fig. **11** with the top connector of the frame;
- 35 - Fig. **16** is a rear view of the mask of Fig. **8**, without the fastening strap;

- Figs. **17A** and **17B** are detailed views of the connection of the first sleeve of the flexible skirt with the first lateral connector of the frame;
- Fig. **18** is an exploded view of the upper part of the breathing tube of the mask of Fig. **8**;
- Fig. **19** illustrates the air inlet circuit in the breathing tube;
- Fig. **20** illustrates the situation wherein the float blocks the entry of the breathing tube when the latter is immersed in water;
- Fig. **21** is a rear view of the mask of Fig. **8**, with the fastening strap;
- Figs. **22A** and **22B** illustrate the telecommunications device and the detachable connector of the diving mask of Fig. **8**;
- Fig. **23** illustrates a variant of the detachable connector of Fig. **8**;
- Figs. **24A** and **24B** illustrate another variant of the detachable connector of Fig. **8**;
- Figs. **25A** and **25B** illustrate a variant of the detachable connector of Fig. **24A**; and
- Figs. **26** and **27** illustrate a case for a microphone configured to be mounted on a breathing tube such as illustrated in Figs. **6A** to **6C**.

Detailed description of the invention

First, it is specified that visor means the face screen through which the user can see objects external to the mask. Frame means the peripheral part of the diving mask which supports the above face screen, the flexible skirt being preferably fixed to the frame.

According to the invention, the frame can form a single piece with the visor, wherein case the frame consists of the peripheral portion of the visor. In the latter case, the flexible skirt is preferably fixed to the frame constituted by the peripheral portion of the visor. The frame can also be in several parts, for example a first part forming a single piece with the visor and a second part fixed about the first part. In the latter case, the flexible skirt can be fixed to the first part of the frame.

Fig. **1** illustrates an example of a diving mask **10** according to a first embodiment of the invention. This diving mask **10** includes a frame **12** fitted with a visor **18**, and a flexible skirt **40** integral with the frame. The flexible skirt includes a partition **46** which delimits an upper chamber **50** for viewing from a lower chamber **52** for breathing. The partition **46** is arranged to bear upon the nose of the user such that the mouth and the nose of the user are in the lower chamber **52**, while the eyes of the user are in the upper chamber **50**.

The diving mask **10** further includes a breathing tube **20** which comprises a proximal end **20a** for linking the breathing tube **20** to the frame **12**, and a distal end **20b** which is opposite the proximal end **20a**.

In the example of Fig. **1**, the proximal end **20a** of the breathing tube **20** extends from a lower part **10a** of the diving mask **10**. The proximal end **20a** of the breathing tube **20**, in this example, traverses the lower part of the frame to terminate in the lower chamber **52**. Without departing from the scope of the present invention, the proximal end of the breathing tube could traverse the lower part of the visor which is facing the lower chamber **52**.

As is evident in Fig. **1**, the breathing tube **20** extends from its proximal end by following one of the side edges of the frame **12** as far as an upper portion **14** of the frame, to then extend in a direction opposite that of the lower chamber **52**.

The distal end **20b** of the breathing tube **20** is fitted with orifices to allow the entry of air in the breathing tube. The breathing tube **20** includes at least one channel **21** which is fluidically connected with the lower chamber **52** and with the orifices **23** of the distal end **20b** of the breathing tube **20**. In this example, the breathing tube is a snorkel.

According to the invention, the diving mask **10** further includes a telecommunications device **500** which is mounted to the breathing tube **20**. The telecommunications device **500** includes a first part **502** which is arranged at the proximal end **20a** of the breathing tube **20**. In this example, the first part **502** includes a microphone **504** which leads in the channel **21**. Without departing from the scope of the present invention, the microphone could also terminate in the lower chamber **52**.

The second part **506** of the telecommunications device is arranged at the distal end **20b** of the breathing tube **20**. In this example, the second part **506** includes an antenna **517**.

5 The telecommunications device **500** further includes a third part **510**, mounted to the frame, which comprises a control button **512** for controlling the telecommunications device. The third part **510** further includes a control element integrated into the frame **12**.

10 For the restitution of the sound, the third part of the telecommunications device further includes a loudspeaker **514** which is integrated into the frame.

Without departing from the scope of the present invention, the loudspeaker can be arranged at another point, and for example be shifted from the frame while being connected by a linking arm.

15 In the example of Fig. **1**, it is evident that the breathing tube **20** forms one and the same piece with the frame **12**, and the electrical linking members, especially the wires, which connect the first, second and third parts of the telecommunications device are integrated into the mask without however being shown in the drawing of Fig. **1**.

20 Figs. **2A** and **2B** illustrate a diving mask **10'** which is a variant of the diving mask **10** according to the first embodiment. The diving mask **10'** differs from that of Fig. **1** by the fact that the breathing tube **20'** is connected to an upper part **12a'** of the frame **12'** of the diving mask **10'**.

