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(54) **MASK WITH INTEGRATED SNORKEL**

(57) A device (1) for breathing underwater is envisaged, comprising vision aids (2) capable of being fitted in line with the eyes of a user and including at least a first containment case(20) and a first gasket (21) capable of ensuring a leakproof connection between the first containment case (20) and the user's face, breathing apparatus(3) capable of being fitted over the oronasal area of the user's face, including at least a second containment case (30), a second gasket (31) designed to guarantee the hermetic connection between the second containment case (30) and the user's face, and a first valve component (32) designed to allow the escape of air from the breathing apparatus (3), and ventilation aids(4) including at least one main duct (40) capable of (41) permitting the passage of air in connection with the fluid passage with the containment case (20), in which the breathing apparatus (3) and the vision aids (2) are separated from each other and connected to the fluid passage by means of at least one secondary duct (33) such that the air withdrawn from the ventilation aids (4)passes in order through the main ducts (40), the first containment case(20) and the third containment case (30) exiting exclusively from the first valve component (32).

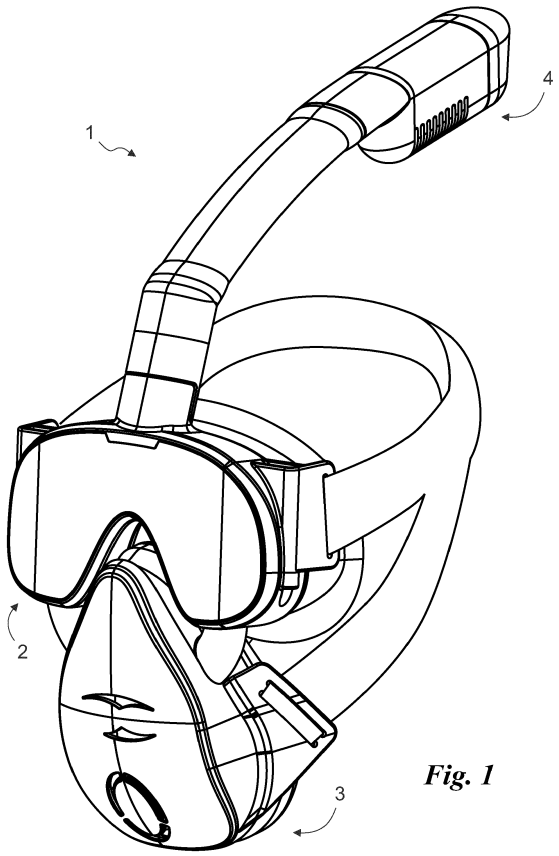

Fig. 1

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Description

[0001] This invention concerns a device for breathing underwater, of the type specified in the preamble of the first claim.

[0002] In particular, this invention concerns an underwater breathing mask which is full-face, and which can be placed over most of the face of the user.

[0003] As is known, there are currently several devices available on the market that enable underwater breathing.

[0004] Traditionally, underwater breathing is enabled through devices that are combined, and which include a snorkel and a mask. The mask, which is equipped with a gasket, comprises at least one transparent portion, which serves as a visor, around a gasket is fitted to allow a hermetic seal between the volume enclosed by the mask and the exterior.

[0005] In this way, the inside of the mask will not be flooded by water during the diving stages and the user's eyes will remain dry. The mask also includes a rubber covering for the nose of the user, so as to isolate this portion of the body from the external environment.

[0006] The user may then use the snorkel to breathe through the mouth.

[0007] Essentially, the mouthpiece of the snorkel is a conduit to allow air to be drawn from its top in such a way as to allow correct breathing even with most of the head immersed.

[0008] The technique described includes some important drawbacks.

[0009] In particular, the use of the mouthpiece is impractical and very uncomfortable for users.

[0010] In addition, the interior of the mask is often affected by condensation, which lead to the transparent surface fog up, thus obstructing the user's full vision.

[0011] However, there are other, more complex devices. Patent applications CN-U-204173146, CN-U-205707245, EP-A-3153400, WO-A-2015170013, for example, describe full face underwater breathing devices.

[0012] These devices solve the problem of condensation with the creation of two parallel circuits inside the mask.

[0013] Furthermore, they include mouthpieces that are connected directly to the mask and which include a float valve or another type of valve designed to allow immersion even beyond the extent determined by the snorkel itself.

[0014] This valve does not allow breathing; however, it prevents water from entering the mouthpiece.

[0015] However, even these devices also have a number of drawbacks.

[0016] All the devices described in the aforementioned patent applications are characterised by a full face structure which, for this reason, is complex and has more complicated and expensive technical features.

[0017] Moreover, as these masks are designed to cover the entire face, this makes them difficult to adapt to different users with different facial features.

