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Koehn et al.

[11] **3,727,250**

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[54] **VEST INFLATION/EXHAUST VALVE ASSEMBLY**

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[73] Assignee: **Under Sea Industries, Inc.,** Compton, Calif.

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[52] **U.S. Cl.** **9/313,** 61/70, 128/142.2

[51] **Int. Cl.**.....**B63c 11/18**

[58] **Field of Search**.....9/313, 311, 314, 9/316, 329, 342, 340; 222/3, 5; 128/142–142.7; 61/70, 71

[56] **References Cited**

UNITED STATES PATENTS

3,129,707	4/1964	Becker et al.	128/142.2
3,147,499	9/1964	Nelson et al.	9/313
3,536,071	10/1970	Ferrando	128/142.4 X

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[57] **ABSTRACT**

An underwater buoyancy device such as a safety vest includes an air chamber and a tube communicating from the chamber to an inflation/exhaust valve assembly. The valve assembly facilitates vest inflation from a scuba supply tank or exhaustion to vent the air chamber or to permit breathing of air from the device. To this end, the assembly includes in a common housing: a quick-release coupling for a supply tank hose, an inflation valve for controlling air flow from the hose to the vest, a mouthpiece or like outlet, and an exhaust valve to control venting from the vest to the mouthpiece.

10 Claims, 2 Drawing Figures

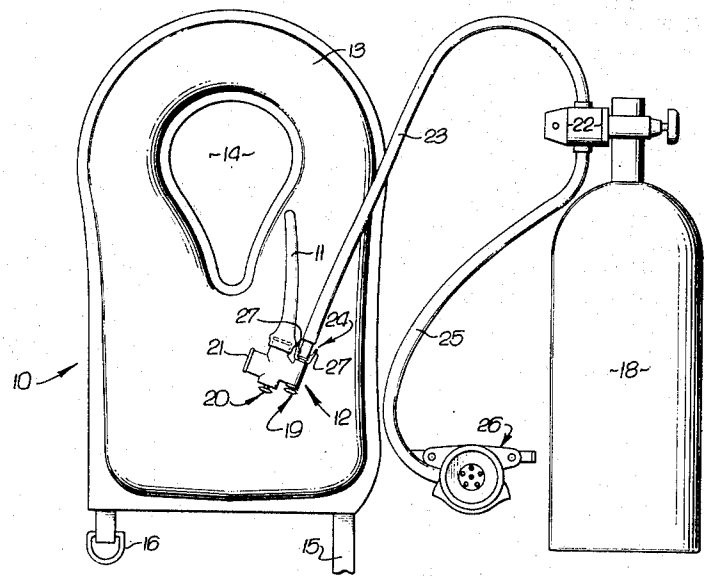


FIG. 1.