25 Here too, the breathing tube **20'** forms one and the same piece with the frame **12'**. The diving mask **10'** also comprises a telecommunications device **500'** which includes a first part **502'** arranged at the proximal end **20a'** of the breathing tube **20'**. In this example, the first part **502'** includes a microphone **504'**, and control buttons **512'** are arranged on an upper face of the breathing tube **20'**, as is clear in Fig. **2A**.

30 The first part **502'** further includes a loudspeaker **514'** which is arranged on a lower face of the breathing tube **20'**, partially proximal.

The telecommunications device **500'** further includes a second part **506'** arranged at the distal end **20b'** of the breathing tube **20'** which includes an antenna **517'**.

35 Fig. **3** illustrates a variant **10''** of the diving mask according to the first embodiment. The mask **10''** illustrated in Fig. **3** differs from the mask

10' of Figs. **2A** and **2B** by the fact that the loudspeaker **514''** and the control buttons **512''** are mounted to the frame **12''**. The first part **502''** as such includes the microphone **504''** while the distal end **20b''** of the breathing tube **20''** includes the second part **506''** of the telecommunications device which includes the antenna **517''**.

Figs. **4A** and **4B** illustrate a diving mask **10'''** according to a variant of the first embodiment of the invention. In this variant the diving mask **10'''** also includes a breathing tube **20'''** having a proximal end **20a'''** to which is arranged the first part **502'''** of the telecommunications device **500'''**, the first part **502'''** of the telecommunications device includes a microphone **504'''**. The variant of Figs. **4A** and **4B** essentially differs from that of Fig. **3** by the fact that the antenna **517'''** is not arranged at the distal end of the breathing tube but in the lower part of the frame **12'''**. In the variant of Figs. **4A** and **4B**, the antenna **517'''** is an ultrasound antenna configured to transmit and receive ultrasound. The antenna **517'''** is also connected to an electronic device arranged into the mask which is adapted to transform the signal emanating from the microphone **504'''** into an ultrasound signal. Preferably, the electronic device is also adapted to transform an ultrasound signal received by the antenna **517'''** into an audio signal which is then transmitted to the loudspeaker of the diving mask.

In this example, the ultrasound antenna **517'''** is arranged in a case **509'''** which projects downwards from the lower end of the frame **12'''**.

By way of Figs. **5** to **7** a diving mask **110** according to a second embodiment of the invention and the detachable breathing tube according to the invention will now be described.

The diving mask **110** illustrated in Fig. **5** includes a frame **112** fitted with a visor **118**, a flexible skirt **140** fixed to the frame, the flexible skirt including a partition **146** delimiting an upper chamber **150** for viewing from a lower chamber **152** for breathing, the partition being arranged to bear upon the nose of the user such that the mouth and the nose of the user are in the lower chamber, while the eyes of the user are in the upper chamber.

The diving mask **110** also includes a breathing tube **120** which includes a proximal end **120a** for linking the breathing tube to the frame at a distal end **120b** opposite the proximal end.

The breathing tube **120** includes at least one channel **121**, illustrated in Fig. **6A** and fluidically connected with the lower chamber **152**. In the example of Fig. **5**, the breathing tube **120** extends from the upper part **112a** of the frame **112**. However, without departing from the scope of the present invention, the breathing tube could extend from the lower part **112b** of the frame **112**. In this example, the breathing tube **120** is a snorkel whereof the distal end **120b** includes openings **123** for enabling exchange of air with the atmosphere.

In the second embodiment, the breathing tube **120** is detachable from the frame **112**. Furthermore, the telecommunications device **1500** is arranged in the breathing tube **120**.

By way of Figs. **6A** to **6C**, a first example of the detachable tube **120** for the diving mask according to the second embodiment will be described.

Figs. **6A** to **6C** illustrate an embodiment of the detachable breathing tube **120** according to the invention. This detachable breathing tube has a proximal end **120a** for linking the breathing tube **120** to the frame **112** of the diving mask of Fig. **5** and a distal end **120b** opposite the proximal end. The distal end **120b** comprises the air inlet **E** which consists of orifices **123**.

The diving mask **110** further includes a telecommunications device **1500** which is mounted to the breathing tube **120**. More precisely, in this second embodiment the telecommunications device **1500** is integrated into the detachable breathing tube **120**. The telecommunications device **1500** includes a first part **1502** arranged at the proximal end **120a** of the breathing tube **120**, the first part **1502** including a microphone **1504** and a loudspeaker **1514**. In this example, the microphone **1504** terminates in the channel **121**, while the loudspeaker **1514** is arranged so as to direct sounds towards the head of the user when the breathing tube is fixed to the diving mask. In this example, the loudspeaker is directed towards the same side of the breathing tube as that of the air inlet.

The telecommunications device **1500** further includes a second part **1506** arranged at the distal end **120b** of the breathing tube **120**. This second part **1506** includes an antenna **1517**. Control buttons **1512** are also provided on the body of the breathing tube **120**. The detachable breathing tube **120** further includes an electronic device including a

transmitter module and/or a receiver module connected to the antenna **1517**, the microphone **1504** and the loudspeaker **1514**.