[0018] In addition, the masks described are rigid and can cause discomfort for the user or even malfunctions where the fitting of the face and the mask is not sufficiently guaranteed.

[0019] Finally, these masks are very bulky and difficult to transport.

[0020] In this situation, the technical task underlying this invention is the design of an underwater breathing device capable of substantially remedying at least some of the aforementioned limitations.

[0021] As part of this technical task, an important purpose of the invention is the obtainment of an underwater breathing device which allows the adaptation of the device to faces of different sizes with different physiognomic characteristics. Furthermore, a further task of the invention is to provide a device that guarantees the correct fitting between the gasket and the face in order to avoid any kind of problem.

[0022] Another important purpose is the creation of a device that can be easily transported. In conclusion, a further purpose of the invention is to create a device that is simple and does not include a complex, and therefore expensive, structure.

[0023] The technical task and the specified purposes are achieved by an underwater breathing device as claimed in Claim 1 attached.

[0024] Preferred technical solutions are highlighted in the derivative claims.

[0025] The features and advantages of the invention are clarified below with a detailed description of the preferred functions of the invention, with reference to the attached drawings, in which:

Fig. 1 shows a perspective view of an underwater breathing device according to the invention;

Fig. 2 shows a perspective view of the separate elements included in an underwater breathing device according to the invention;

Fig. 3 is an exploded view of an underwater breathing device according to the invention;

Fig. 4 represents a frontal view of an underwater breathing device according to the invention;

Fig. 5a shows a rear view of an underwater breathing device according to the invention, in which the direction of air movement is highlighted;

Fig. 5b shows a side sectional view of an underwater breathing device according to the invention, in which the direction of air movement is highlighted.

[0026] In this document, the measurements, values, shapes and geometric references (such as perpendicularity and parallelism), when associated with words such as "approximately" or other similar terms such as "broadly", "almost" or "substantially", "essentially" or "fundamentally"* are to be understood to account for measurement errors or inaccuracies due to production and/or manufacturing errors and, above all, to account for a

slight divergence from the value, measurement, geometric shape or reference with which it is associated. For example, these terms, if associated with a value, ideally indicate a divergence of no more than 10% of the value. Moreover, when used, terms such as "first", "second", "higher/upper", "lower", "primary" and "secondary" do not necessarily identify an order, a relationship priority or relative position, but can simply be used to more clearly distinguish between their different components.

[0027] The measurements and data reported in this text are to be considered, unless otherwise indicated, as carried out under the ICAO International Standard Atmosphere (ISO 2533:1975).

[0028] With reference to the Illustrations, the device for underwater breathing according to the invention is indicated throughout by the number **1**.

[0029] Device 1 is essentially an apparatus that allows the coverage of a user's face and respiratory tract in order to allow breathing even when part of the user's head is immersed in a fluid, typically water, for example in the sea.

[0030] Therefore, Device 1 is affixed to a mask for underwater activities including, for example, snorkelling.

[0031] Preferably, therefore, Device 1 includes at least some vision aids **2**, breathing aids **3** and ventilation aids **4**.

[0032] The viewing aids 2 and the breathing aids 3 preferably include a device of the type noted for fastening them to the face of a user, such as straps for masks and the like.

[0033] The viewing aids 2 are preferably intended to be placed over the eyes of a user. In particular, the viewing aids 2 are intended to allow the user to view, for example, the seabed when the user is underwater.

[0034] The viewing aids 2 therefore comprise at least one first containment case **20** and a first gasket **21**.

[0035] The first containment case 20 is preferably an open system, basically a cup that can be placed on the part of the user's face around the eyes.

[0036] The gasket 21 may be inserted into the first containment case 20, or it can be placed in a peripheral zone of the first system 20 at the opening of the system 20 itself.

[0037] In general, the gasket 21 is preferably able to ensure the airtight pairing of the first casing system the first containment case 20 and the user's face. Such a gasket may be, for example, a rubber or silicone component and may be shaped to surround the portion of the the face that includes the eyes and excludes the nose of the user. These types of designs are, in any case, current state of the art and are also used for traditional masks.

[0038] Preferably, the viewing aids 2 include a variety of components.

[0039] In particular, the first containment case 20 provides at least one transparent surface **210**.

[0040] The transparent surface 210 is essentially a surface capable of allowing the user to be able to see fully, whilst covering and protecting his or her eyes. This transparent surface 210 may therefore take the shape of glasses for the eyes.

[0041] Furthermore, the viewing aids 2 can comprise at least one deflector **211**.

[0042] The deflector 211 is preferably placed arranged at an area of the viewing aid 2 through which air passes, so as to divert at least part of the airflow against the transparent surface 210.

[0043] In addition to the above, in a preferred configuration, the containment case 20 includes a tank **212**.

