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(54) **BREATHING APPARATUS WITH ILLUMINATED CONNECTION**

ATMUNGSVORRICHTUNG MIT BELEUCHTETER VERBINDUNG

APPAREIL RESPIRATOIRE AVEC RACCORD ÉCLAIRÉ

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Description**BACKGROUND**

[0001] The following information is provided to assist the reader in understanding technologies disclosed below and the environment in which such technologies may typically be used. The terms used herein are not intended to be limited to any particular narrow interpretation unless clearly stated otherwise in this document. References set forth herein may facilitate understanding of the technologies or the background thereof.

[0002] A self-contained breathing apparatus ("SCBA") is a device used to enable breathing in environments which are immediately dangerous to life and health (sometimes referred to as "IDLH" environments). For example, firefighters wear an SCBA when fighting a fire. The SCBA typically has a harness or carrier system including a backplate supporting an air tank which is connected to a facepiece, all of which are worn or carried by the user. The tank typically contains air or oxygen-containing breathing gas under high pressure (for example, 2200-5500 psi or 15,168 to 37921 kPa) and is connected to a first stage regulator which reduces the pressure to about 80-100 psi or 552 to 689 kPa. The SCBA usually has a second stage regulator that has an inlet valve which controls the flow of air for breathing between the air tank and the facepiece. Typically, the inlet valve controls the flow of air through the second state regulator in response to the respiration of the user. Such respiration-controlled regulator assemblies are disclosed, for example, in U.S. Pat. Nos. 4,821,767 and 5,016,627.

[0003] Under the 2002 edition of NFPA 1981 (Standard on Open Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services), manufacturers must include a Rapid Intervention Crew/Universal Air Coupling (RIC/LTAC), sometimes referred to herein as a universal air coupling or UAC in SCBAs to be in compliance for firefighting. The UAC allows a cylinder that is low on air to be "transfilled" from another, secondary cylinder regardless of the manufacturer thereof. After the transfilling process, each cylinder may, for example, have an equal amount of air. The UAC must be permanently fixed to the SCBA within 0.1016 meters (four inches) of the threads of the SCBA cylinder valve.

[0004] A backplate for a generic breathing system in form of a SCBA is for example disclosed in US 2008/257928 A1, wherein the backpack assembly comprises a plurality of components, for example a low air light, positioned in housings that define a body for the backpack assembly. The body is assembled to a back frame. A pivoting and swiveling hip plate is connected to the back frame in multiple distinct positions to provide a customizable and comfortable fit for the wearer.

[0005] Further air breathing systems are disclosed for example in US 2012/067348 A1 and US 2008/041379 A1.

SUMMARY

[0006] By the claimed subject matter a breathing system that includes a tank for pressurized breathing gas, at least one regulator comprising a connection to which the tank is attachable, and a universal air connector in fluid connection with the connection is provided that furthermore comprises the features of the characterizing portion of claim 1.

[0007] In claims 2 to 8, advantageous embodiments of the breathing system are claimed.

[0008] The predetermined second pressure may, for example, be greater than or equal to the predetermined first pressure. In a number of embodiments, the predetermined second pressure is equal to the predetermined first pressure.

[0009] Furthermore a method according to claim 9 is provided.

[0010] In claims 10 to 14, advantageous embodiments of the claimed method are provided.

[0011] The present devices, systems, and methods, along with the attributes and attendant advantages thereof, will best be appreciated and understood in view of the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS**[0012]**

Figure 1 illustrates an embodiment of a self-contained breathing apparatus (SCBA) hereof.

Figure 2 illustrates a cutaway view of a portion of a backplate of the carrier system of Figure 1 including electronic circuitry and the UAC.

Figure 3 illustrates a perspective view of a portion of the backplate of the carrier system of Figure 1.

Figure 4 illustrates a perspective view of a portion of another embodiment of a backplate.

Figure 5 illustrates a side view of a portion of another embodiment of a backplate.

DETAILED DESCRIPTION

[0013] It will be readily understood that the components of the embodiments, as generally described and illustrated in the figures herein, may be arranged and designed in a wide variety of different configurations in addition to the described example embodiments. Thus, the following more detailed description of the example embodiments, as represented in the figures, is not intended to limit the scope of the embodiments, as claimed, but is merely representative of example embodiments.

[0014] Reference throughout this specification to "one

embodiment" or "an embodiment" (or the like) means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, the appearance of the phrases "in one embodiment" or "in an embodiment" or the like in various places throughout this specification are not necessarily all referring to the same embodiment.

[0015] Furthermore, described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided to give a thorough understanding of embodiments. One skilled in the relevant art will recognize, however, that the various embodiments can be practiced without one or more of the specific details, or with other methods, components, materials, et cetera. In other instances, well known structures, materials, or operations are not shown or described in detail to avoid obfuscation.

[0016] As used herein and in the appended claims, the singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise. Thus, for example, reference to "a light source" includes a plurality of such light sources and equivalents thereof known to those skilled in the art, and so forth, and reference to "the light source" is a reference to one or more such light sources and equivalents thereof known to those skilled in the art, and so forth.

[0017] Figure 1 illustrates an embodiment of a breathing system 10 hereof such as an SCBA. In the illustrated embodiment, breathing system 10 includes a facepiece 100 to be worn by a user. Facepiece 100 forms a sealed volume surrounding the nose and mouth of the user into which breathing gas is introduced. In that regard, facepiece 100 includes a regulator interface portion 110 of facepiece 100 to place facepiece 100 in fluid connection with a second stage pressure regulator assembly 300 so that pressurized air can be supplied from a pressurized air tank 400 via high-pressure hosing 350. A facepiece suitable for use in breathing system 10 is described, for example, in U.S. Patent Application Publication No. 2012/0160245 and U.S. Patent No. 8,256,420. Likewise, a second stage pressure regulator suitable for use in connection therewith is described, for example, in U.S. Patent Application Publication No. 2012/0160245 and U.S. Patent No. 8,256,420.