The telecommunications device **1500** further includes receiver/transmitter modules **1505** and **1507** which are arranged in this example in the body of the breathing tube **120**.

For its detachable fastening to the frame **112** of the diving mask **110**, the breathing tube includes at its proximal end a coupling member **125**.

Fig. **7** illustrates a detachable breathing tube **120'** wherein is arranged a telecommunications device **1500'**, this breathing tube **120'** being designed to be coupled to the diving mask **110** illustrated in Fig. **5**. The breathing tube **120'** also has a proximal end **120'a** and a distal end **120'b**. The telecommunications device also includes a first part **1502'** which includes a loudspeaker **1514'** and a microphone **1504'**. Control buttons **1512'** are also arranged on the body of the breathing tube. Like that of Figs. **6A** to **6C**, the detachable breathing tube **120'** further includes a coupling member **125'** for its fastening to the frame of the mask.

The breathing tube **120'** of Fig. **7** differs from that of Figs. **6A** to **6C** by the fact that the second part **1506'** of the telecommunications device includes not only the antenna **1517'**, but also the battery **1513'** and the transmitter/receiver modules **1505'** and **1507'**, these elements being arranged beyond the air inlet **E** of the breathing tube. To do this, the breathing tube **120'** includes a cap **124'** which has an extension forming a housing to sealingly receive the above electronic components of the telecommunications device **1500'**.

By way of Figs. **8** to **25B**, a third embodiment of the diving mask **210** of the invention, as well as the detachable connector according to the invention will now be described.

The diving mask **210** illustrated in Fig. **8** includes a frame **212** of general oblong shape having an upper part **212a** and a lower part **212b**. The frame **212** is fitted with a visor **218**.

In this example, the frame **212** includes an upper portion **214** forming an upper strapping and a lower portion **216** constituting a lower strapping.

The upper **214** and lower **216** portions of the frame are fixed to each other to form a strapping enclosing the face of the user.

As is evident from Fig. **8**, the frame **212** encloses the visor **218**. This mask further includes a purge valve **217** for evacuation of water
5 which would have been able to enter the mask.

The diving mask **210** also includes a breathing tube **220** which has a proximal end **220a**, in this case its lower end, which includes a fastening member **229** adapted to be connected to the upper part **212a** of the frame.

10 In this example, the breathing tube **220** is detachable. It can be detached or unclipped from the frame **212**, reducing the bulk of the mask when the latter is not being used.

The breathing tube **220**, seen more clearly in Fig. **9**, also has a distal end **220b** which is fitted with a cage **222** permeable to air.

15 As will be described in more detail hereinbelow, the breathing tube **220** further includes a cap **224** which cooperates with the cage **222**.

In reference now to the exploded view of Fig. **9**, it is clear that the lower portion **216** of the frame **212** includes a first element **216'** and a second element **216''** which are fixed to each other to form the lower
20 portion. Without departing from the scope of the present invention, the frame could be constituted by one and the same piece.

It is also evident that the breathing tube **220** includes a slender body **226** whereof the lower end **226a** is capable of nesting with an extension **228** of the upper portion **214** of the frame **212** which projects
25 from the upper end **212a** of the frame.

Also, the breathing tube **220** includes a float **230** which is movable in the cage **222**, the float including an upper end **230a** fitted with a blocking device **232**. As will be explained in more detail hereinbelow, the float **230** is arranged such that when the breathing tube **220** is immersed
30 in water the float shifts so that the blocking device **232**, in this case a flexible membrane, closes off the entry of the breathing tube.

In reference to Figs. **10**, **11** and **12**, it is evident that the flexible skirt **240** has a general oblong shape substantially of the same dimension as the frame **212** and the visor **218**.

35 The flexible skirt includes a circumference **242** which has an upper part fixed to the lower portion of the frame.

The flexible skirt **240** further includes a peripheral sealing lip **244** arranged to bear against the face of the user so as to prevent water from seeping in between the face of the user and the visor.

5 The flexible skirt **240** further includes a partition **246** which is arranged to bear upon the nose of the user. This partition **246** delimits an upper chamber **250** for viewing from a lower chamber **252** for breathing. As is clear from Fig. **12**, which illustrates the frame **212** assembled with the visor **218** and the skirt **240**, the mouth and the nose of the user are in the lower chamber **252**, while the eyes of the user are in the upper
10 chamber **250**.

Otherwise expressed, the upper chamber **250** is delimited by the visor, the eyes of the user, the upper wall **246a** of the partition **246**, and the part of the flexible skirt which extends above the partition **246**.

Also, the lower chamber **252** is delimited by the visor **218**, the
15 mouth and the nose of the user, the lower part **246b** of the partition **246**, and by the part of the flexible skirt which extends below the partition **246**.