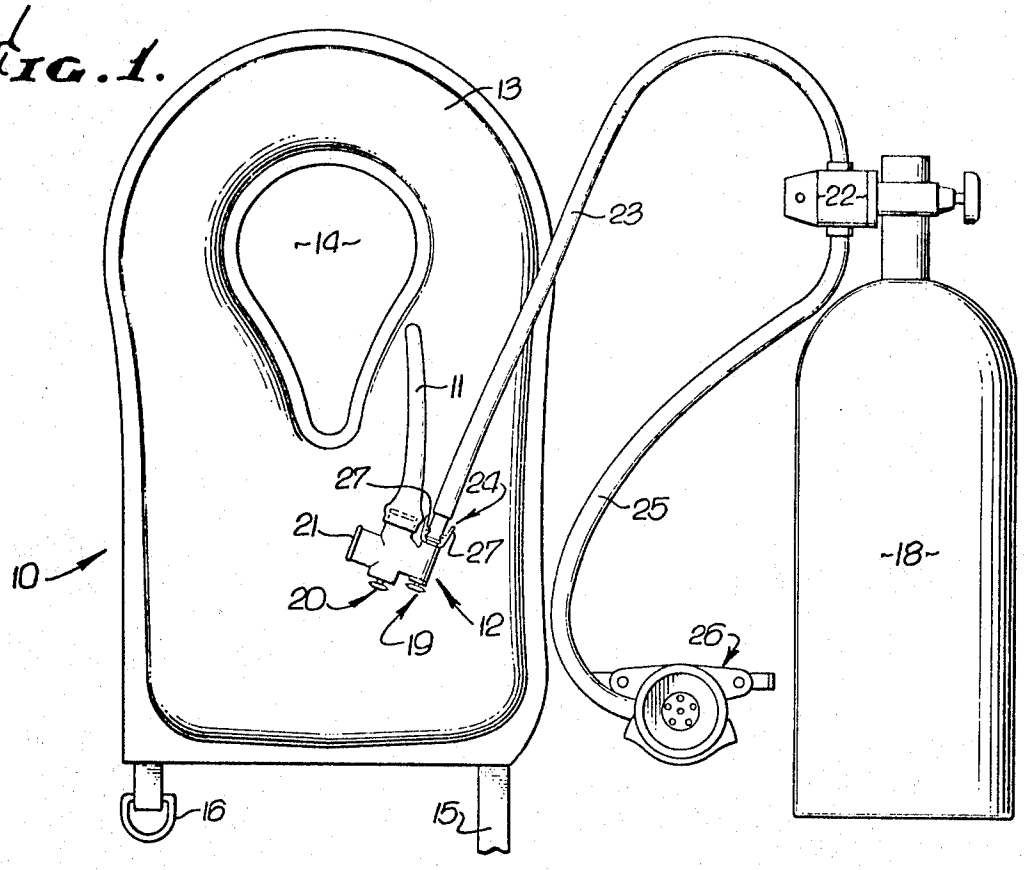
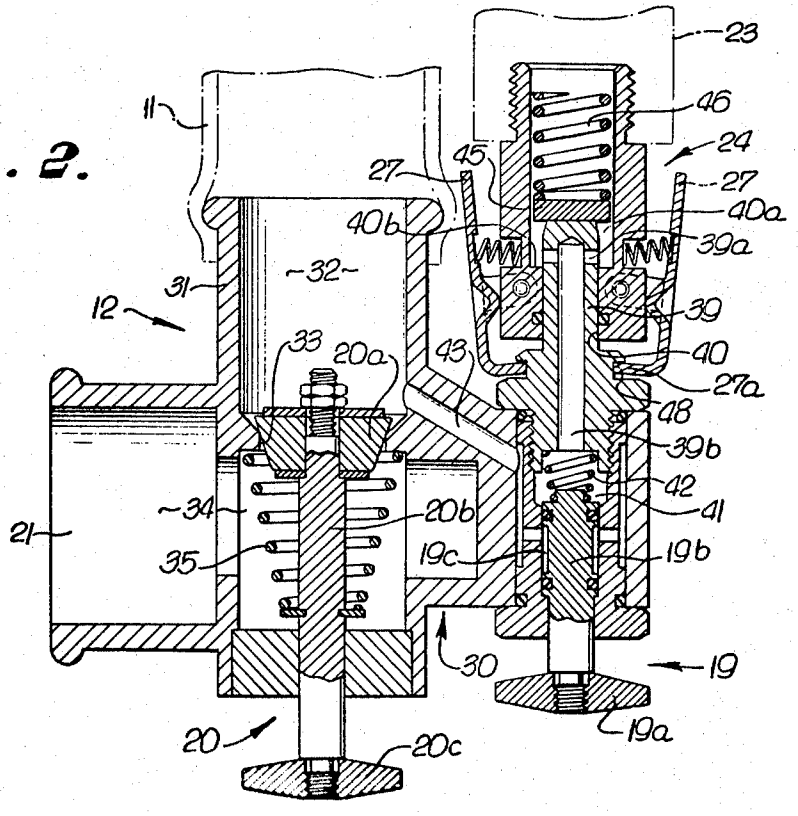

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16
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FIG. 2.


23
11
46
24
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45
27
40a
40b
39a
32
31
39
12
33
20a
43
40
27a
48
39b
42
34
20b
41
21
35
19c
19b
30
19
20
19a
20c

VEST INFLATION/EXHAUST VALVE ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an underwater buoyancy device having an inflation/exhaust tube and valve assembly for inflating the device from a scuba supply tank and for venting the device.

2. Description of the Prior Art

Many aquatic divers prefer to wear a safety vest which can be inflated underwater to regulate the buoyancy of the diver or to assist in bring him safely to the surface. Normally the vest is empty, provision being made to inflate the vest rapidly under emergency conditions or when added buoyancy is needed.

In the past, most underwater safety vests have used a self-contained inflation source, such as a replaceable cartridge of compressed air or CO_2 gas. Air from the supply tank of the diver's self-contained underwater breathing apparatus (scuba tank) also may be used to inflate a safety vest. One such arrangement is shown in the U.S. Pat. No. 3,436,777 to A.T. Greenwood. There a diver's jacket includes at least one inflatable bladder, together with a combined fill and dump control valve for conveying gas from the scuba tank to the bladder. In another arrangement, disclosed in the U.S. patent application, Ser. No. 188,082 to Robert Roberts, assigned to Under Sea Industries, Inc., the scuba tank air supply hose is latched directly to a coupling on an inflatable vest.

