

[54] **FIRST STAGE SCUBA REGULATOR**

3,244,196	5/1966	Replogle	137/63 R
3,606,390	9/1971	Taylor.....	285/198

[75] Inventor: **Raymond A. Christianson**, Redondo Beach, Calif.

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

Primary Examiner—Alan Cohan
Assistant Examiner—David R. Matthews
Attorney, Agent, or Firm—Flam & Flam

[22] Filed: **Oct. 6, 1972**

[21] Appl. No.: 295,477

[57] **ABSTRACT**

[52] U.S. Cl..... 137/316, 137/63 R, 285/197,
137/505.25

[51] **Int. Cl.**..... **F16l 19/00**

[58] **Field of Search** 137/315, 316, 317, 318,
137/63 R; 285/197, 198, 199, 272, 274

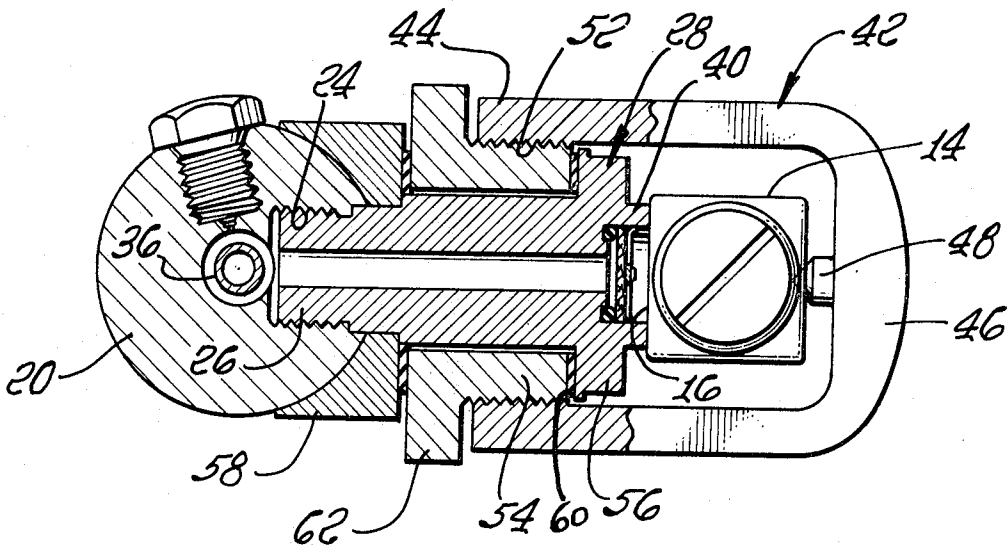
A yoke for attaching a tank valve to an inlet fitting of the regulator has a threaded base ring telescoped over the inlet fitting, the base ring engaging a lead screw journaled on the base of the fitting. Rotation of the lead screw moves the yoke to clamp or release the tank valve. A ball is clamped by the yoke against the inlet fitting to exclude moisture when the regulator is not in use.