In this example, the partition includes a pair of passageways **254** fitted with check valves arranged to enable circulation of inspired air directed only from the upper chamber **250** towards the lower chamber **252** during an inspiration phase of the user. In this example, the flexible skirt is made of silicone and forms one and the same piece with the partition **246**, the sealing lip **244** and the circumference **242**.
20

Fig. **13** illustrates the breathing tube **220**, seen from its proximal
25 end **220a**.

It is evident that the breathing tube **220** comprises an inspired air intake channel **260** which extends between the proximal end **220a** of the breathing tube and the distal end **220b** of the breathing tube. This inspired air intake channel extends according to the longitudinal direction
30 of the body **226**. As will be explained in more detail hereinbelow, the inspired air intake channel terminates in the upper chamber.

The breathing tube **220** further includes two channels **221** fluidically connected with the lower chamber, i.e a first expired air exhaust channel **262**, which also extends according to the longitudinal direction of
35 the body **226** between the proximal end **220a** and the distal end **220b** of

the breathing tube **220**. This first expired air exhaust channel **262** communicates with the lower chamber **252**.

In this example, the breathing tube **220** includes a second expired air exhaust channel **264** similar to the first expired air intake channel.

5 As is clear from Fig. **13** the inspired air intake channel **260** is separated from the first and second air exhaust channels **262**, **264** by two longitudinal walls **266**, **268**.

10 As is clear from Fig. **14**, which shows the frame **212** assembled on the flexible skirt **240** in plan view, the extension **228** further includes a central channel **270** arranged to communicate with the inspired air intake channel **260** when the breathing tube is fixed to the frame, and two expiration channels **272**, **274** arranged to respectively communicate with the first and second expired air exhaust channels **262**, **264**.

15 In reference now to Fig. **15**, it is evident that the frame **212** further includes a top connector **280** which projects from the upper portion **214** of the frame **212**. The flexible skirt **240** as such includes a top sleeve **282** which projects from an upper part of the flexible skirt **240** and terminates in the upper chamber **250**. It is clear that the top connector **280** engages inside the top sleeve **282** to create a sealed
20 connection between these two elements. In Fig. **15**, the arrow **F1** symbolises the flow of fresh inspired air.

It is understood that during an inspiration phase, fresh air enters into the breathing tube, flows into the inspired air intake channel, then into the upper chamber **250** by passing through the top sleeve **282**.

25 The circuit of expired air will now be described.

Arranged in the frame **212**, and more particularly in the upper part **214** of said frame is a first inner duct **290** for expired air, and a second inner duct **292** for expired air. However, without departing from the scope of the present invention the first and second inner ducts **290**, **292** can be
30 arranged in a peripheral circumference **219** of the visor **218** which borders the inner circumference of the frame **212**. According to another variant, the mask can include a single inner duct for expired air. Similarly, the breathing tube can also include a single inspired air intake channel.

35 As is clear from Fig. **16**, these first and second inner ducts are arranged on either side of a longitudinal plane **P** of the mask. This plan **P** here constitutes the plane of symmetry of the mask.

To the extent where the first and second inner ducts **290**, **292** are identical, only the first inner duct **290** will be described. The latter has an upper end which corresponds to the outlet of the channel **272** illustrated in Fig. **14**. The first inner duct **290** further has a lower end.

5 Also, the flexible skirt **240** further includes a first sleeve **2100** projecting from a first side edge **241** of the flexible skirt **240** and extending towards the upper part **212a** of the frame **212**. The first sleeve, which forms one and the same piece with the flexible skirt, has a lower end **2100a** leading in the lower chamber **252** and an upper end
10 **2100b** opposite the lower end, which is fluidically connected with the lower end of the first inner duct. It is understood that the sleeve forms a duct for expired air.

The flexible skirt further includes a second sleeve **2200**, identical to the first sleeve **2100**, whereby the second sleeve **2200** projects from a
15 second side edge **243** of the skirt **240**, opposite the first side edge **241**. The second sleeve has a lower end **2200a** leading in the lower chamber **252** and an upper end **2200b** opposite the lower end which is fluidically connected with the lower end **292b** of the second inner duct **292**.

In reference to Fig. **16**, it is evident that the first inner duct **290**
20 extends between the apex of the frame and a lower end **214a** of the upper portion **214** of the frame.

In reference to Figs. **16**, **17A** and **10B**, it is evident that the frame **212**, and more precisely the lower end of the upper portion **214** of the frame **212** includes a first lateral connector **2110** which is engaged in the
25 second end **2100b** of the first sleeve. To improve strength and sealing, the first lateral connector **2110** includes grooves **2112** on its external face **2110a**, the grooves **2112** cooperating with the internal face **2101** of the second end of the first sleeve. In reference again to Fig. **16**, it is evident that the second end of the first sleeve brushes a lateral side **212c**
30 of the frame **212**.