[0044] In detail, the tank 212 itself may be part of the containment case 20 and may form this first containment case 20 together with the gasket 21, as shown in Fig. 3. The tank 212 is preferably a closed type tank.

[0045] However, the reservoir 212 provides at least one first channel **213** and a second channel **214**.

[0046] More appropriately, the tank 212 includes two second channels 214.

[0047] The channels 213, 214 are preferably able to allow a fluid substance, typically air, to enter and/or exit from the internal volume of the tank 212.

[0048] In this preferred configuration the tank 212 itself includes both the transparent surface 210 and the deflector 211.

[0049] In particular, the deflector 211 is able to direct the air from the first channel 213 against the transparent surface 210.

[0050] Therefore, suitably, the deflector 211 is placed at the first channel 213 and the transparent surface 210 essentially establishes a wall of the tank 212.

[0051] The ventilation aids 4 are preferably created to allow air to be obtained for the vision aids 2 and the breathing aids 3.

[0052] Preferably, the ventilation aids 4 include a main air duct **40**.

[0053] The main duct 40 is preferably designed to allow the passage of air in connection with a fluid passage with the containment case 20.

[0054] Therefore, the ventilation aids 4 may be part of the viewing aids 2, or attached thereto, or affixed to them by removable means.

[0055] In particular, preferably, since the main duct 40 is designed to allow a user to suck in air from outside, the deflector 211 is preferably positioned, within the viewing aids 2, near the main duct 40, in such a way as to divert at least part of the flow of air from the ventilation aids 4 against the transparent surface 210.

[0056] Moreover, in the preferred configuration, the first channel 213 is preferably connected to the main duct 40 so that the air can pass into the tank 212.

[0057] The ventilation aids 4 may be substantially similar to that of the Easybreath mask marketed under the Tribord brand.

[0058] Therefore, it preferably includes a third valve component **41**.

[0059] The third valve component 41 is preferably interposed between the main duct 40 and the exterior, and, therefore, is positioned for example at the free end of the main duct 40.

[0060] The third valve element 41 is preferably designed to allow air to enter through the duct 40 and to block the entry of fluid when the device 1, in particular the valve component 41, is immersed in water.

[0061] Thus, the third valve element 41 comprises an opening **410**, a float **411** and a guide **412**.

[0062] Preferably, the opening 410 is designed to allow the passage of air between the outside and the main duct 40.

[0063] The float 411 is preferably designed to be moved inside the guide 412 by means of the effect deriving from the Archimedes' principle, which occurs following the immersion of the third valve component 41 in water.

[0064] The guide 412 is preferably designed to establish a predefined direction of movement for the float 411.

[0065] In particular, the float 411 is configured in such a way that when the third valve element 41 is immersed in a fluid, it hermetically seals the opening 411.

[0066] The breathing aids 3 are preferably suitable for placement at the oronasal area of the user's face.

[0067] Therefore, they are preferably suitable for fitting onto both the mouth and nose of a user.

[0068] The breathing aids 3 should preferably include a second containment case **30** and a second gasket **31**.

[0069] The second containment case 30 is preferably an open system, essentially a cup which can be placed over the area of the user's face comprising the oronasal device. The second gasket 31 can be integrated into the second containment case 30 or it can be arranged in a peripheral area of the second containment 30 at the opening of the case 30 itself.

[0070] In general, the gasket 31 is preferably capable of ensuring the hermetic seal between the first containment case 30 and the face of a user.

[0071] In addition, the breathing aids 3 comprise a first valve element **32**.

[0072] The first valve component 32 is preferably designed to allow air to escape from the breathing device 3.

[0073] In particular, the first valve component 32 is preferably designed to allow only fluid to escape from the second containment case 30.

[0074] The first valve component 32 is therefore, for example, a one-way check valve able to prevent the entry of air or water into the second containment case 30. Advantageously, the suction aids 3 and the viewing aids 2 are separated.

[0075] In addition, the suction aids 3 also include at least one secondary duct **33**. In detail, the suction aids 3 and the viewing aids 2 are mutually connected in a passage connection alongside the secondary duct 33.

[0076] In this way, the air drawn from the ventilation aids 4 transits, in order, through the main duct 40, the first containment case 20 and the third containment case 30, exiting exclusively from the first valve component 32.

[0077] The latter result s facilitated by the fact that, in particular, the secondary duct 33 comprises a second valve component **330**.

[0078] The second valve component 330 is preferably designed to allow only air to enter from the first containment case 20 to the second containment case 30.

[0079] Therefore, the second valve component 330 is preferably basically the same type as the first valve component 32, i.e. a one-way check valve.

[0080] Conveniently, device 1 includes two secondary ducts 33.

[0081] In particular, irrespective of the number of secondary ducts 33, the vision aids 2 and the breathing aids 3 are mutually linked by means of the ducts or secondary ducts 33.

