Feb. 27, 1968 R. J. ARAGONA ETAL 3,370,586

UNDERWATER BREATHING DEVICE WITH VALVED FLOAT

Filed June 1, 1965 3 Sheets-Sheet 1

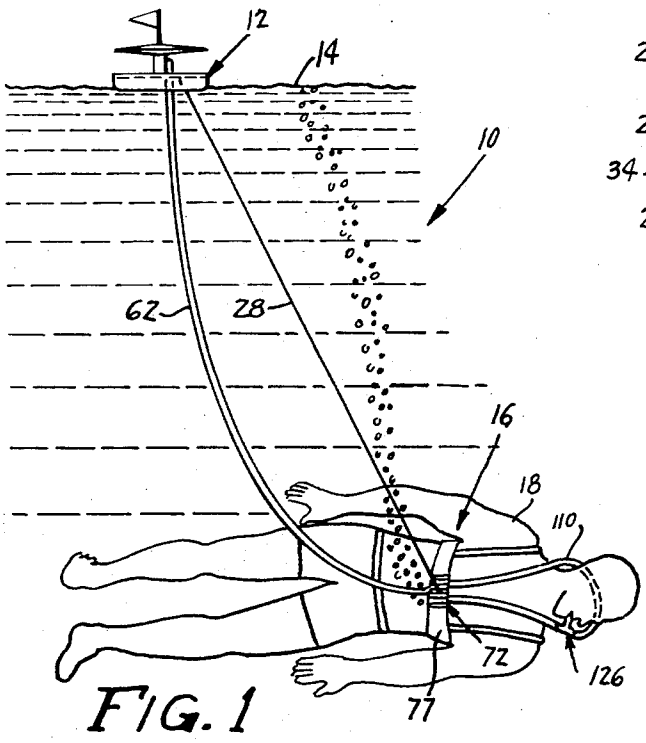


FIG. 1

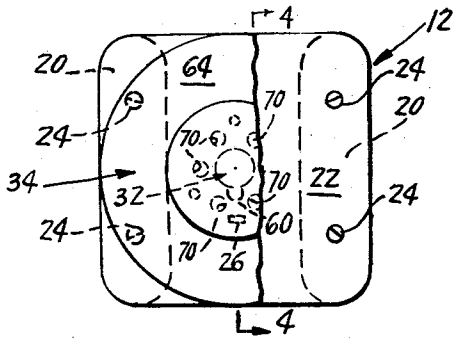


FIG. 2

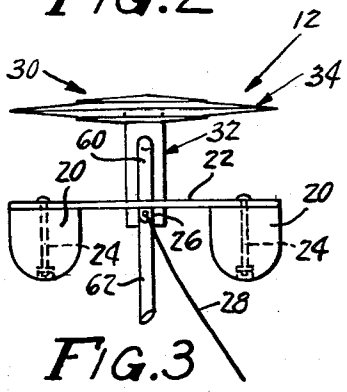


FIG. 3

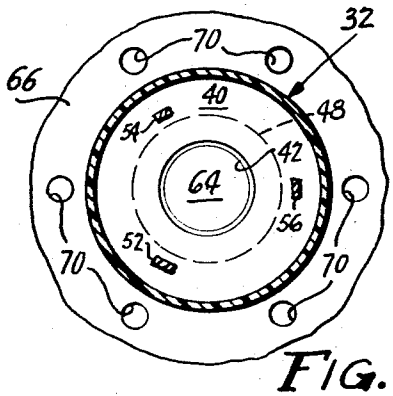


FIG. 6

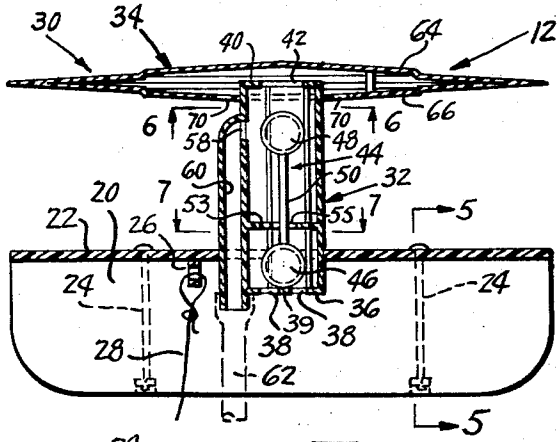


FIG. 4

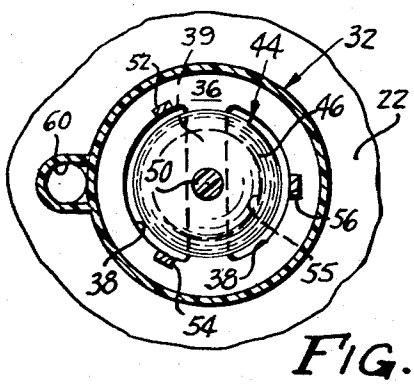


FIG. 7

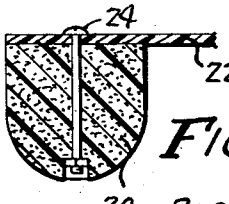


FIG. 5

INVENTORS.
ROBERT J. ARAGONA
JEROME T. FRYLING

BY Kimmel, Crowell & Weaver
ATTORNEYS.