An object of the present invention is to provide an underwater safety vest, inflatable from the diver's scuba tank, and incorporating an inflation/exhaust valve assembly conveniently situated for one-hand control of both inflation and venting, to enable quick disconnect of the supply tank hose, and to permit breathing of air from the vest via a mouthpiece contained in the assembly.

SUMMARY OF THE INVENTION

The foregoing objective is achieved by providing an underwater safety vest having an air chamber which can be inflated or exhausted via a tube extending from the chamber and terminating at a valve assembly. The valve assembly includes, in a common housing: an exhaust valve and a mouthpiece for breathing or venting air from the chamber, a quick-release coupling for connecting a hose from a scuba supply tank and a valve for controlling inflation of the device with air from the supply tank.

BRIEF DESCRIPTION OF THE DRAWINGS

A detailed description of the invention will be made with reference to the accompanying drawings, which are to scale. Like numerals designate corresponding parts in the two figures.

FIG. 1 is a pictorial view of an underwater safety vest incorporating an inflation/exhaust tube and valve assembly in accordance with the present invention; the device is shown operatively connected to a scuba supply tank.

FIG. 2 is a transverse section view of the inflation/exhust valve assembly also shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The following detailed description is of the best presently contemplated mode of carrying out the invention. This description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating the general principles of the invention, since the scope of the invention best is defined by the appended claims.

Referring now to FIG. 1, there is shown an inflatable underwater safety vest **10** provided with an inflation/exhaust tube **11** and valve assembly **12** in accordance with the present invention. The vest **10**, which includes a hollow, inflatable air chamber **13**, is made of flexible, water-proof material and has an opening **14** which forms a collar when worn by a diver. The opening **14** has a V-neck design to hold the diver in face-up position when the vest **10** is fully inflated, without constricting the diver's throat. A belt **15** cooperates with a loop **16** to secure the bottom of the vest **10** to the diver's waist.

The vest **10** normally is inflated with air from the diver's scuba supply tank **18** under control of an inflation valve **19** in the assembly **12**. Air can be vented from the chamber **13** under control of an exhaust valve **20** in the assembly **12**, such venting often being required during underwater ascent. The inflated chamber **13** also serves as an emergency air source for the diver, who can inhale the air through a mouthpiece **21** in the assembly **12**.

Air from the tank **18** is supplied to the assembly **12** via a conventional first-stage regulator **22**, a hose **23** and a quick-release connector **24**. Thus, the air supplied to the vest **10** is at the same reduced pressure as that delivered via a hose **25** to the diver's conventional second-stage regulator and mouthpiece **26**. A pair of spring-biased levers **27** latch the connector **24** to the assembly **12**. Depression of these levers **27** enables quick release of the connector **24** from the assembly **12**.

Details of the inflation/exhaust assembly **12** are shown in FIG. **2**. The assembly **12** includes a unitary housing **30** containing both the inflation valve **19**, the exhaust valve **20** and the mouthpiece **21**. A cylindrical projection **31** receives the end of the tube **11** and provides communication from that tube via a chamber **32** to an opening **33** selectively blocked by a resilient valve plug **20***a* of the valve **20**. A chamber **34** leads from the opening **33** to the mouthpiece **21**. A spring **35** surrounding the valve stem **20***b* in the chamber **34** biases the valve **20** to the illustrated position in which the plug **20***a* closes the opening **33**, thereby preventing the escape of air from the chamber **13**. Manual depression of the valve handle **20***c* unblocks the opening **33**, to exhaust air from the chamber **13** via the tube **11** to the mouthpiece **21**.

For connection to the hose **23**, the housing **30** includes a tubular projection **39** which is matingly received by a cylindrical bore **40** extending through the connector **24**. Lateral openings **39***a* from the interior **39***b* of the projection **39** communicate with an enlarged diameter region **40***a* of the bore **40**. Thus, the projection **39** provides a flow path from the hose **23** to a chamber **41** at the inlet of the inflation valve **19**. A spring **42** in the chamber **41** biases the valve **19** is closed.

To inflate the chamber **13**, the valve handle **19***a* is depressed, thereby positioning a channeled valve member **19***b* to open a flow path from the chamber **41** through a valve channel **19***c* and an interior passageway **43** to the chamber **32**. Air flow from the scuba tank supply hose **23** to the air chamber thus is controlled by the inflation valve **19**.