[0018] Pressurized air tank 400 is supported on and strapped to a harness or carrier system 500 that is worn by the user of system 10. In the illustrated embodiment, carrier system 500 includes a backplate 510 to support tank 400 and strapping (not shown) to connect backplate 510 to the user. A tank strap 405 (for example, a metal strap) assists in retaining tank 400 in connection with backplate 510. A valve 410 provides air from pressurized tank 400 to a connector 520 in fluid connection with a first stage regulator 700 via a connector 520a in fluid connection with connector 520 and a connector 710 (see, for example, Figures 2) in fluid connection with first stage regulator 700. As described above, tank 400 may, for

example, contain air or oxygen-containing breathing gas under high pressure (for example, in the range of 2200-4500 psi). First stage regulator 700 reduces the pressure to, for example, about 80 psi. Breathing gas leaves first stage regulator 700 via a connector 720 and flows to inlet 310 of second stage regulator 300 via high pressure hosing 350 (a portion of which is shown Figure 1).

[0019] As described above, breathing system 10 includes a Rapid Intervention Crew/Universal Air Coupling or UAC 800. As, for example, illustrated in Figure 2, UAC 800 is in fluid connection with connector 710 and, thereby, in fluid connection with tank 400 when tank 400 is in fluid connection with connector 710. UAC 800 thereby allows tank 400, when low on air/breathing gas, to be "transfilled" from another source of pressurized breathing gas such as another cylinder (for example, secondary tank 400a as illustrated in Figure 1) regardless of the manufacturer thereof. Tank 400 can also, for example, be filled from a compressor or from a cascade system (including, a plurality of cylinders). Firefighters, however, inherently work in conditions of low visibility resulting from smoke and airborne debris associated with fires and other emergency conditions. Moreover, the turnout gear and gloves worn by firefighter can greatly reduce the manual dexterity of a rapid intervention crew member trying to locate UAC 800. Thus locating (both visually and tactilely) a UAC and connecting to the UAC by a rapid intervention crewmember can often be very difficult.

[0020] In a number of embodiments hereof, the position of UAC 800 is made readily locatable, even under conditions of poor visibility by lighting or illuminating at least a portion of UAC 800 or the vicinity of UAC 800, either directly or indirectly. The illumination provides a guide for a person other than the user of breathing system 10 (for example, a rapid intervention crewmember) to locate and connect to UAC 800 to fill/transfill tank 400 via a secondary tank 400a (see, Figure 1). In that regard, tank 400a (or another source of breathing gas) has a universal connector (represented by arrow C in Figure 1) which connects to UAC 800 to fill/transfill UAC 800.

[0021] As, for example, illustrated in Figures 2 and 3, a light source 900, may be positioned on or in operative connection with carrier system 500 to illuminate at least a portion of UAC 800. In the embodiment illustrated in Figures 1 through 3, light source 900 is positioned within a power module and electronics assembly, referred to herein as electronics assembly 530. In a number of embodiments, light source 900 shines through a translucent panel 542 of a compartment 540 enclosing a portion of electronics assembly 530 to illuminate at least a portion of UAC 800.

[0022] Light source 900 is in electronic connection with circuitry including, for example, a printed circuit board 550, which is in electrical connection (via a connector 552) with a power source including, for example, one or more batteries 554 positioned within a battery compartment 556. In the illustrated embodiment, the illumination

of light source 900 (for example, on/off switching) is controlled as a function of the pressure of the breathing gas in tank 400. Illuminating light source 900 only during a low pressure state may, for example, assist in conserving battery power. In the illustrated embodiment, a pressure sensor or transducer 560 is in fluid connection with connector 520 and thereby with tank 400. Transducer is also in electrical connection with the circuitry of circuit board 550, including, for example, a controller system including, for example, one or more processors 570. (for example, a microprocessor).

[0023] In a number of embodiments, signals of measured pressure are transmitted from pressure sensor 560 to microprocessor 570. Microprocessor 570 controls light source 900 such that light source 900 is illuminated when the pressure in tank 400 is determined to be at or below a certain predefined level. For example, light source 900 may be illuminated when the measured pressure of tank 400 is at or below a low pressure limit (or in a low-pressure state) as, for example, defined by a measured pressure in the range of 25-33% of pressure of the tank 400 when full.

[0024] The illumination of light source 900 also provides an indication to persons other than the user of a low-pressure condition of tank 400. In a number of embodiments, a periodic pulsing of light source 900 and a frequency of such pulsing may, for example, be used to provide information to persons other than the user related to the measured pressure of tank 400. For example, light source 900 may pulse slowly upon a low pressure state first being sensed (for example, at a pressure level of 33%). The frequency of pulsing may, for example, be increased as measured pressure decreases until a critical pressure level is reached at which point light source 900 may be illuminated continuously.

[0025] In a number of embodiments, light source 900 remains continuously illuminated after sensing the predetermined low pressure state. Other light sources, such as light sources 930 and 940 may, for example, be used to provide information to persons other than the user regarding the pressure level of tank 400. Color and/or frequency of pulsation of light sources 930 and 940 may, for example, be used to provide information regarding the measure pressure level.

[0026] As described above, light source 900 illuminates at least a portion of UAC 800 to make UAC 800 readily locatable even under conditions of poor visibility. Once again, the illumination provides a guide for a person other than the user of breathing apparatus 10 to locate and connect to UAC 800. In a number of embodiments, light source 900 remains illuminated until tank 400 is brought to a predetermined pressure (for example, at a "second" predetermined pressure above the pressure defining the low-pressure state or at the "first" predetermined pressure, which defines the low-pressure state), at which point light source 900 is turned to an off state until the low-pressure state is once again sensed. In other embodiments, light source 900 may remain illuminated

for, for example a period of time (for example, a predetermined period of time such as 30-60 seconds) after the first predetermined pressure (that is, the pressure defining the low-pressure state) is measured to provide the person transfilling tank 400 (for example, a member of a rapid intervention crew) guidance when disconnecting the connector of the filling tank from UAC 800. In general, transfilling or filling processes (from, for example, a secondary tank, a cascade system or a compressor system) occur relatively quickly and are typically accomplished within 30-90 seconds after connecting to UAC 800. Providing illumination from light source 900 for 30-60 seconds after the first predetermined pressure state is reached provides sufficient time to end the transfilling or filling process and disconnect from UAC 800.