[56] **References Cited**

UNITED STATES PATENTS

2,889,828	6/1959	Butler	137/557
-----------	--------	--------------	---------

5 Claims, 5 Drawing Figures



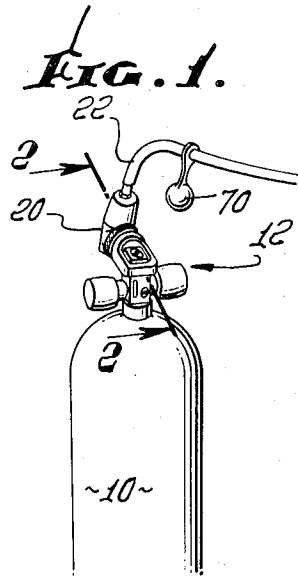
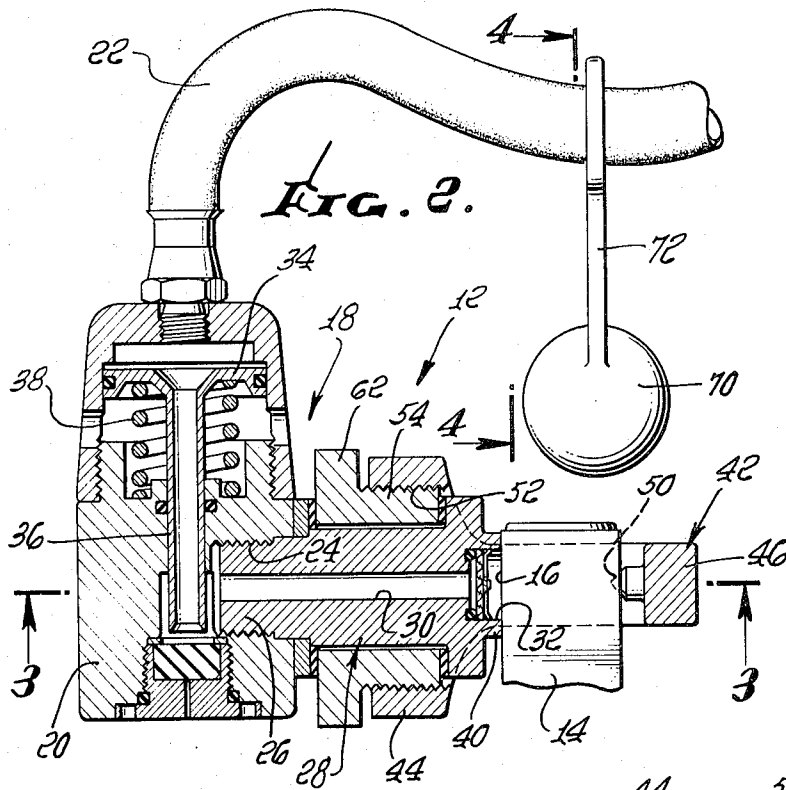
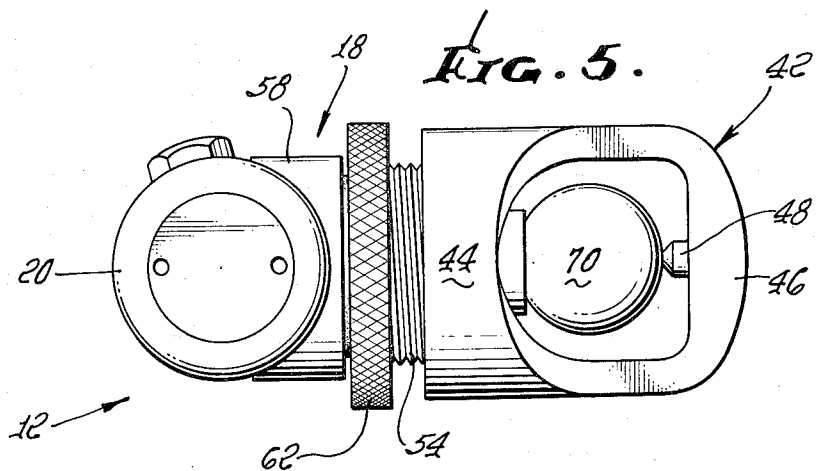
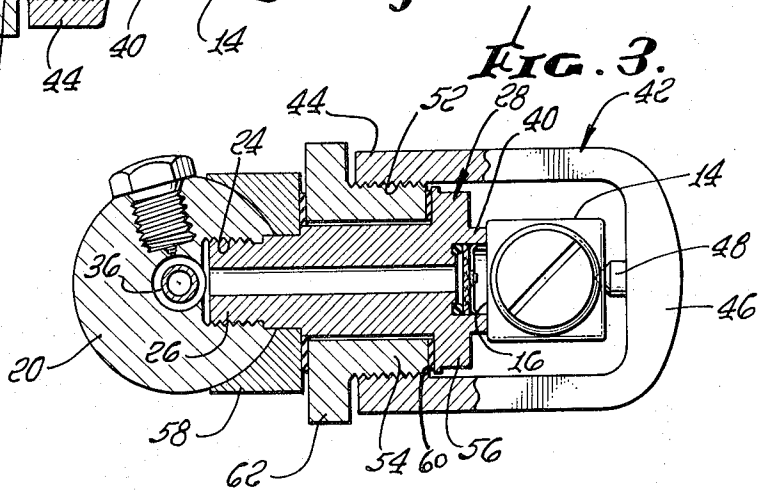
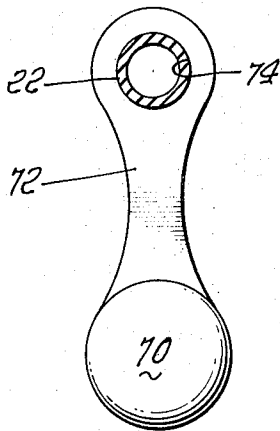


FIG. 4.



FIRST STAGE SCUBA REGULATOR

BACKGROUND OF THE INVENTION

1. Field of Invention

This invention relates to breathing apparatus intended primarily for use by divers, although the apparatus also has use in other mephitic atmospheres.