[0082] These conduits are preferably the only connecting element between the aids 2, 3. Overall, in fact, the vision aids 2 and the breathing aids 3 are reciprocally linked by means of the secondary ducts 33 and the vision means 2 and the ventilation means 4 are mutually linked by the main duct 40.

[0083] Each connection can be enforced by appropriate joints and sealing elements including gaskets, or other viable linking methods.

[0084] The secondary duct 33, in the preferred set-up, is joined to the second channel 214 in such a way as to achieve the connection of a fluid passage between the vision aids 2 and the breathing aids 3.

[0085] In conclusion, preferably, the breathing aids shouldpreferably comprise only material that can be molded.

[0086] This material may be rubber, silicone or another type, provided that an adequate level of moldability is guaranteed.

[0087] However, protective covers may be provided, as shown in Fig. 1-5b.

[0088] Conversely, the tank 12 and the main duct 40 preferably comprise only rigid material.

[0089] The operation of the underwater breathing device 1 previously described in structural terms is as follows.

[0090] A user can apply the breathing apparatus 3 and the vision aids 2 to his or her face in such a way so as to hermetically seal them them with the oronasal area of the face and the eyes.

[0091] Thereafter the user can partially immerse his or her head in water, keeping the third valve component 41 out of the water. In this way he can breathe air through the main duct 40, the first containment case 2 and the second containment case 3 and exhale through the expulsion the air through the first valve component 32.

[0092] If the user wants to dive to a greater depth, the third valve component 41 can close, so as to prevent water from entering component 40.

[0093] The underwater breathing device 1 according to the invention delivers significant advantages.

[0094] In fact, device 1 is easily adaptable to any face since the breathing aids are interchangeable, as are the vision aids. Therefore, these aids can be replaced, so as to create user components that are, more or less, ergonomic.

[0095] The availability of this possibility reduces the inconvenience resulting from an incorrect fitting of the gaskets onto the face with the possible loss in watertightness and the entry of water into the device 1, reducing the efficiency of the mask.

[0096] In addition, the device is simple and economical, while still providing excellent breathing efficiency.

[0097] Second, but not least, the overall dimensions of device 1 are greatly reduced since the breathing aids 3 are detached, or can be disconnected from the vision aids 2. In addition, they are moldable and his therefore reduces the overall internal dimensions of the device 1.

[0098] These characteristics are relevant if it is considered, for example, that these devices 1 are placed inside suitcases that already contain other objects.

[0099] The invention is subject to variations falling within the scope of the inventive concept defined in the claims.

[0100] In this context all the details can be substituted by equivalent elements and the materials, the shapes and the dimensions can vary.

Claims

1. Device (1) for breathing underwater comprising:

- vision aids (2) capable of being placed over the eyes of a user and including at least an first containment case (20) and an first gasket (21) designed to ensure a leakproof attachment between the aforementioned first containment case (20) and the face of the user,
- breathing aids (3) capable of being fitted over the oronasal area of the face of a user including at least one second containment case (30), a second gasket (31) capable of ensuring the hermetic fixing of the second containment casing (30) to the face of the user, and a first valve component (32) designed to allow air to escape from the breathing apparatus (3), and
- ventilation aids (4) including at least one main duct (40) designed to permit the passage of air in connection with the fluid passage with the containment case (20), and **characterised by the fact** that
- the aforementioned breathing aids (3) and vision aids(2) are separated from each other and placed in connection with fluid passages by means of at least one secondary duct (33) in such a way that the air drawn from the aforementioned ventilation aids (4) passes in that order through the aforementioned main duct (40), with the first containment case (20) and the third containment case (30) exiting only from the first valve component (32).

2. Device (1) according to Claim 1, in which the aforementioned secondary duct (33) comprises a second valve component (330) designed to allow only air to enter from the first containment case (20) to the second containment case (30).

3. Device (1) according to at least one previous claim, wherein the first and second valve components (32, 330) are one-way check valves.

4. Device (1) according to one or more previous claims, comprising at least two of the aforementioned said secondary ducts (33).

5. Device (1) according to one or more previous claims, wherein the aforementioned vision aids (2) and breathing aids (3) are reciprocally bound by means of the aforementioned secondary ducts (33) and vision aids (2) and the ventilation aids (4) are reciprocally bound by means of the aforementioned main duct (40).

6. Device (1) according to one or more preceding claims, in which the first containment case (20) establishes at least one transparent surface (210) and includes a deflector (211), that deflector (211) being placed near that main duct (40) in such a way as to divert at least part of the airflow from the aforementioned ventilation aids (4) against that transparent surface (210).