It is understood therefore that expired air flows successively through the first sleeve **2100**, through the first inner duct **290** then through the first expired air exhaust channel **262**. This outgoing airflow is illustrated by arrow **F2**. Arrow **F3** as such illustrates the other outgoing air
35 circuit which flows via the second sleeve **2200** and the second inner duct **292**.

By way of Figs. **18** to **20** more particularly the upper portion of the breathing tube **220** will now be described.

The breathing tube **220** of the mask according to the invention includes at its upper end means for adjusting the air inlets and outlets in
 5 the breathing tube. For this purpose the breathing tube **220** includes a wafer **2300** which is sealingly arranged between the cap **224** and the upper end **226b** of the body **226** of the breathing tube **220**.

This wafer includes a main orifice **2302** communicating with the intake **E** of the breathing tube. In this example, the intake **E** of the
 10 breathing tube is made by slots **223** made in the cage **222**.

The wafer **2300** further includes an inlet orifice **2304** communicating with the intake **260a** of the inspired air emission channel **260**.

The wafer **2300** further includes a first outlet orifice **2306** which
 15 communicates with the outlet **262a** of the first exhaust channel **262**.

The wafer **2300** further includes a second outlet orifice **2308** which communicates with the outlet **264a** of the second expired air exhaust channel.

As is seen from Fig. **18**, the sections of the main orifice **2302**, of
 20 the inlet orifice **2304** and the two outlet orifices **2306**, **2308** substantially correspond to the transversal sections of the inspired air intake channel **260** and the expired air exhaust channels **262**, **264**.

The wafer **2300** further includes a first check valve **2310** arranged facing the first inlet orifice **2304** to block said inlet orifice during an
 25 expiration phase. The wafer **2300** further includes a second check valve **2312**, arranged facing the first outlet orifice to block said first outlet orifice during an inspiration phase. And, in this example the wafer **2300** also includes a third check valve **2312** which is arranged to block the second outlet orifice during an inspiration phase.

The breathing tube **220** further includes a fluid communication
 30 chamber **2350** wherein the main orifice **2302**, the inlet orifice **2304**, the first outlet orifice **2306** and the second outlet orifice **2308** terminate. The fluid communication chamber **2350** is arranged in the cap **224** which is sealingly fixed to the upper end of the body **226**.

35 Fig. **19** illustrates the configuration of the breathing tube during an inspiration phase. It is understood that inspired fresh air illustrated by

arrow **F1** enters the cage **222** via the slots **223**, then enters the fluid communication chamber **2350** via the main orifice **2302** then enters the inspired air intake channel **260** by passing through the inlet orifice **2304**, the first check valve **2310** being open to let airflow through.

5 Fig. **20** illustrates the case where the breathing tube is immersed in water. The float **230**, under the action of Archimedes thrust, rises in the cage **222** until the blocking device **232** blocks the main orifice **2302**, the effect of which is to close the inlet of the breathing tube.

10 As illustrated in the example of Fig. **21**, the diving mask **210** further includes an elastic holding strap **2400** which extends between the upper portion **214** of the frame and the lower portion **216**. The elastic strap **2400** includes two link points **2402**, **2404** with the upper portion **214** and two link points **2406**, **2408** with the lower portion **216**. It is seen that the strap elastic forms a "X".

15 The upper portion **214** of the frame **212** also includes two loops **2410**, **2412** wherein are engaged the ends of the two upper portions of the strap portions **2414**, **2416**. It is seen that the ends of these two strap portions **2414**, **2416** form beads **2418**, **2420** wider than the slots **2422**, **2424** made in the loops, the effect of which is to ensure the elastic strap **2400** is held to the frame.

20 According to this first embodiment, the diving mask **210** further includes a telecommunications device **2500** which is also mounted to the breathing tube **220**. In this way the diving mask **210** includes a detachable connector **600** arranged to be mounted to the breathing tube and the frame such that the detachable connector **600**, when mounted to the breathing tube and the frame, forms a fluidic connection between the lower chamber **252** and the expired air exhaust channels **262**, **264** of the breathing tube, and between the upper chamber **250** and the inspired air intake channel **260**. As will be explained in detail hereinbelow, the detachable connector is detachable from the frame **212** and the breathing tube **220**.

 According to the third embodiment, the detachable connector **600** comprises the telecommunications device **2500**.

35 In the example of Figs. **22A** and **22B** the telecommunications device **2500** comprises a loudspeaker **2514** which is housed in the detachable connector **600**.

The telecommunications device **2500** further includes a transmitter module **2505** of a radio signal, and a receiver module **2507** of a radio signal.

In this example, the radio signal is a signal complying with
 5 "Bluetooth®" protocol, known elsewhere. The transmitter and receiver modules are therefore configured to transmit or receive radio signals according to this wireless transmission protocol. The loudspeaker **2514** is connected to the receiver module by a wire link, not shown here.

The telecommunications device includes an antenna **2517**, which
 10 receives and transmits the radio signals. This antenna **2517** is connected to the transmitter **2505** and receiver **2507** modules. The telecommunications device **2500** further includes control buttons **2512** which are arranged, in this example, on the detachable connector.