[0027] Figure 4 illustrates another embodiment of backplate 510 wherein a portion of UAC 800 includes a light source 900a, which operates in a manner similar to light source 900 as described above. In the illustrated embodiment, light source 900a is positioned on a portion of UAC 800 rearward of the portion thereof that cooperates with connector C in forming a connection therewith.

[0028] Figure 5 illustrates another embodiment of backplate 510 wherein an area in the vicinity of UAC 800 includes a light source 900b, which is illuminated in a manner similar to light source 900 as described above. Light source, 900b may but need not illuminate a portion of UAC 800. By illuminating the vicinity of UAC 800, light source 900b provides a guide for a person such as a member of a rapid intervention crew to connect connector C to UAC 800. In the illustrated embodiment, light source 900b has an annular shape and is positioned around a base of UAC 800. As is clear to one skilled in the art, many other configurations of one or more light sources may be used to provide guidance to a person or persons trying to connect a connector to UAC 800.

[0029] In general light sources such as light sources 900, 990a and/or 900b, which provide guidance to connect and disconnect to UAC 800, preferably provide white light at sufficient luminosity to provide such guidance in low visibility conditions. Light source 900 is positioned no more than 0.1016 meters (4 inches), or no more than 0.076 meters (3 inches) away from UAC 800.

[0030] The foregoing description and accompanying drawings set forth a number of representative embodiments at the present time. Various modifications, additions and alternative designs will, of course, become apparent to those skilled in the art in light of the foregoing teachings without departing from the scope hereof, which is defined by the following claims rather than by the foregoing description.

Claims

1. A breathing system (10), comprising:
 - a tank (400) for pressurized breathing gas;

- at least one regulator (700) comprising a connection to which the tank (400) is attachable; a universal air connector (800) in fluid connection with the connection; **characterized in that** at least one light source (900) is positioned to project light which is incident upon the universal air connector (800), is positioned upon a portion of the universal air connector (800), or is positioned in the vicinity of the universal air connector (800) to be no more than 0.1016 meters (4 inches) from the universal air connector (800), whereby the light source (900), when illuminated, provides a guide to connect a connector in fluid connection with a secondary air supply (400a) to the universal air connector (800) to supply breathing gas to the tank (400) by illuminating at least a portion of the universal air connector (800) or by illuminating the vicinity of the universal air connector (800).
2. The breathing system of claim 1 wherein the at least one regulator (700) is a first stage regulator and the breathing system (10) further comprises a second stage regulator (300) in fluid connection with the first stage regulator (700).
 3. The breathing system (10) of claim 1 further comprising a controller (570) in operative connection with the at least one light source (900), the controller (570) being operative to place the light source (900) in an on state.
 4. The breathing system (10) of claim 3 further comprising a pressure sensor (560) in operative connection with the controller (570), the pressure sensor (560) being in fluid connection with the tank (400), the controller (570) placing the light source (900) in the on state upon receiving a signal from the pressure sensor (560) indicating that a pressure in the tank (400) is at or below a predetermined first pressure.
 5. The breathing system (10) of claim 4 wherein the controller (570) places the light source (900) in an off state upon receiving a signal from the pressure sensor (560) indicating the pressure in the tank (400) is at or above a predetermined second pressure.
 6. The breathing system (10) of claim 4 wherein the controller (570) places the light source (900) in an off state a predetermined period of time after receiving a signal from the pressure sensor (560) indicating a pressure in the tank (400) is at or above a predetermined second pressure.
 7. The breathing system (10) of claim 3 wherein the at least one light source (900) is spaced from the universal air connector (800) and projects light which is incident upon the universal air connector (800).
 8. The breathing system (10) of claim 7 wherein the at least one light source (900) has an annular shape and is positioned around a base of the universal air connector (800).
 9. A method, comprising:
 - providing a breathing system (10) comprising a tank (400) for pressurized breathing gas; and at least one regulator (700) comprising a connection to which the tank (400) is attached and a universal air connector (800) in fluid connection with the connection; **characterized in that** the method further comprises illuminating at least one light source (900) operatively connected to the breathing system (10) and positioned to project light which is incident upon the universal air connector (800), is positioned upon a portion of the universal air connector (800), or is positioned in the vicinity of the universal air connector (800) to be no more than 0.1016 meters (4 inches) from the universal air connector (800) to provide a guide to connect a connector in fluid connection with a secondary air supply (400a) to the universal air connector (800) to supply breathing gas to the tank (400) by illuminating at least a portion of the universal air connector (800) or by illuminating the vicinity of the universal air connector (800).
 10. The method of claim 9 wherein the breathing system (10) further comprises a controller (570) in operative connection with the at least one light source (900), wherein the controller (570) is operative to place the light source (900) in an on state.
 11. The method of claim 10 further comprising sensing pressure in the tank (400) via a pressure sensor (560) in operative connection with the controller (570), the pressure sensor (560) being in fluid connection with the tank (400), the controller (570) placing the light source (900) in the on state upon receiving a signal from the pressure sensor (560) indicating that a pressure in the tank (400) is at or below a predetermined first pressure.
 12. The method of claim 11 wherein the controller (570) places the light source (900) in an off state upon receiving a signal from the pressure sensor (560) indicating a pressure in the tank (400) is at or above a predetermined second pressure.
 13. The method of claim 11 wherein the controller (570) places the light source (900) in an off state a predetermined period of time after receiving a signal from

the pressure sensor (560) indicating a pressure in the tank (400) is at or above a predetermined second pressure.