7. Device (1) according to one or more previous claims, in which said first containment case (20) includes a closed tank (12) delimiting at least one first channel (213) and a second channel (214), said first channel (213) being coupled with said main duct (40) and said second channel (214) being coupled with said secondary duct (33) so as to form fluid passage connections, said tank (212) including the aforementioned transparent surface (210) and deflector (211).

8. Device (1) according to one or more previous claims, in which said ventilation aids (4) further include a third valve component (41) interposed between that main duct (40) and the exterior, said third valve component (41) comprising an opening (410) designed to allow the passage of air between the outside and said main duct (40), a float (411) and a guide (412) designed to determine a predefined direction of movement of said float (411), said float (411) being adapted to hermetically seal the aforementioned opening (410) when the valve component (41) is immersed in fluid.

9. Device (1) according to one or more of the previous claims, wherein said breathing aids (3) comprise exclusively moldable material.

10. Device (1) according to one or more of the previous

claims, wherein the tank (212) and the main duct (40) comprise exclusively rigid material.

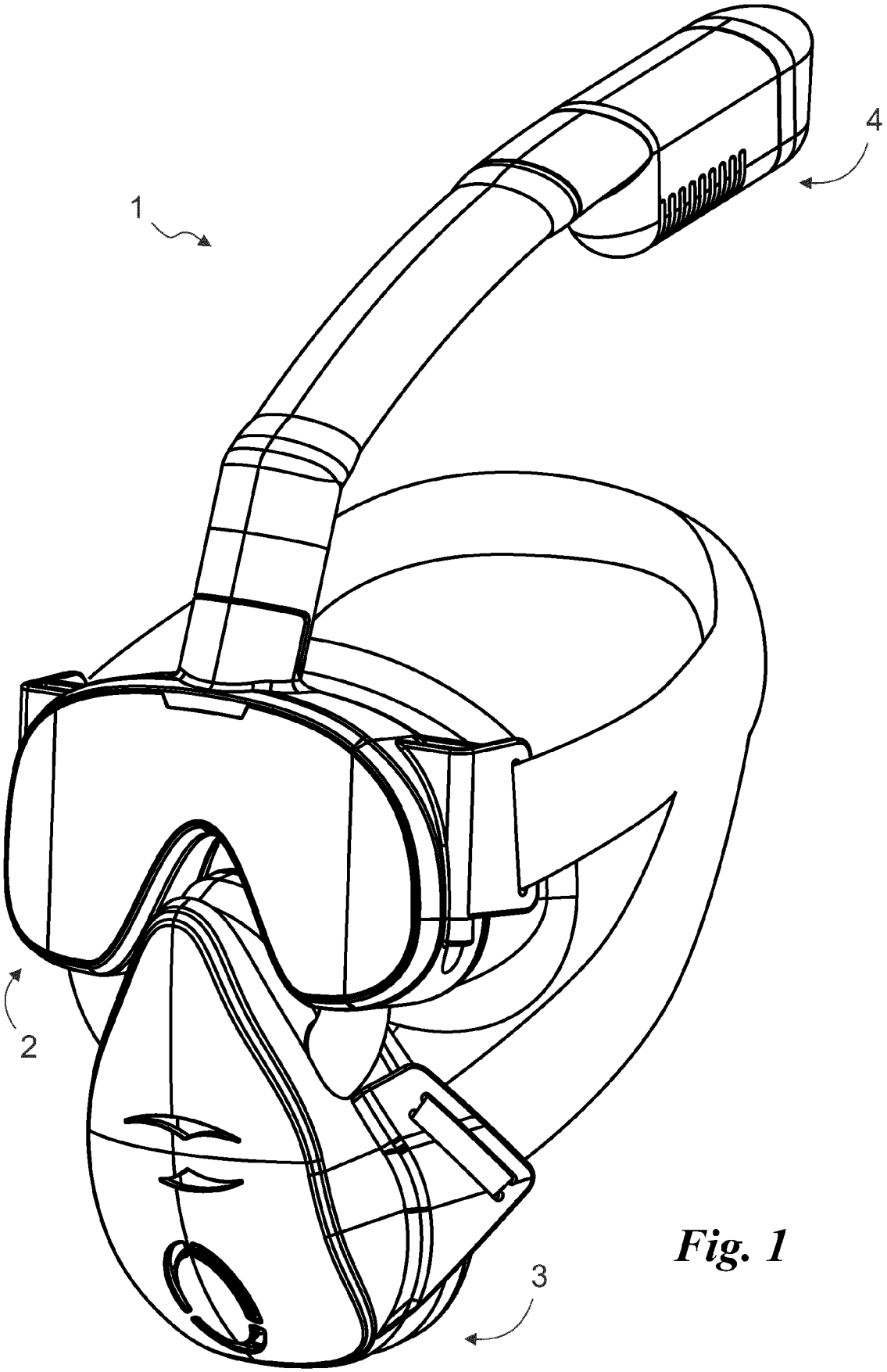

Fig. 1

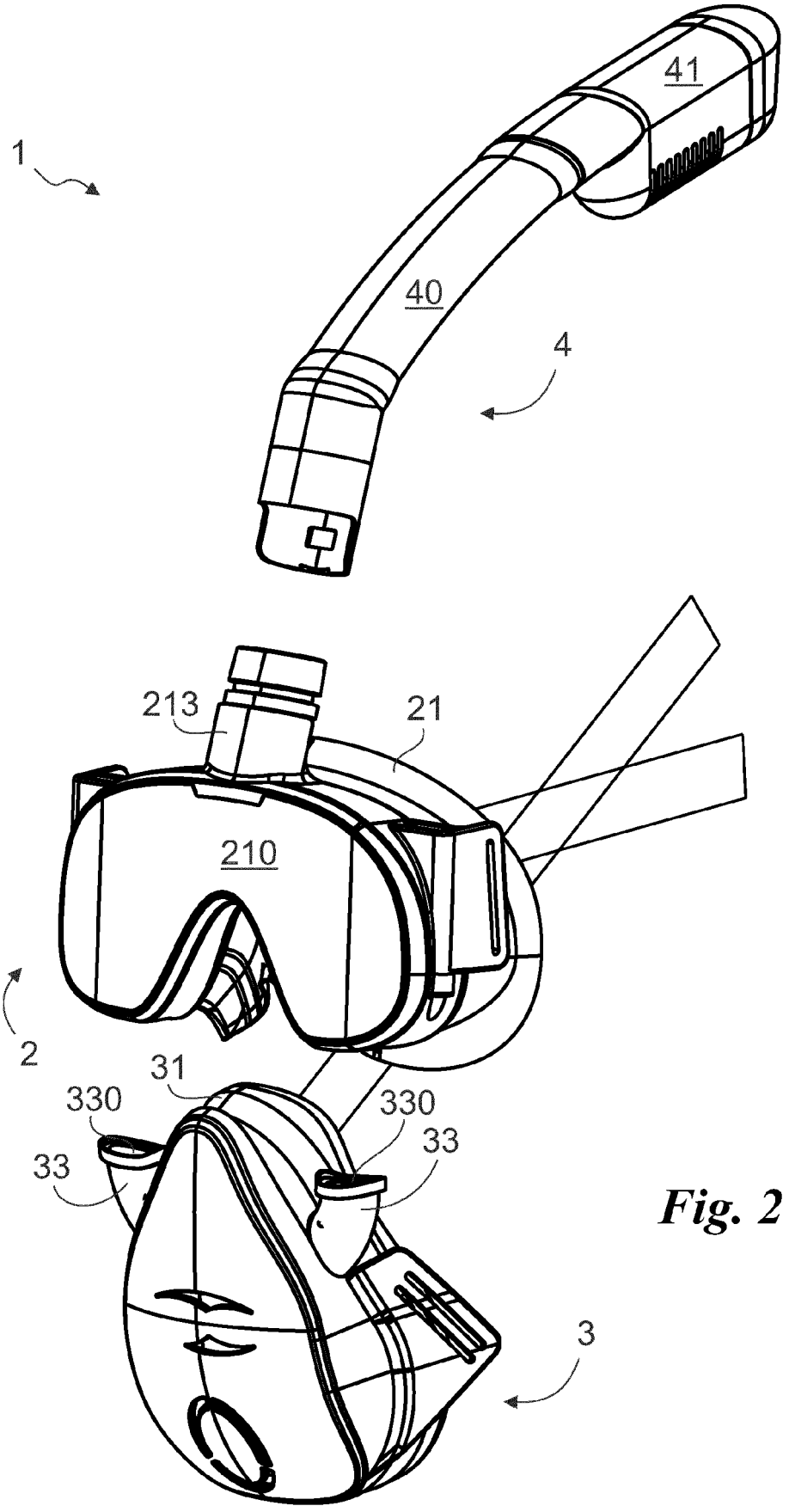

Fig. 2

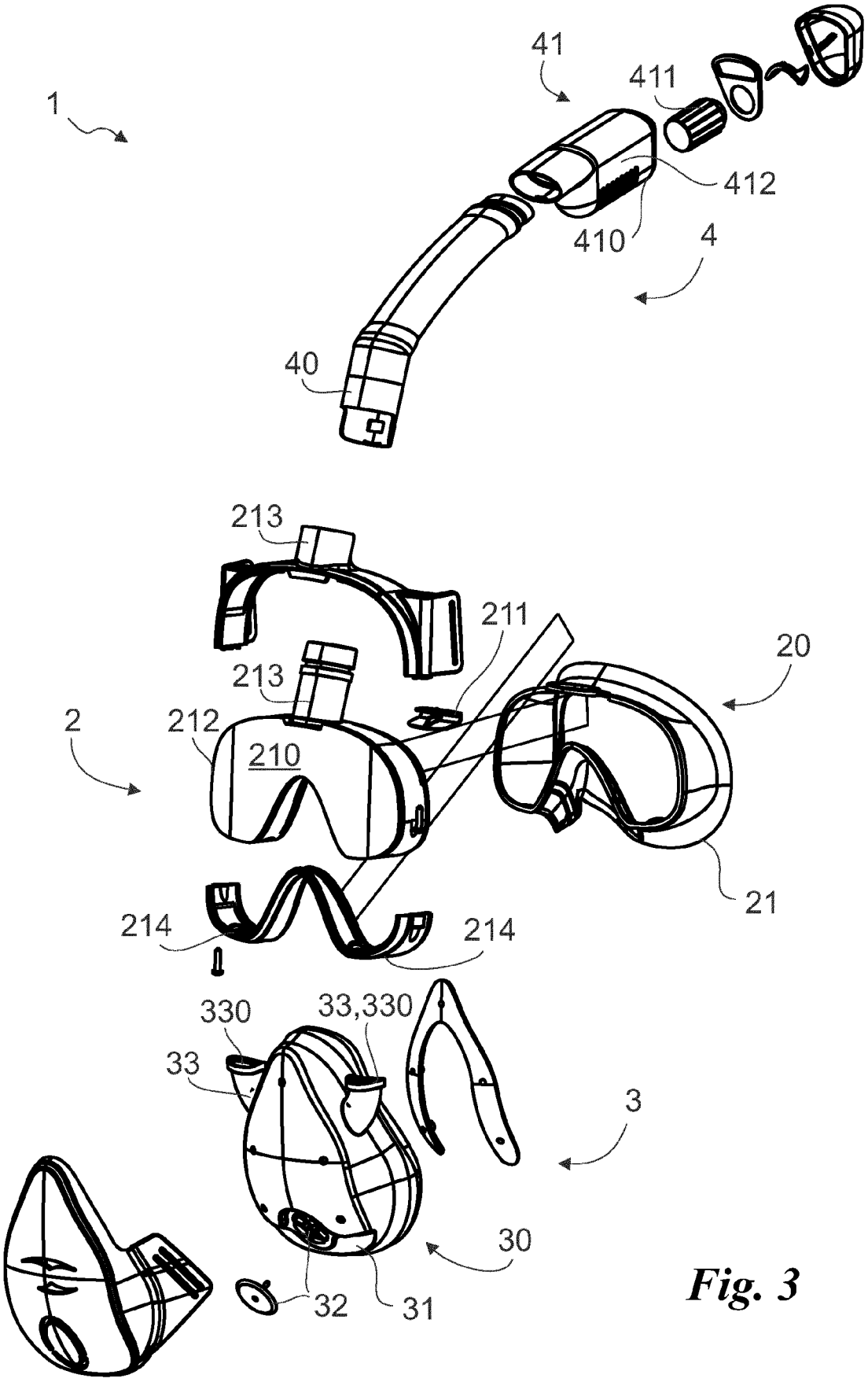
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Fig. 3