Breathing apparatus for underwater use ordinarily includes a first stage regulator and a second stage regulator. The first stage regulator attaches to the neck of an air bottle, and converts air under tank pressure of thousands of pounds per square inch to air at a predetermined relatively small pressure, say 75 pounds per square inch, for use by the second stage regulator. The second stage regulator delivers the air so supplied to the user in response to the inhalation by the user. This invention relates to the detachable connection between the air bottle or tank, and the first stage regulator.

2. Discussion of the Prior Art

A typical prior art first stage regulator has an exposed inlet about 1 centimeter in diameter. The inlet is surrounded by a raised seat. The air bottle or tank carries a valve adapted to engage the raised seat. In order to ensure an adequate connection, the tank valve is urged against the seat by the aid of a clamp structure. The clamp comprises a yoke bridging the seat and a clamp screw mounted on the bight or connecting portion of the yoke. The clamp screw has a wing handle. When the regulator is separated from the tank valve, the inlet opening is protected against entry of water by the aid of a hollow conical cap that is pressed against the seat by the aid of the clamp screw. A ring tethers the cap to the yoke so that it isn't misplaced.

The above described prior art clamp functions well so far as connection of tank valve and regulator are concerned. However, the wing handle of the clamp screw tends to snag on kelp, lines or other things with consequent danger to the diver or user. Additionally, the hollow conical cap is difficult to dry; moisture contained in the cap may contaminate the first stage regulator.

In order to avoid snagging, it has been proposed to utilize a nut and screw arrangement inside the yoke, such as illustrated in United States Pat. No. Des. 195,803 issued July 30, 1963, to Robert Elder. The problem, however, is that the nut or screw is small, and it is therefore difficult to twist it between the thumb and forefinger to develop the requisite resultant axial force. The nut or screw, by virtue of its internal orientation, can't be enlarged without corresponding enlargement of the yoke itself. It was then proposed to utilize a piston arrangement whereby the tank pressure itself would develop the clamping force. Such arrangements were unduly complicated, and in fact not always reliable. The best, simplest arrangement is a nut and screw arrangement.

The primary object of this invention, therefore, is to provide a simple yoke clamp that is large enough to be manipulated easily yet designed in such a way as to avoid protuberances that might snag on kelp, lines, etc. Another object of this invention is to provide an improved cap arrangement that eliminates the moisture trap.

SUMMARY OF THE INVENTION

In order to accomplish the foregoing objects, I provide a yoke structure the mounting ring of which is in-

teriorly threaded to form a follower nut, and a companion lead screw mounted on the fitting that forms the inlet opening to the first stage regulator. The lead screw has an enlarged handle at the base of the lead screw remote from the bight portion of the yoke, and hence shielded from entanglement with kelp, lines, etc. Preferably, the handle is circular and knurled. A simple neoprene or similar ball closure unit is provided that is carried by the hose that connects the regulator stages. The ball unit is easily clamped over the inlet to protect it from moisture while its spherical form readily lends itself to being wiped dry preparatory to placement at the inlet.

BRIEF DESCRIPTION OF THE DRAWINGS

A detailed description of the invention will be made with reference to the accompanying drawings wherein like numerals designate corresponding parts in the several figures. These drawings, unless otherwise indicated, are to scale.

FIG. 1 is a pictorial view of an air bottle to which the first stage regulator is attached, the ball closure being shown suspended on the hose that connects the outlet of the first stage regulator to the second stage regulator (not shown).

FIG. 2 is an enlarged sectional view of the second stage regulator taken along a plane indicated by line 2—2 of FIG. 1, the section plane extending axially of the regulator mechanism.

FIG. 3 is a sectional view taken along a plane indicated by line 3—3 of FIG. 2, the section plane extending at right angles to the regulator mechanism, but axially of the inlet to the regulator.

FIG. 4 is a sectional view taken along the offset plane indicated by line 4—4 of FIG. 2.

FIG. 5 is an end view of the first stage regulator, showing the ball closure in position to protect the inlet.

DETAILED DESCRIPTION

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 is best defined by the appended claims.