The telecommunications device **2500** further includes a
 15 microphone **2504**, connected to the transmitter module **2505**. The microphone **2504** terminates in at least one of the ducts of the detachable connector, preferably in the inspired air exhaust duct.

When the detachable connector **600** is mounted to the frame **212**
 20 of the diving mask and the breathing tube **220**, the telecommunications device **2500** is de facto mounted to the breathing tube **220**.

More precisely, the detachable connector **600** is interleaved
 between the upper part **212a** of the frame **212** and the breathing tube **220**. As is evident from Fig. **8**, the detachable connector is located at the proximal end of the breathing tube **20** when these two pieces are
 25 assembled with each other.

In reference to Fig. **22A**, the detachable connector **600** includes an inspired air intake duct **602**, and a first and a second expired air exhaust ducts **604**, **606** which extend on either side of the inspired air intake duct **602**. As mentioned hereinabove, without departing from the scope of the
 30 present invention, the detachable connector **600** can include a single duct when the breathing tube includes a single channel.

When the detachable connector **600**, the breathing tube **220** and the frame **212** are mounted together, the inspired air intake duct **602** of the detachable connector **600** fluidically connects the inspired air intake
 35 channel **260** of the breathing tube **220** to the upper chamber **250**, while the first and second expired air exhaust ducts **604**, **606** of the detachable

connector **606** fluidically connect the lower chamber **252** to the first and second expired air exhaust channels **262**, **264** of the breathing tube **220**.

The detachable connector **600** includes a first end **600a** configured to cooperate with the proximal end **220a** of the breathing tube, and a
 5 second end **600b** which is shaped to cooperate with the extension **228** of the upper portion of the frame **212**.

More precisely, it is understood by means of Fig. **14** that when the detachable connector is fixed to the frame **212** and the breathing tube **220**, the inspired air intake duct **602** of the detachable connector is
 10 fluidically connected to the central channel **270** of the extension **228**, while the first and second expired air exhaust ducts **604**, **606** are fluidically connected to the expiration channels **272**, **274**.

To ensure fastening of the detachable connector **600** to the frame **212** and the breathing tube **220**, the breathing tube **220** includes a
 15 fastening member **229**, seen in Fig. **9**. The frame **12** includes a fastening device, here constituted by the extension **228** illustrated in Fig. **14**, arranged so it can be detachably coupled to the fastening member **229** of the breathing tube so it can form a sealed connection between the breathing tube and the frame.

The detachable connector **600** further includes a first fastening part **608**, located at the first end **600a**, arranged to be detachably fixed with the fastening member **229** of the breathing tube **220**. The first fastening part **608** is shaped to nest in the fastening member **229** of the breathing tube **220**.

The detachable connector **600** includes a second fastening part **610** arranged so it can be detachably fixed with the fastening device **228** of the frame **212**. As is understood by means of Figs. **14** and **24**, the fastening device **228** of the frame **212** is shaped to fit inside the second fastening part **610**.

This arrangement makes for a first sealed connection between the breathing tube **220** and the detachable connector **600**, and a second sealed connection between the frame and the detachable connector.

It is understood that it is also possible to directly connect the breathing tube **220** to the frame **212** of the mask, as is illustrated in
 35 Figs. **16**, for example when the aim is not to utilise the telecommunications device.

The detachable connector **600** includes a body **611** fitted with a housing **612** which receives the loudspeaker **2514**, the transmitter module, the receiver module, the microphone and the antenna. The detachable connector further includes a battery and control buttons **512**.

5 Fig. **23** illustrates a variant of the detachable connector **600'** according to the invention. The detachable connector **600'** of Fig. **23** differs from the detachable connector **600** of Fig. **22A** by the fact that the loudspeaker **2514'** is shifted and is connected to the detachable connector **600'** by a linking arm **614'** which laterally extends relative to
10 the frame **212**. As is understood by means of Fig. **23**, the shifted loudspeaker **2514'** is located facing the ear of the user, which substantially improves the hearing quality.

To improve the hold of the linking arm **614'** during snorkelling, the frame **212** includes a fastening element **219** for fastening the linking arm
15 **614'** to the frame **212**. This fastening element **219**, shown in Fig. **23**, is an extension of the strapping of the frame of the mask. It is specified here that this configuration of shifted loudspeaker can also be implemented in the first and second embodiments of the diving mask described hereinabove.

20 Figs. **24A** and **24B** illustrate another variant of the detachable connector **600''** according to the invention. The detachable connector **600''** illustrated in Figs. **24A** and **24B** differs from the detachable connector **600** of Fig. **22A** by the fact that the antenna is not arranged in the housing of the detachable connector, but at the distal end **220b** of
25 the breathing tube **220** when the latter is fixed to the detachable connector **600''**.