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UNDERWATER BREATHING DEVICE WITH VALVED FLOAT

Filed June 1, 1965 3 Sheets-Sheet 2

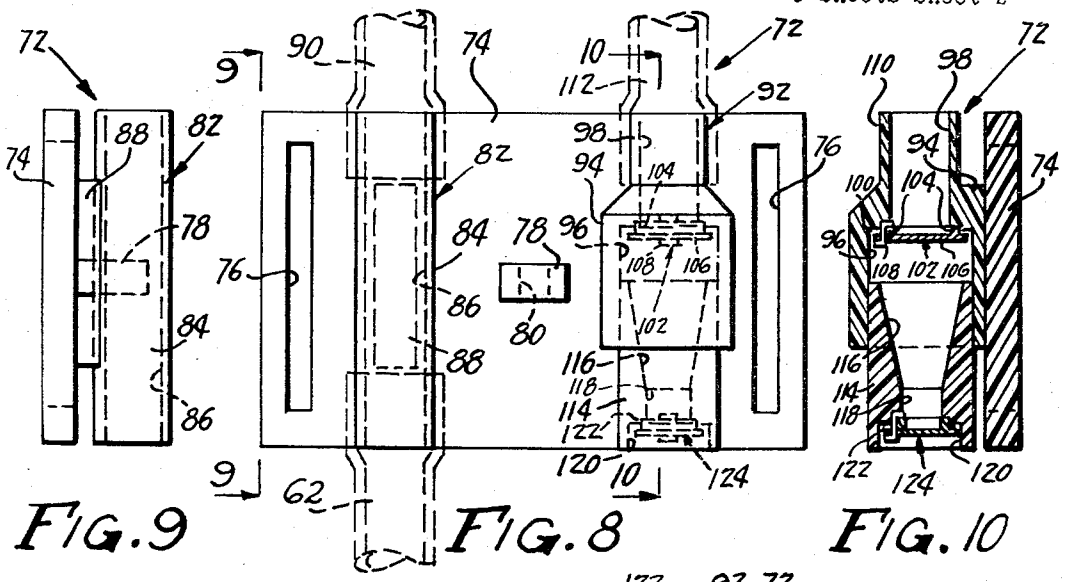


FIG. 9 FIG. 8 FIG. 10

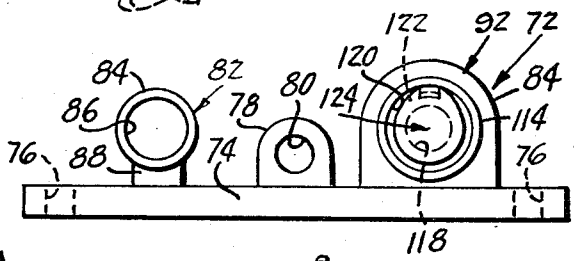


FIG. 11

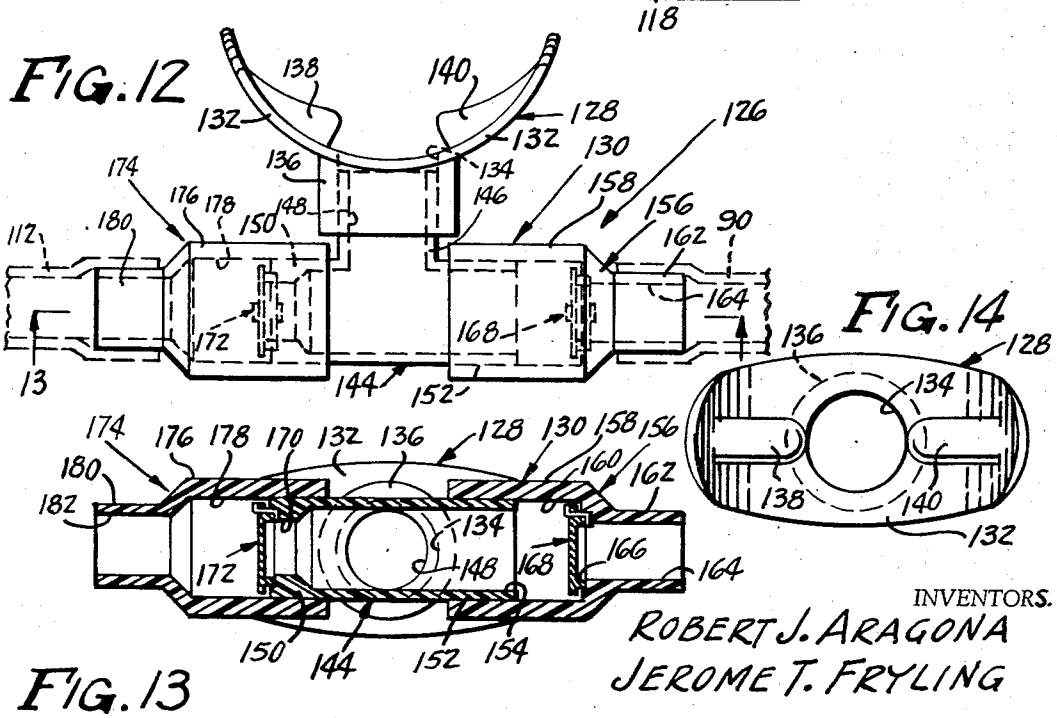


FIG. 12 FIG. 14 FIG. 13

INVENTORS.
ROBERT J. ARAGONA
JEROME T. FRYLING

BY Kimmel, Crowell & Weaver
ATTORNEYS.