14. The method of claim 9 wherein the at least one light source (900) projects light which is incident upon the universal air connector (800).

Patentansprüche

1. Atmungssystem (10), umfassend:

einen Tank (400) für druckbeaufschlagtes Atemgas;
 mindestens einen Regler (700), der einen Anschluss umfasst, an welchem der Tank (400) befestigbar ist;

einen Universalluftverbinder (800), der mit dem Anschluss in Fluidverbindung steht;

dadurch gekennzeichnet, dass

mindestens eine Lichtquelle (900) zum Projizieren von auf den Universalluftverbinder (800) auftreffendem Licht angeordnet ist, auf einem Abschnitt des Universalluftverbinders (800) angeordnet ist oder in der Umgebung des Universalluftverbinders (800) angeordnet ist, sodass er nicht mehr als 0,1016 Meter (4 Zoll) von dem Universalluftverbinder (800) entfernt ist, wodurch die Lichtquelle (900) - wenn sie beleuchtet ist - eine Führung bereitstellt, um einen Verbinder, der mit einer Sekundärluftzufuhr (400a) in Fluidverbindung steht, mit dem Universalluftverbinder (800) zu verbinden, um dem Tank (400) Atemgas zuzuführen, und zwar durch Beleuchten mindestens eines Abschnitts des Universalluftverbinders (800) oder durch Beleuchten der Umgebung des Universalluftverbinders (800).

2. Atmungssystem nach Anspruch 1, wobei der mindestens eine Regler (700) ein Regler einer ersten Stufe ist und das Atmungssystem (10) ferner einen Regler (300) einer zweiten Stufe umfasst, der mit dem Regler (700) der ersten Stufe in Fluidverbindung steht.

3. Atmungssystem (10) nach Anspruch 1, ferner eine Steuerung (570) umfassend, die mit der mindestens einen Lichtquelle (900) in Wirkverbindung steht, wobei die Steuerung (570) dazu betriebsfähig ist, die Lichtquelle (900) in einen eingeschalteten Zustand zu versetzen.

4. Atmungssystem (10) nach Anspruch 3, ferner umfassend einen Drucksensor (560), der mit der Steuerung (570) in Wirkverbindung steht, wobei der Drucksensor (560) mit dem Tank (400) in Fluidverbindung steht, wobei die Steuerung (570) die Licht-

quelle (900) in den eingeschalteten Zustand versetzt, wenn sie ein Signal von dem Drucksensor (560) empfängt, das anzeigt, dass ein Druck in dem Tank (400) bei oder unter einem vorbestimmten ersten Druck liegt.

5. Atmungssystem (10) nach Anspruch 4, wobei die Steuerung (570) die Lichtquelle (900) in einen ausgeschalteten Zustand versetzt, wenn sie ein Signal von dem Drucksensor (560) empfängt, das anzeigt, dass der Druck in dem Tank (400) bei oder über einem vorbestimmten zweiten Druck liegt.

6. Atmungssystem (10) nach Anspruch 4, wobei die Steuerung (570) die Lichtquelle (900) für eine vorbestimmte Zeitdauer in einen ausgeschalteten Zustand versetzt, nachdem sie ein Signal von dem Drucksensor (560) empfangen hat, das anzeigt, dass ein Druck in dem Tank (400) bei oder über einem vorbestimmten zweiten Druck liegt.

7. Atmungssystem (10) nach Anspruch 3, wobei die mindestens eine Lichtquelle (900) von dem Universalluftverbinder (800) beabstandet ist und auf den Universalluftverbinder (800) auftreffendes Licht projiziert.

8. Atmungssystem (10) nach Anspruch 7, wobei die mindestens eine Lichtquelle (900) ringförmig ist und um einen Boden des Universalluftverbinders (800) herum angeordnet ist.

9. Verfahren, umfassend:

Bereitstellen eines Atmungssystems (10), umfassend einen Tank (400) für druckbeaufschlagtes Atemgas; und

mindestens einen Regler (700), der einen Anschluss umfasst, an welchem der Tank (400) befestigt ist, und einen Universalluftverbinder (800), der mit dem Anschluss in Fluidverbindung steht; **dadurch gekennzeichnet, dass** das Verfahren ferner Folgendes umfasst:

Beleuchten mindestens einer Lichtquelle (900), die mit dem Atmungssystem (10) in Wirkverbindung steht und zum Projizieren von auf den Universalluftverbinder (800) auftreffendem Licht angeordnet ist, auf einem Abschnitt des Universalluftverbinders (800) angeordnet ist oder in der Umgebung des Universalluftverbinders angeordnet ist, sodass sie nicht mehr als 0,1016 Meter (4 Zoll) von dem Universalluftverbinder (800) entfernt ist, um eine Führung bereitzustellen, um einen Verbinder, der mit einer Sekundärluftzufuhr (400a) in Fluidverbindung steht, mit dem Universalluftverbinder (800) zu verbinden, um dem Tank (400) Atemgas zuzuführen, und zwar durch Beleuchten mindestens eines

Abschnitts des Universalluftverbinders (800) oder durch Beleuchten der Umgebung des Universalluftverbinders (800).