A supply of air or other breathable gas is provided by an air bottle or tank 10 (FIG. 1). Fitted into the neck of the tank 10 is a conventional tank valve assembly 12. This assembly includes a generally rectangular part 14 (FIGS. 2 and 3) having a lateral outlet 16. A first stage regulator structure 18 is designed to convert air from the tank at thousands of pounds per square inch pressure to some set amount, say 75 pounds, above ambient pressure. The regulator 18 has a body 20 the upper end of which connects to a hose 22 that leads to the second stage (not shown). On the side of the body is an interiorly threaded opening 24 that receives the reduced threaded end 26 of an inlet fitting 28. The inlet fitting 28 has a through bore 30, the outer end of which is enlarged, as at 32, to form a recess accommodating a filter cake. The fitting 28 is designed to register with the tank valve opening 16.

A piston 34 having a hollow stem closure 36 is acted upon by a spring 38, the air pressure at the hose 22 and by the ambient water. These three forces tend to coun-

terbalance each other in a known way such that the pressure at the hose 22 is maintained at a set value (corresponding to the spring pressure) above ambient.

The inlet fitting has an annular wall 40 surrounding the inlet recess 32 and which is designed to engage a resilient seal member (not shown) at the tank valve outlet 16 whereby a suitable coupling is established therebetween. In order to clamp the valve part 14 against the wall 40, a yoke 42 is provided. This yoke 42, as most clearly shown in FIG. 5, has a generally cylindrical base ring 44 and a generally U-shaped bridge 46 the ends of which are joined to diametrically opposite sides of the cylindrical base ring 44. The base ring is large enough to telescope over the outer end of the inlet fitting 28. Preferably, the bridge and base ring are parts of a unitary structure. The bridge portion 42 has a tapered thrust pin 48 (FIG. 3) designed to seat in a corresponding recess 50 at the side of the tank valve opposite its opening 16. By urging the yoke 42 toward the regulator body, the tank valve 14 is clamped into position.

For this purpose, the base ring 44 of the yoke 42 is interiorly threaded as at 52 to engage a lead screw 54. The lead screw is journaled on the inlet fitting and is held against axial movement between an enlarged flange 56 at the outer end of the inlet fitting 28 and a bearing 58 that fits the side of the regulator body 20. Washers 60 are interposed at the ends of the lead screw 54. By turning the lead screw, the yoke 42 is moved axially to clamp or release the tank valve 14.

To facilitate turning, the lead screw 54 has a handle portion 62. The handle is formed at the inner end of the lead screw beyond the base ring 44 of the yoke at a place where it does not interfere or snag kelp or lines. The handle can take a variety of forms. In the present instance, the handle is simply a knurled flange that is sufficiently large to permit easy turning.

When the regulator is separated from the tank for storage, a ball closure 70 seals the inlet fitting 28 against entry of moisture. The ball closure 70 is formed at the end of a tether strap 72 (FIG. 4) that has a hole 74 whereby it is conveniently carried by the hose 22. The strap 72 and ball 70 are conveniently molded as a unit. The closure 70, being in the form of a ball, is easily wiped dry before it is clamped in position by the yoke thrust pin 48 as shown in FIG. 5.

Intending to claim all novel, useful, and unobvious

features shown or described, I make the following claims:

1. In breathing apparatus of the class described cooperable with a valve projection of an air bottle:

- a. a regulator body having an inlet fitting, there being an inlet opening at the end of the fitting for admission of breathable gases into the regulator body, said regulator body having means forming an outlet;
- b. a lead screw journaled on the inlet fitting and confined against axial movement; and
- c. a yoke, said yoke having
 - i. a threaded base ring telescoped over said inlet fitting and engaging said lead screw; and
 - ii. a bridge attached to said base ring, and projecting across said inlet opening at the end of said fitting, and forming a space for the reception of said valve projection;
- d. angular movement of said lead screw causing said bridge to move toward or away from said inlet opening to clamp or release said tank valve projection;
- e. said lead screw having a handle part located between the end of said base ring and said regulator body to be removed from a place of possible entanglement with kelp, lines or the like while being of a size adequate to permit easy rotation of said lead screw.

2. The combination as set forth in claim 1 in which said inlet fitting is formed as a part separate from said regulator body, and having a flange at its outer end to confine said lead screw on said fitting, said base ring fitting over said flange.

3. The combination as set forth in claim 2 in which said base ring is internally threaded and said lead screw is externally threaded.

4. The combination as set forth in claim 1 in which said handle part is a knurled generally circular flange located at the base of the lead screw.

5. The combination as set forth in claim 1 together with a ball closure and apertured tether formed as a unitary molded article of neoprene or rubber-like material, said regulator including a hose threaded through said apertured tether, said ball closure being cooperable with said inlet opening and said bridge to seal said inlet opening from entry of moisture.

* * * * *

50

55

60

65