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UNDERWATER BREATHING DEVICE WITH VALVED FLOAT

Filed June 1, 1965 3 Sheets-Sheet 3

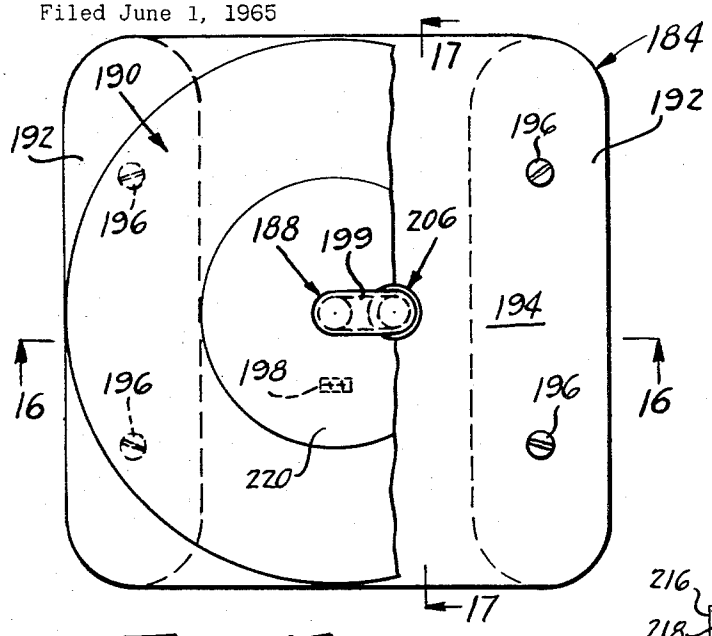


FIG. 15

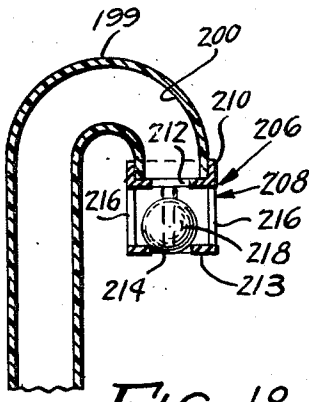


FIG. 18

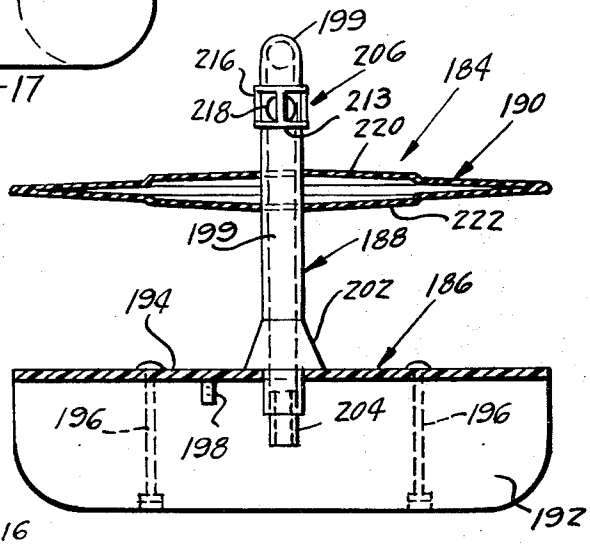


FIG. 17

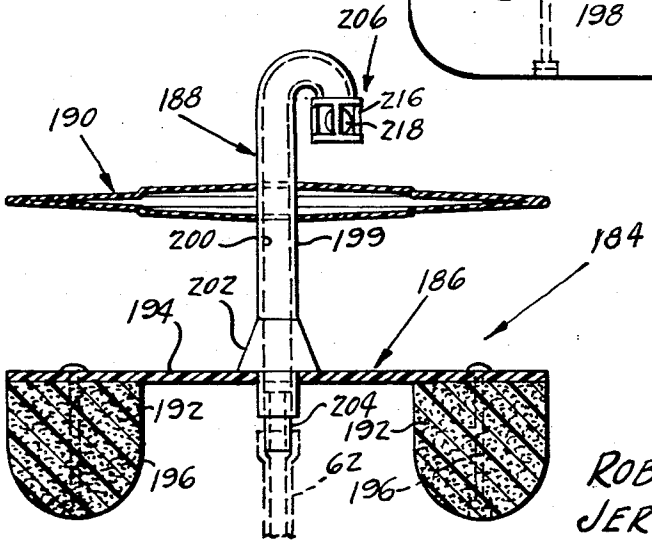


FIG. 16

INVENTORS.
ROBERT J. ARAGONA
JEROME T. FRYLING
BY Kimmel, Crowell & Weaver
ATTORNEYS.

United States Patent Office

3,370,586

Patented Feb. 27, 1968

3,370,586
UNDERWATER BREATHING DEVICE WITH VALVED FLOAT

Robert J. Aragona, R.D. 5, Box 102, Westcott Road, Schenectady, N.Y. 12306, and Jerome T. Fryling, Schenectady, N.Y.; said Fryling assignor to said Aragona

Filed June 1, 1965, Ser. No. 460,031
6 Claims. (Cl. 128—145)

ABSTRACT OF THE DISCLOSURE

A snorkel type of underwater breathing apparatus in which a float is provided with a valved air passage, a splash guard and an air hose. The float and air hose are attached to a harness worn on the swimmer's body whereby the float may be towed by the swimmer. The mouthpiece has a pair of conduits which are supported on the harness, one being attached to the air hose and the other opening into the water.

This invention relates to an underwater breathing device, and more particularly to an underwater breathing device which is so constructed and arranged to preclude the inadvertent inhalation of water by the user.

The underwater breathing devices known to the prior art may be separated into various categories, e.g., (1) the scuba type, in which the swimmer carries a self-contained pressurzide breathing device, (2) the user-carrier compressor type which utilizes an underwater compressor means and an above water air source to provide the user with a source of oxygen, and the non-compressor type in which the user carries a breathing apparatus adjacent the face connected to an above water air source.

It is with this latter category that this invention is primarily concerned, although certain subcombinations of this invention may be utilized in other devices. One disadvantage of the underwater breathing devices known to the prior art is that water may be inhaled therethrough, much to the discomfort and chagrin of the user. Another disadvantage of the devices known to the prior art is that the exhausted air exits adjacent the face of the user, thus limiting his ability to observe the adjacent surroundings. Other disadvantages of the prior art reside in the use of complicated check valves to correctly distribute the flow of air through the underwater breathing device.

It is an object of the instant invention to provide an underwater breathing device which utilizes the breathing power of the user to inhale air from an above water station.