10. Verfahren nach Anspruch 9, wobei das Atmungssystem (10) ferner eine Steuerung (570) umfasst, die mit der mindestens einen Lichtquelle (900) in Wirkverbindung steht, wobei die Steuerung (570) dazu betriebsfähig ist, die Lichtquelle (900) in einen eingeschalteten Zustand zu versetzen. 5
11. Verfahren nach Anspruch 10, ferner umfassend das Erfassen von Druck in dem Tank (400) über einen Drucksensor (560), der mit der Steuerung (570) in Wirkverbindung steht, wobei der Drucksensor (560) mit dem Tank (400) in Fluidverbindung steht, wobei die Steuerung (570) die Lichtquelle (900) in den eingeschalteten Zustand versetzt, wenn sie ein Signal von dem Drucksensor (560) empfängt, das anzeigt, dass ein Druck in dem Tank (400) bei oder unter einem vorbestimmten ersten Druck liegt. 10
12. Verfahren nach Anspruch 11, wobei die Steuerung (570) die Lichtquelle (900) in einen ausgeschalteten Zustand versetzt, wenn sie ein Signal von dem Drucksensor (560) empfängt, das anzeigt, dass ein Druck in dem Tank (400) bei oder über einem vorbestimmten zweiten Druck liegt. 15
13. Verfahren nach Anspruch 11, wobei die Steuerung (570) die Lichtquelle (900) für eine vorbestimmte Zeitdauer in einen ausgeschalteten Zustand versetzt, nachdem sie ein Signal von dem Drucksensor (560) empfangen hat, das anzeigt, dass ein Druck in dem Tank (400) bei oder über einem vorbestimmten zweiten Druck liegt. 20
14. Verfahren nach Anspruch 9, wobei die mindestens eine Lichtquelle (900) auf den Universalluftverbinder (800) auftreffendes Licht projiziert. 25

Revendications

1. Système respiratoire (10), comprenant : 30
- un réservoir (400) pour le gaz respiratoire sous pression ;
 - au moins un détendeur (700) comprenant un raccord auquel le réservoir (400) peut être attaché ;
 - un connecteur d'air universel (800) en liaison fluïdique avec le raccord ; **caractérisé en ce qu'** au moins une source de lumière (900) est positionnée pour projeter de la lumière qui est incidente sur le connecteur d'air universel (800), est positionnée sur une partie du connecteur d'air universel (800), ou est positionnée à proximité 35

du connecteur d'air universel (800) pour ne pas être à plus de 0,1016 mètres (4 pouces) du connecteur d'air universel (800), moyennant quoi la source de lumière (900), lorsqu'elle est allumée, fournit un guide pour raccorder un connecteur en liaison fluïdique avec une alimentation en air secondaire (400a) au connecteur d'air universel (800) afin d'alimenter en gaz respiratoire le réservoir (400) en éclairant au moins une partie du connecteur d'air universel (800) ou en éclairant à proximité du connecteur d'air universel (800).

2. Système respiratoire selon la revendication 1, dans lequel l'au moins un détendeur (700) est un détendeur de premier niveau et le système respiratoire (10) comprend en outre un détendeur de second niveau (300) en liaison fluïdique avec le détendeur de premier niveau (700). 40
3. Système respiratoire (10) selon la revendication 1, comprenant en outre un moyen de commande (570) en liaison fonctionnelle avec l'au moins une source de lumière (900), le moyen de commande (570) pouvant fonctionner pour placer la source de lumière (900) dans un état de marche. 45
4. Système respiratoire (10) selon la revendication 3, comprenant en outre un capteur de pression (560) en liaison fonctionnelle avec le moyen de commande (570), le capteur de pression (560) étant en liaison fluïdique avec le réservoir (400), le moyen de commande (570) plaçant la source de lumière (900) dans l'état de marche lors de la réception d'un signal en provenance du capteur de pression (560) indiquant qu'une pression dans le réservoir (400) se trouve inférieure ou égale à une première pression prédéterminée. 50
5. Système respiratoire (10) selon la revendication 4, dans lequel le moyen de commande (570) place la source de lumière (900) dans un état d'arrêt lors de la réception d'un signal en provenance du capteur de pression (560) indiquant que la pression dans le réservoir (400) est égale ou supérieure à une seconde pression prédéterminée. 55
6. Système respiratoire (10) selon la revendication 4, dans lequel le moyen de commande (570) place la source de lumière (900) dans un état d'arrêt pendant une durée prédéterminée après la réception d'un signal en provenance du capteur de pression (560) indiquant qu'une pression dans le réservoir (400) est égale ou supérieure à une seconde pression prédéterminée. 60
7. Système respiratoire (10) selon la revendication 3, dans lequel l'au moins une source de lumière (900) 65

est espacée du connecteur d'air universel (800) et projette la lumière qui est incidente sur le connecteur d'air universel (800).

8. Système respiratoire (10) selon la revendication 7, dans lequel l'au moins une source de lumière (900) présente une forme annulaire et est positionnée autour d'une base du connecteur d'air universel (800). 5
9. Procédé, comprenant :
- la fourniture d'un système respiratoire (10) comprenant un réservoir (400) pour le gaz respiratoire sous pression ; et
au moins un détendeur (700) comprenant un raccord auquel le réservoir (400) est attaché et un connecteur d'air universel (800) en liaison fluïdique avec le raccord ;
caractérisé en ce que le procédé comprend en outre
l'allumage d'au moins une source de lumière (900) raccordée en fonctionnement au système respiratoire (10) et positionnée pour projeter la lumière qui est incidente sur le connecteur d'air universel (800), est positionnée sur une partie du connecteur d'air universel (800), ou est positionnée à proximité du connecteur d'air universel pour ne pas être à plus de 0,1016 mètres (4 pouces) du connecteur d'air universel (800) afin de fournir un guide pour raccorder un connecteur en liaison fluïdique avec une alimentation en air secondaire (400a) au connecteur d'air universel (800) afin d'alimenter en gaz respiratoire le réservoir (400) en éclairant au moins une partie du connecteur d'air universel (800) ou en éclairant à proximité du connecteur d'air universel (800). 15 20 25 30 35
10. Procédé selon la revendication 9, dans lequel le système respiratoire (10) comprend en outre un moyen de commande (570) en liaison fonctionnelle avec l'au moins une source de lumière (900), dans lequel le moyen de commande (570) peut fonctionner pour placer la source de lumière (900) dans un état de marche. 40 45
11. Procédé selon la revendication 10, comprenant en outre la détection de pression dans le réservoir (400) par le biais d'un capteur de pression (560) en liaison fonctionnelle avec le moyen de commande (570), le capteur de pression (560) étant en liaison fluïdique avec le réservoir (400), le moyen de commande (570) plaçant la source de lumière (900) dans l'état de marche lors de la réception d'un signal en provenance du capteur de pression (560) indiquant qu'une pression dans le réservoir (400) est égale ou inférieure à une première pression prédéterminée. 50 55

12. Procédé selon la revendication 11, dans lequel le moyen de commande (570) place la source de lumière (900) dans un état d'arrêt lors de la réception d'un signal en provenance du capteur de pression (560) indiquant qu'une pression dans le réservoir (400) est égale ou supérieure à une seconde pression prédéterminée.