To do this, the detachable connector includes a joining element **616''** which projects from the body **611''** of the detachable connector **600''** so as to extend along the breathing tube **220** when the latter is
30 fixed to the detachable connector **600''**. The joining element **616''** receives the antenna **2517** at its distal end **617''**. As is evident by means of Fig. **24B**, the distal end **617''** of the joining element **616''** is shaped to be fixed to the distal end **220b** of the breathing tube. In this example, fastening is realised by the fact that the distal end **617''** of the joining
35 element made of flexible material forms a hook whereof the end

cooperates with the slots **223** made in the cage **222** of the breathing tube **220**.

As is evident from Fig. **24A**, the telecommunications device further includes control buttons **2512** arranged on the body **611** of the detachable connector.

Figs. **25A** and **25B** illustrate a variant of the detachable connector **600** according to the invention. The detachable connector **600** of Figs. **25A** and **25B** differs from that of Figs. **24A** and **24B** by the fact that the loudspeaker is laterally shifted, as for the variant of Fig. **23**.

Figs. **26** and **27** illustrate a case **1509** for a microphone configured to be mounted, for example and non-limiting, on a breathing tube **120** such as illustrated in Figs. **6A** to **6C**.

As is evident from the exploded view of Fig. **26**, the case **1509** includes a body **1511** defining a housing wherein the microphone **1504** is disposed. The case further includes a face **1515** configured to cover the opening of the housing defined by the body.

Furthermore, the case **1509** includes a damper block **1521**, for example formed from material of foam type, disposed between the microphone **1504** and the face **1515**.

The body **1511** also includes sealing means **1519**, **1519'** which comprise, for example and non-limiting, two sealing lips annularly extending around the body **1511**.

Fig. **27** illustrates the assembly of the case **1509** on the breathing tube **120**.

The breathing tube **120** includes a wall **127** wherein an orifice **129** is formed. For example and non-limiting, the orifice **129** is formed in the wall opposite that on which the loudspeaker **1514** is mounted.

The case **1509** is mounted on the wall **127** by extending through the orifice **129** such that the face **1515** is disposed inside the tube **120**; in other words, the face **1515** of the case **1509** leads in the channel **121** of the breathing tube **120**; the sealing means **1519**, **1519'** are thus configured to ensure sealing between the wall **127** and the case **1509**, the sealing lips coming into contact with the two opposite faces of the wall **127**. It is clear that the case **1509** is thus housed in the thickness of material forming the wall **127**.

The case **1509** prevents the microphone **1504** from being exposed to water, which would compromise its operation.

5 So that the case **1509** does not compromise the quality of the signal sensed by the microphone **1504**, the face **1515** has minimum thickness and is formed from material of silicone type. Furthermore, to ensure propagation of sound between the face **1515** and the microphone **1504**, sufficient volume between said elements is provided into the housing of the case **1509**.

10 The body **1511** is formed from elastic material such as silicone and has a thickness configured to reduce vibrations generated by the breathing tube **120**; the thickness of the body **1511** is preferably greater than that of the face **1515**. Thickness of the body **1511** means the thickness of the different walls constituting the body **1511**.

15 The body **1511** also has a face **1523** disposed outside the tube **120** ; for example and non-limiting, the face **1523** of the body **1511** includes elastic material such as silicone adhesive so as to participate for the hermetic sealing of the housing and contribute to reducing vibrations generated by the breathing tube **120**.

20 The presence of the damper block **1521** also participates to the vibration damping emitted by the breathing tube **120**.

In this way the case **1509** receiving the microphone **1504** and mounted in the wall of the breathing tube **120** both protects the microphone from humidity and filters mechanical vibrations emitted by the breathing tube **120**.

25

CLAIMS

1. A diving mask including:
a frame fitted with a visor;
5 a flexible skirt including a partition delimiting an upper chamber for viewing from a lower chamber for breathing, the partition being arranged to bear upon the nose of the user such that the mouth and the nose of the user are in the lower chamber, while the eyes of the user are in the upper chamber,
10 a breathing tube having a proximal end for linking the breathing tube to the frame, and a distal end opposite the proximal end, the breathing tube including at least one channel fluidically connected with the lower chamber;
the diving mask being characterized in that it further includes a
15 telecommunications device which is mounted at least partially to the breathing tube.
2. The diving mask according to claim **1**, wherein at least one part, the first part, of the telecommunications device is arranged at the
20 proximal end of the breathing tube.
3. The diving mask according to claim **2**, wherein the first part includes a microphone and/or a loudspeaker.
- 25 4. The diving mask according to claim **3**, wherein the first part includes a microphone which leads in the channel.
5. The diving mask according to any one of claims **1 to 4**, wherein at least one part, the second part, of the telecommunications device is
30 arranged at the distal end of the breathing tube.
6. The diving mask according to claim **5**, wherein the second part includes an antenna, and preferably transmitter and/or receiver modules for receiving or transmitting radio signals.