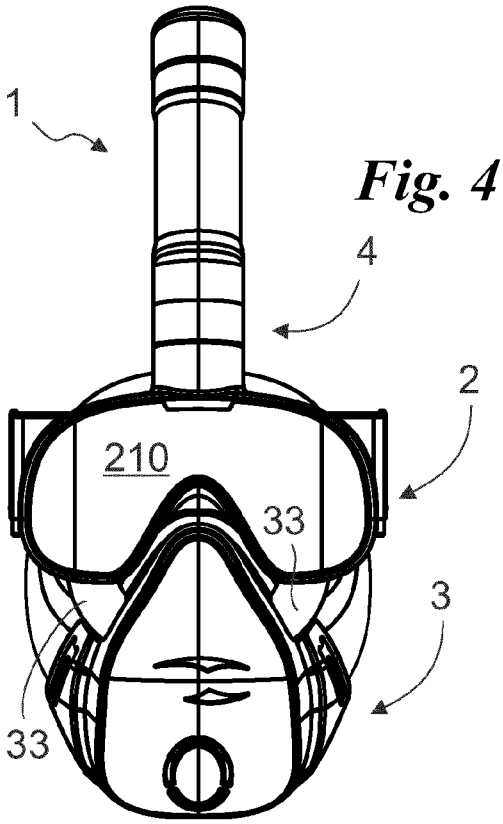

Fig. 4

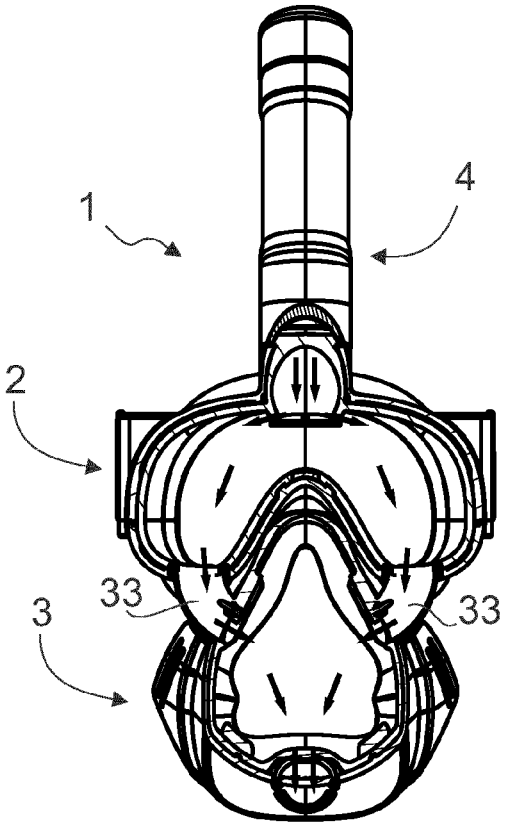

Fig. 5a

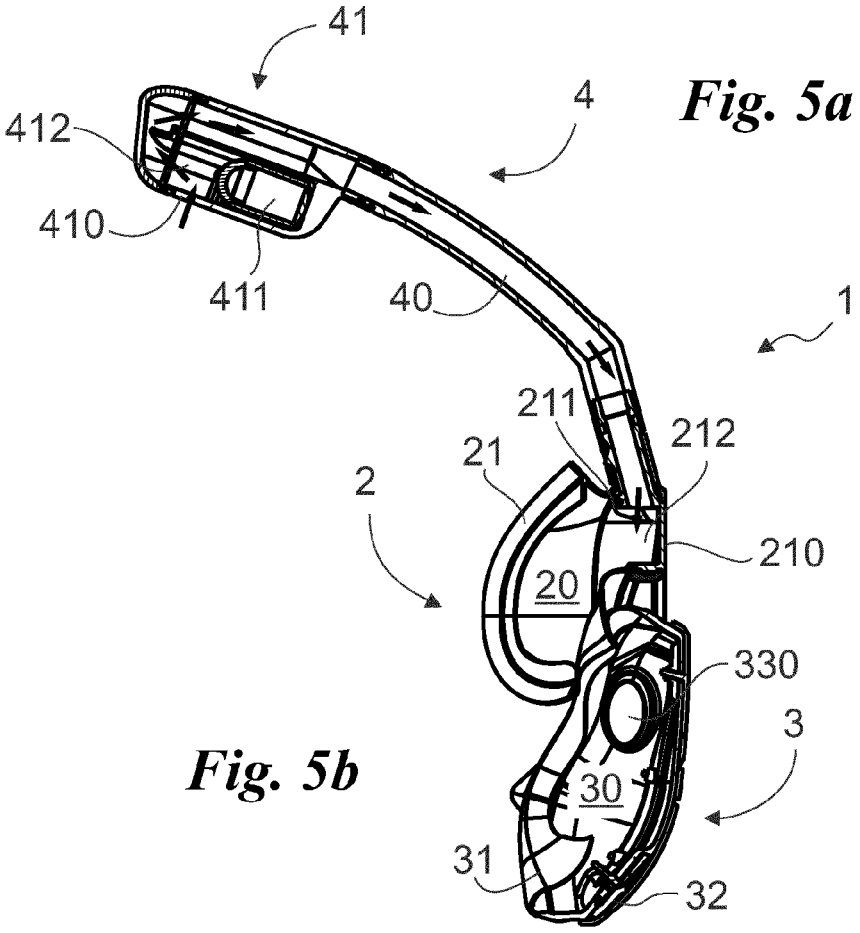

Fig. 5b

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EUROPEAN SEARCH REPORT

Application Number
EP 19 17 6695

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 1 044 187 A (EDOUARD GODEL) 16 November 1953 (1953-11-16) * pages 1,2; claims; figures 1,2 *	1-10	INV. B63C11/16
X	WO 2012/044113 A2 (WANG JONG MUN [KR]) 5 April 2012 (2012-04-05) * claims; figures *	1-7,9,10	
A	FR 2 990 355 A3 (VENDETXE 24 S L [ES]) 15 November 2013 (2013-11-15) * figures *	1	
A	US 2018/065719 A1 (LIAO LEON [CN]) 8 March 2018 (2018-03-08) * figure 2 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 June 2019	Knoflacher, Nikolaus

CATEGORY OF CITED DOCUMENTS

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11-06-2019

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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