13. Procédé selon la revendication 11, dans lequel le moyen de commande (570) place la source de lumière (900) dans un état d'arrêt pendant une durée prédéterminée après la réception d'un signal en provenance du capteur de pression (560) indiquant qu'une pression dans le réservoir (400) est égale ou supérieure à une seconde pression prédéterminée. 10 15

14. Procédé selon la revendication 9, dans lequel l'au moins une source de lumière (900) projette la lumière qui est incidente sur le connecteur d'air universel (800). 20

Fig. 1

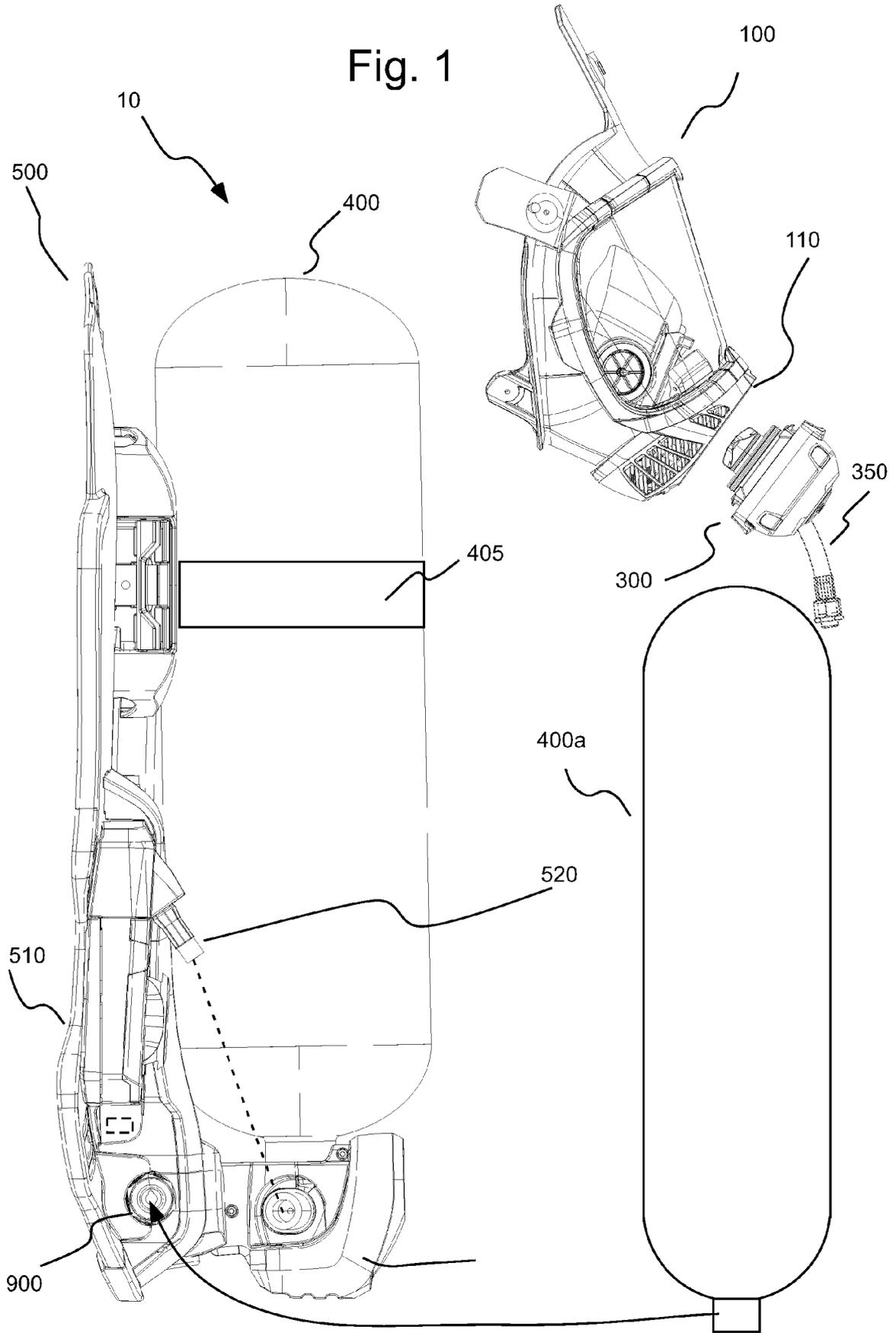
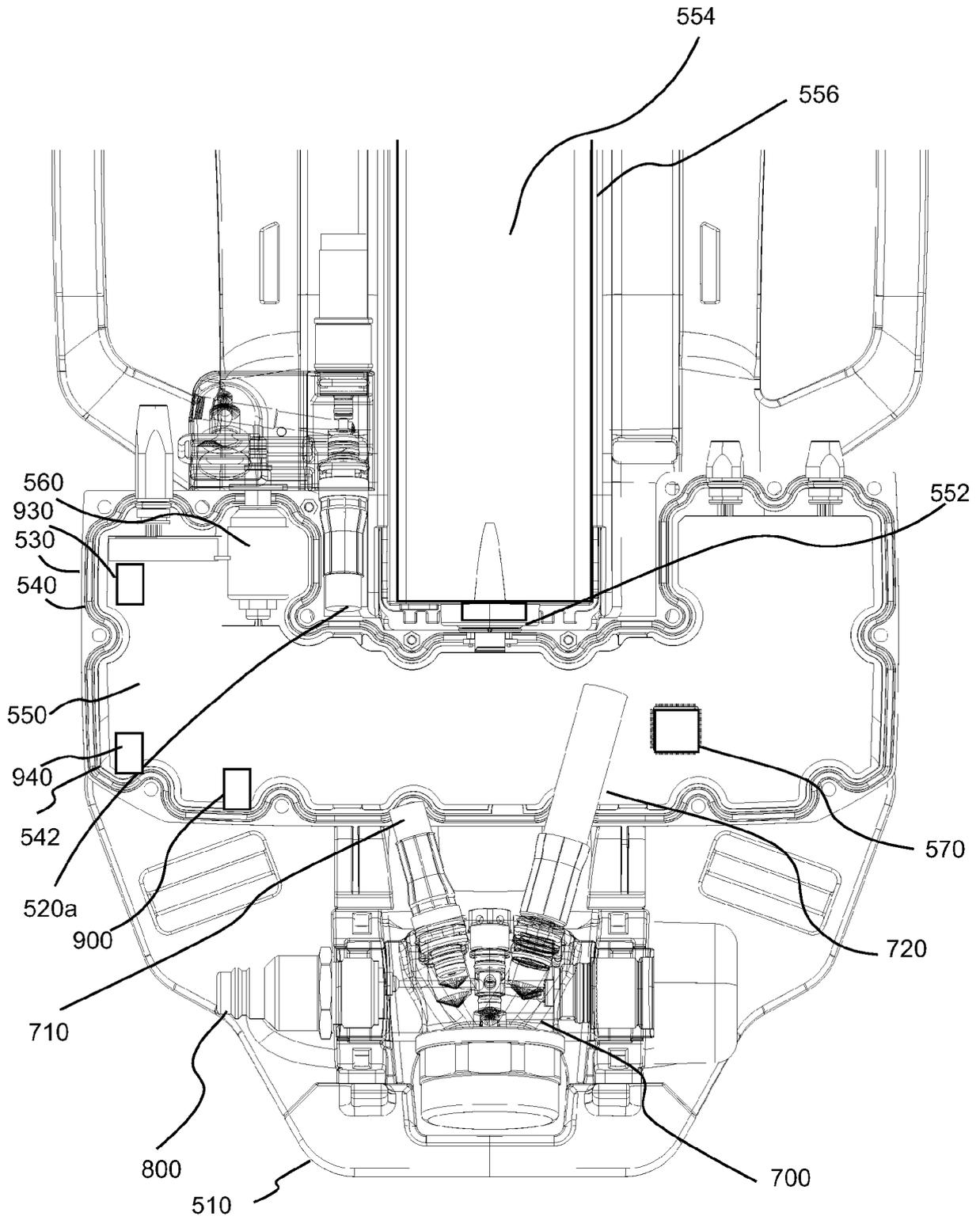