Another object of this invention is to provide an above water air inlet station which precludes the inhalation of water into the air distribution system of an underwater breathing device.

Another object of the instant invention is to provide an underwater breathing device in which exhaust air is emitted rearwardly of the face of a user.

A further object of this invention is to provide an underwater breathing device having a single hose communicating with the surface in order to avoid tangling of hoses.

Another object of this invention is to provide pivotally mounted pressure operated check valves to control the flow of air within the apparatus.

A further object of this invention is to provide a float having an air inlet station which precludes the entry of water into a breathing apparatus.

Other objects and advantages of the instant invention reside in the combinations of elements, arrangements of

parts and features of construction and use, some of which will be apparent and some of which will be more fully pointed out hereinafter and disclosed in the accompanying drawings wherein there is shown preferred embodiments of this inventive concept.

In the drawings:

FIGURE 1 is a pictorial view showing the underwater breathing apparatus of the instat invention as it appears in use;

FIGURE 2 is a top plan view of the float device utilized in the underwater breathing apparatus of the instant invention, certain parts being broken away for clarity of illustration;

FIGURE 3 is a front elevational view of the float of FIGURE 2;

FIGURE 4 is a longitudinal sectional view of the float of FIGURE 2, taken along line 4—4 thereof and viewing in the direction of the arrows;

FIGURE 5 is a transverse sectional view of FIGURE 4 taken along line 5—5 thereof and viewing in the direction of the arrows;

FIGURE 6 is a cross-sectional view of the device of FIGURE 4 taken along line 6—6 thereof and viewing in the direction of the arrows;

FIGURE 7 is a cross-sectional view of the float of FIGURE 4 taken along line 7—7 thereof and viewing in the direction of the arrows;

FIGURE 8 is a top plan view of the inlet and outlet connections carried by a user;

FIGURE 9 is an end elevational view of the structure of FIGURE 8 as seen along line 9—9 viewing in the direction of the arrows;

FIGURE 10 is a longitudinal sectional view of the fresh air conduit, taken along line 10—10 of FIGURE 8 and viewing in the direction of the arrows;

FIGURE 11 is a front elevational view of the structure of FIGURE 8;

FIGURE 12 is a top plan view of a mouthpiece and air conduits of the instant invention;

FIGURE 13 is a longitudinal cross-sectional view of the air conduits shown in FIGURE 12 taken along line 13—13 and viewing in the direction of the arrows;

FIGURE 14 is a front elevational view of the mouthpiece of FIGURES 12;

FIGURE 15 is a top plan view of another embodiment of a float of the instant invention, certain parts being broken away for clarity of illustration;

FIGURE 16 is a transverse sectional view of the float of FIGURE 15, taken along line 16—16 thereof and viewing in the direction of the arrows;

FIGURES 17 is a longitudinal cross-sectional view of the float of FIGURES 15, taken along line 15—15 thereof and viewing in the direction of the arrows; and

FIGURE 18 is a cross-sectional view of the air inlet of the float shown in FIGURES 15 to 17.

Referring now to the drawings in detail, wherein like reference characters designate like elements throughout the several views thereof, and particularly to FIGURES 1 to 14 inclusive, there in indicated generally at 10 an underwater breathing apparatus comprising a float shown generally at 12 on a surface 14 of a body of water, and an air distribution system indicated generally at 16 secured to a user 18 for supplying sufficient quantities of air for breathing.

Referring now to FIGURES 2 to 7 inclusive, float 12 includes two laterally spaced floatable supports or pontoons 20 which may be of wood, styrofoam or the like, and which are fixedly secured to a horizontal transverse platform 22 by a series of substantially vertical conventional nut and bolt connecting members 24. Dependingly secured to the under side of platform 22 between pon-

toons **20** is an eye **26** which acts as a securing means for a tow rope or wire **28** as more fully explained hereinafter. It should be noted that the configuration of pontoons **20** and eye **26** provides an easily towable float as shown in FIGURE 3. It is apparent that the configuration of FIGURE 3 is more easily towed than is an innertube, for example, which presents a frictional surface transverse to the direction of travel.

Secured centrally of platform **22** is a mushroom-shaped structure shown generally at **30** which houses the air inlet mechanisms of the instant invention. Mushroom-shaped structure **30** comprises a vertical tube shown generally at **32** secured to platform **22** so that a portion of tube **32** extends below platform **22** and a horizontal disc indicated generally at **34** secured to the uppermost end of vertical tube **32**.