The connector **24** includes a check valve disc **45** situated within the enlarged bore region **40***a*. A spring **46** biases the disc **45** toward the bore shoulder **40***b*. Thus, as the connector **24** is removed from the assembly **12**, the disc **45** seats against the shoulder **40***b* blocking the bore **40** and preventing escape of air from the supply tank hose **23**. In an alternative embodiment, not shown, the inflation control valve may be contained in the hose connector itself, and the mating coupling on the assembly housing may include a check valve.

The hooked ends **27***a* of the levers **27** engage an annular recess **48** at the base of the projection **39**. When the levers **27** are depressed, the spring **46** and disc **45** press against the end of the projection **39** to urge the connector **24** away from the assembly **12**. A quick-release action is achieved. Such uncoupling permits the hose **23** to be connected for inflation of a companion diver's like vest, should that diver be out of air. Such quick-release also permits jettisoning of the tank **18**, if required in an emergency.

Very convenient buoyancy control results from adjacently positioning both the inflation and exhaust valves **19**, **20** in the same assembly. The diver can hold the assembly **12** in one hand and use one or two fingers of that hand to control both inflation and venting. Thus, during ascent, e.g., if too much air is vented and the diver begins to sink, more air quickly can be added by depressing the valve **19**. Further, if the scuba supply tank **18** is exhausted, the diver easily can hold the assembly **12** to his mouth and breathe the air from the chamber directly from the mouthpiece **21**. Manual opening of the valve **20** during inhalation serves in lieu of a demand regulator. Similarly, if a companion diver is out of air, the assembly **12** can be used by the companion to breathe air from the tank **18**, while the first diver still uses the mouthpiece **26**.

Intending to claim all novel, useful and unobvious features shown or described, the applicants:

1. An underwater buoyancy device having an air chamber and an inflation/breathing tube communicating between said chamber and an inflation/exhaust assembly, said chamber being inflatable with air supplied from a scuba tank via a hose, said assembly comprising:

a. a housing having coupling means providing flow communicating, quick-release connection to said hose,

b. a mouthpiece formed in said housing,

c. an exhaust valve in said housing for controlling air flow from said tube to said mouthpiece for breathing or for venting of said chamber,

d. a separately manually operable inflation valve in said housing for controlling air flow from said hose via said coupling means to said tube.

2. A buoyancy device according to claim **1** wherein said tube is flexible and of sufficient length to permit a diver wearing said device to breathe air from said chamber via said mouthpiece.

3. A buoyancy device according to claim **2** wherein said device comprises a vest and wherein said assembly is adapted to be hand-held for independent digital operation of said valves.

4. A buoyancy device according to claim **2** wherein said hose includes a connector, and further comprising check valve means in said connector for preventing escape of air from said hose when said connector is disengaged from said coupling means.

5. A buoyancy device according to claim **4** wherein said coupling means includes a projection matingly received by said connector, wherein said connector includes means for latched engagement to said housing, and wherein said check valve means includes a spring biased element positioned within said connector to urge quick release of said connector when said latch means is disengaged.

6. A buoyancy device according to claim **5** wherein said connector has a cylindrical bore therethrough, said bore having a relatively narrow diameter section extending to one connector end and opening into a relatively wider diameter section with a shoulder at said opening, said projection extending through said narrow diameter section into wider region, said element comprising a valve disc and a spring in said wider section, said spring biasing said disc against said shoulder to block said opening when said connector is disengaged, said spring pressing said disc against the end of said projection to urge quick release of said connector.

7. A safety vest for a scuba diver and having a chamber inflatable with air supplied via a hose from a scuba supply tank, said vest having a flexible inflation/breathing tube extending from said chamber and terminating at an assembly including in a common housing a mouthpiece and an exhaust valve controlling air flow from said chamber to said mouthpiece, said tube being of sufficient length to permit said mouthpiece to be held at the mouth of a diver wearing said vest, said hose having a connector and said housing having coupling means detachably receiving said connector, one of said connector and coupling means containing a separate valve for controlling inflation of said chamber from said supply tank, the other of said connector and coupling means having a check valve to prevent air escape.

8. In a buoyancy vest of the type worn by underwater divers and having a flexible oral inflation/breathing tube extending therefrom, an end of said tube being provided with a mouthpiece and control valve for breathing or venting air from said vest, the improvement wherein said vest is inflatable with air from a scuba tank supplied via a hose releasably connected to the same end of said tube having said mouthpiece.

9. A buoyancy vest according to claim **8** wherein said mouthpiece and control valve are in a common housing, said housing also containing a separate, manually operable inflation valve for controlling air flow from said hose to said vest.

10. A buoyancy vest according to claim **9** wherein said hose terminates at a connector having a check valve, said connector being quick-releasably, matingly engageable with a coupling member on said housing.

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