7. The diving mask according to any one of claims **1 to 6**, wherein at least one part, the third part, of the telecommunications device is mounted to the frame.

5 8. The diving mask according to claim **7**, wherein the third part comprises a control button of the telecommunications device.

9. The diving mask according to claim **7** or **8**, wherein the third part includes at least one loudspeaker which is connected to the frame by
10 a linking arm.

10. The diving mask according to any one of claims **1 to 9**, wherein the breathing tube forms one and the same piece with the frame.

15 11. The diving mask according to claim **10**, wherein the telecommunications device includes an antenna arranged in the lower part of the frame.

12. The diving mask according to any one of claims **1 to 9**, wherein
20 the breathing tube is detachable from the frame, and wherein the breathing tube includes the telecommunications device.

13. The diving mask according to any one of preceeding claims, wherein the telecommunications device comprises an antenna, transmitter
25 and receiver modules, a loudspeaker and a microphone.

14. The diving mask according to any one of preceeding claims, wherein the telecommunications device comprises at least a loudspeaker shifted relative to the body of the breathing tube so as to be placed near
30 at least one of the ears of the user.

15. The diving mask according to any one of preceeding claims, wherein the telecommunication devices is housed in a case which is mounted with the breathing tube by clipping or other detachable fastening
35 means.

16. The diving mask according to any one of claims **1 to 9**, wherein said diving mask further includes a detachable connector arranged to be mounted to the breathing tube and the frame, such that the detachable connector, when mounted to the breathing tube and the frame, forms a fluidic connection at least between the lower chamber and the channel of the breathing tube, the detachable connector being detachable from the frame and the breathing tube, and wherein the detachable connector includes the telecommunications device.

17. The diving mask according to claim **16**, wherein the telecommunications device includes a loudspeaker housed in the detachable connector.

18. The diving mask according to claim **16**, wherein the telecommunications device includes at least one shifted loudspeaker which is arranged to be disposed facing one of the ears of the user.

19. The diving mask according to claim **18**, wherein the frame includes a fastening element for holding the shifted loudspeaker.

20. The diving mask according to claim **18**, wherein the detachable connector includes a linking arm supporting the shifted loudspeaker, the linking arm extending according to a lateral side of the diving mask.

21. The diving mask according to any one of claims **16 to 20**, wherein the telecommunications device includes an antenna which is disposed in a joining element configured to extend along the breathing tube, said joining element having an end arranged to be fixed to the distal end of the breathing tube.

22. The diving mask according to any one of claims **16 to 21**, wherein the breathing tube includes a fastening member, while the frame includes a fastening device arranged to be able to be detachably fixed to the fastening member of the breathing tube so as to be able to form a sealed connection between the breathing tube and the frame, and

wherein the detachable connector includes a first fastening part arranged to be detachably fixed with the fastening member of the breathing tube, and a second fastening part arranged to be able to be detachably fixed with the fastening device of the frame, so as to be able to form a first sealed connection between the breathing tube and the detachable connector, and a second sealed connection between the frame and the detachable connector.

23. The diving mask according to any one of claims **1 to 22**, wherein the partition includes at least one passageway for enabling circulation of inspired air directed from the upper chamber towards the lower chamber during an inspiration phase of the user, and wherein the breathing tube has an inspired air intake channel and at least one first expired air exhaust channel, such that when said breathing tube is fluidically connected with the frame, the inspired air intake channel is fluidically connected with the upper chamber, while the first expired air exhaust channel is fluidically connected with the lower chamber.

24. The diving mask according to claim **23** and any one of claims **16 to 22**, characterized in that the detachable connector includes an inspired air intake duct and at least one first expired air exhaust duct, and in that when the detachable connector, the breathing tube and the frame are mounted together, the inspired air intake duct of the detachable connector fluidically connects the inspired air intake channel of the breathing tube to the upper chamber, while the first expired air exhaust duct of the detachable connector fluidically connects the lower chamber to the first expired air exhaust channel.

25. A detachable connector of a diving mask according to any one of claims **16 to 24**, characterized in that the detachable connector includes at least one duct, wherein, when the detachable connector is fixed to the diving mask, the duct fluidically connects the breathing tube to the lower chamber, and in that the detachable connector includes a telecommunications device.

26. A detachable breathing tube of a diving mask according to claim **12**, said diving mask having a frame, characterized in that the breathing tube includes a fastening part for its detachable fastening to the frame of the mask, and a telecommunications device.

5

27. A case for a microphone of a diving mask according to any one of claims **1 to 24**, the breathing tube including a wall wherein an orifice is formed, said case being characterized in that it includes a microphone and in that it is mounted to the wall of the breathing tube by extending through the orifice, the case comprising a face disposed inside the breathing tube and sealing means configured to ensure sealing between the wall and the case, the case also including a damper block disposed between the microphone and the face.

10

28. The case for a microphone according to claim **27**, characterized in that it further includes a body defining a housing wherein the microphone is disposed, the face having a thickness less than that of the body.

15