Tube **32** includes a bottom wall **36** which is provided with a pair of openings **38** separated by a cross bar **39**, each opening having the configuration of a segment of a circle, and a top wall **40** having an aperture **42** for the entry of air as will be more fully explained hereinafter. Disposed within tube **32** is a valve closure indicated generally at **44** comprising a lower float **46**, an upper ball-shaped closure member **48** and a shaft **50** fixedly connecting float **46** and walve closure **48**.

As more fully explained hereinafter, valve closure member **44** must be made of a material which floats in water, such as for example, wood, styrofoam, plastic or the like. Secured between upper and lower walls **36**, **40** and forming a guide means for valve closure member **44** are three spaced rods **52**, **54**, **56** to insure that valve closure member **44** reciprocates linearly so that ball closure **48** will close aperture **42**. Also secured within tube **32** is a flange **53** having an aperture **55** that cooperates with ball valve or float **46** to create an air lock within tube **32** to preclude the entry of water into the air distribution system leading to a swimmer. Secured to one side of tube **32** and communicating with the interior thereof through opening **58** is an air outlet tube **60** to which is secured a fresh air conduit **62** as is more fully explained hereinafter.

Horizontal disc **34** includes an upper impervious circular plate **64** and a lower plate **66** forming a central aperture **68** and a series of laterally spaced air inlets **70**. As shown in FIGURE 4, plates **64**, **66** are spaced apart at their center to provide an air conduit between air inlets **70**, opening **42**, opening **58** in tube **32**, tube **60** and fresh air conduit **62**.

From the previously mentioned structure, it is seen that float **12** provides an air supply for an underwater swimmer in which it is practically impossible to inhale water. For example, the positioning of air inlets **70** beneath horizontal disc **34** precludes the inhalation of water produced by waves on surface **14**. The use of a floating reciprocable valve **44** results in the closing of aperture **42** when float **46** is raised by an upsurging wave while the placement of opening **58** precludes the wave from entering tube **60** and fresh air conduit **62**.

Referring now to FIGURES 8 to 11 inclusive, there is shown generally at **72** a support means comprising a substantially planar platform **74** having an elongate slot **76** at each end thereof for the reception of a body encompassing strap **77** which secures support means **72** to the torso of a swimmer as shown in FIGURE 1. Support means **72** includes a centrally mounted upstanding lug **78** having an aperture **80** into which is looped wire **28** for towing float **12**. As previously mentioned, the relationship between eye **26**, rope or wire **28**, and lug **78** results in the movement of float **12** over surface **14** in a most expeditious manner.

Secured to platform **74** between upstanding lug **78** and one edge of platform **74** is an air inlet support generally shown at **82** comprising a cylindrical tube **84** having an interior conduit **86** and secured to plate **74** by a depending bracket **88**. As shown in FIGURE 8 one end of air inlet **82** is secured to fresh air conduit **62** while

the other end of fresh conduit **82** is secured by a second fresh air conduit **90** to a breathing apparatus held in the mouth of a swimmer as is more fully explained hereinafter.

Secured on the support means **72** on the other side of upstanding lug **78** is an air exhaust support generally indicated at **92** including a first support section **94** secured to platform **74** in any conventional manner and having a first enlarged aperture **96**, a second smaller aperture **98** communicating therewith and a shoulder **100** formed at the juncture of apertures **96**, **98**. Pivotally mounted on shoulder **100** is a flap-type check valve indicated generally at **102** comprising an annular upstanding sealing ring **104** secured to shoulder **100** and a circular closure plate **106** mounted on an S-shaped spring **108** one end of which is secured to shoulder **100**. As shown in FIGURES 8 and 10, closure plate **106** overlaps annular sealing ring **104** with spring **108** providing the biasing forces necessary to effectuate a one-way closure.

Fitted about a smaller section **110** of first support **94** is an exhaust air conduit **112** which conducts the exhaust gas from a breathing apparatus held in the mouth of a swimmer as will be more fully explained hereinafter.

Secured within enlarged aperture **96** is a second cylindrical support **114** comprising a first frusto-conical aperture **116** communicating through a circular aperture **118** to an enlarged circular aperture **120**. As shown in FIGURES 8 and 10, the differences in diameters of apertures **118**, **120** creates a shoulder **122** on which is mounted a flap-type check valve **124** of identical configuration with check valve **102**.