Fig. 2



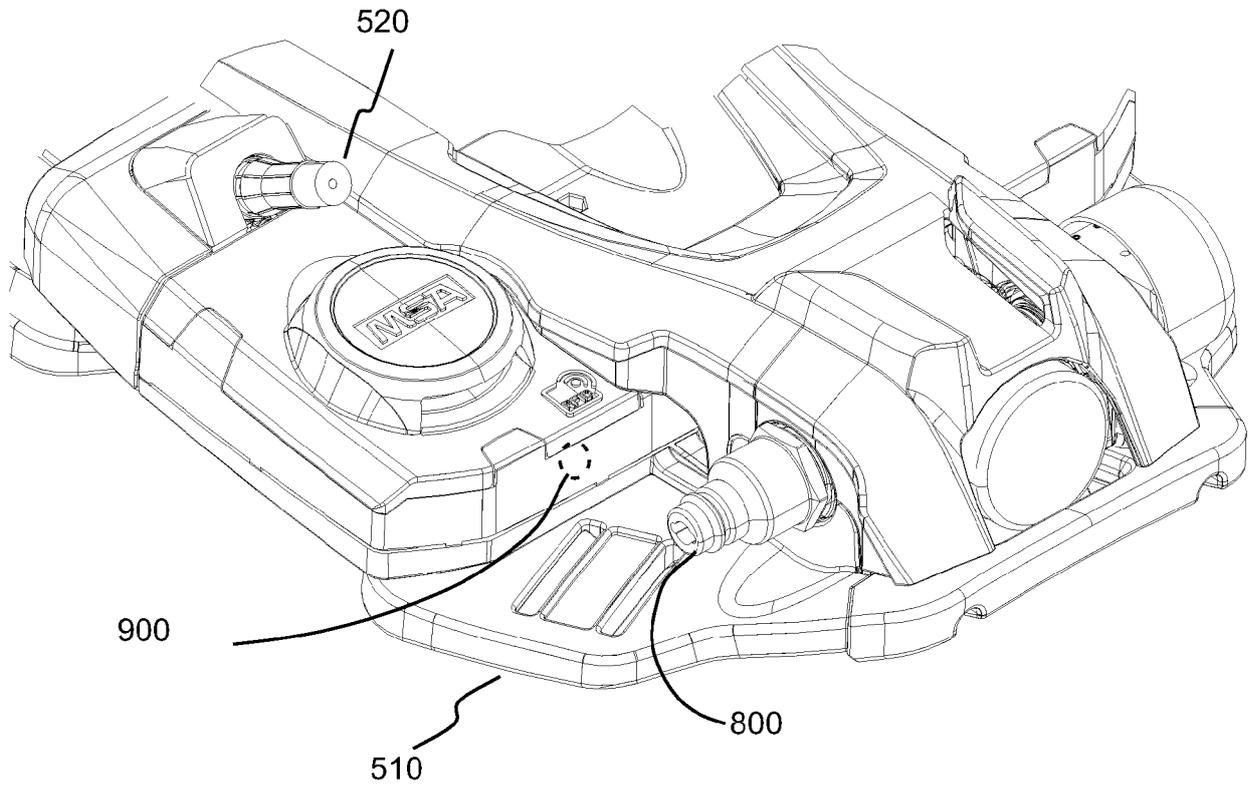


Fig. 3

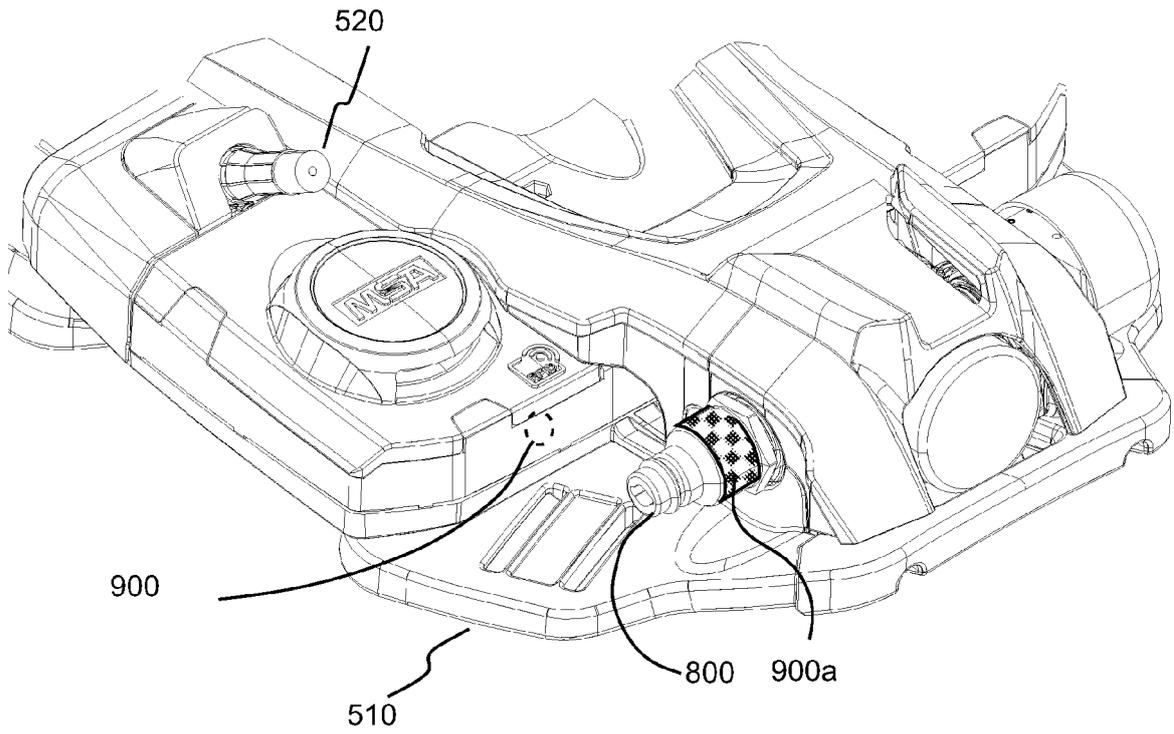


Fig. 4

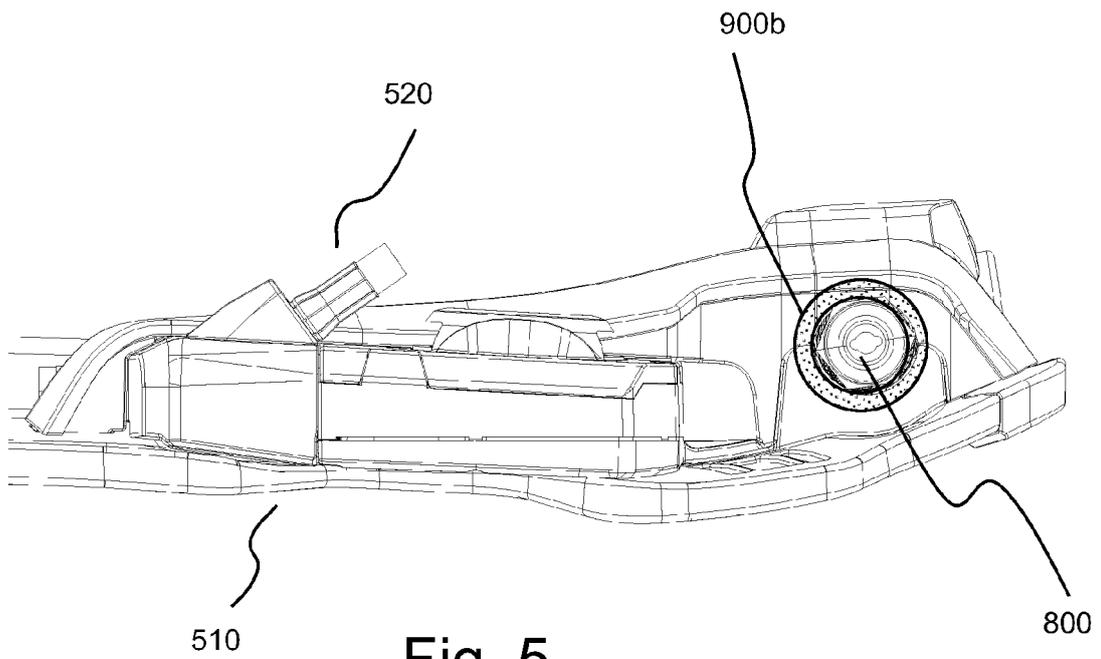


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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