As will be more fully explained hereinafter, the exhaled air from a swimmer travels through conduit **112** into aperture **98** and opens flap-type check valve **102** against the biasing forces produced by spring **108**. Unless the swimmer is taking very short breaths, the amount of air exhaled will not only open check valve **102** and fill the volume between check valves **102**, **124**, but will also open check valve **124** with the exhaled air escaping through a body of water as indicated in FIGURE 1. It should be apparent that the use of two check valves in air exhaust support **92** precludes the possibility of an inflowing rush of water reaching a swimmer.

Referring now to FIGURES 12 to 14 inclusive, there is indicated generally at **126** a breathing apparatus including a mouthpiece indicated generally at **128** and a distribution T indicated generally at **130**.

Mouthpiece **128** comprises an arcuate substantially semicircular flange **132** having a centrally disposed aperture **134** about which is secured a collar **136** for engagement with distribution T **130**. Mouthpiece **128** also includes a pair of centrally mounted coplanar sections **138**, **140** which a swimmer may grasp between his teeth in a convention manner.

Distribution T **130** includes a male T shown generally at **144** having a first leg **146** formed with an aperture **148** fixedly secured in collar **136** of mouthpiece **128**. T **144** also includes a second leg **150** and a third leg **152**, legs **150**, **152** forming a common aperture **154** communicating with aperture **148** and consequently with aperture **134** of mouthpiece **128**.

Secured about leg **152** of T **144** is a connecting member shown generally at **156** comprising an enlarged cylindrical body **158** having an enlarged aperture **160** fixedly receiving leg **152**. Connecting member **156** also includes a smaller cylindrical section **162** having a smaller aperture **164** communicating with aperture **160** and forming a shoulder **166** formed at the junction of the apertures. As intimated previously, fresh air conduit **90** connects fresh air support **82** with cylindrical section **162**, thus providing fresh air communication between float **12** and mouthpiece **128**.

Mounted on shoulder **166** is a flap-type check valve **168** of identical configuration with check valves **102** and **124**, as more fully explained hereafter. Leg **150** of male

T 144 forms an aperture 170 of smaller diameter than aperture 154 with a check valve indicated generally at 172 mounted on the annular ring of leg 150.

An exhaust connection indicated generally at 174 includes a first enlarged cylindrical section 176 forming an enlarged aperture 178 fixedly secured about leg 150 and a second smaller cylindrical section 180 forming a smaller aperture 182 communiacting with opening 178. As previously indicated, exhaust hose 112 provides communication between exhaust air connection 92 and mouthpiece 128.

In the operation of breathing apparatus 126, mouthpiece 128 will be grasped in the teeth of a user so that the user may breathe through the mouth. Upon inhalation, check valve 172 will remain closed with check valve 168 opening, thus providing a flow of fresh air from float 12 through fresh air conduit 62, fresh air support 82, fresh air conduit 90 and distribution T 130. Upon exhalation, check valve 168 will close with check valve 172 opening thus allowing the flow of stale air from mouthpiece 128 to exhaust air support 92 through exhaust air conduit 112. As previously explained, check valves 102, 124 will open upon the flow of fresh air through support 92, thus discharging exhaled air rearwardly of the user as indicated in FIGURE 1.

Referring now to FIGURES 15 to 18 inclusive, there is indicated generally at 184 a modified form of a float which may be utilized with the remainder of the components of the instant invention and which comprises a supporting structure indicated generally at 186, an air inlet tube shown generally at 188 and a horizontal disc indicated generally at 190.

Supporting means 186 is of similar configuration to that of float 12 and comprises a pair of parallel spaced apart floating supports or pontoons 192 secured to a horizontal transverse platform 194 by any conventional fastening means, such as nuts and bolts 196. Dependingly secured to the underside of platform 194 is an eye 198 for securement with a tow rope or two wire as previously explained. Air inlet tube 188 comprises an inverted J-shaped tube 199 forming a central aperture 200 and secured to platform 194 by a frusto-conical connecting member 202. Tube 199 extends below platform 194 and is connected to a fresh air conduit 62 by an intermediate connecting member 204.

The upper end of tube 199 is equipped with a ball-type check valve indicated generally at 206 which is composed of a valve cage shown generally at 208 in FIGURE 18. Valve cage 208 includes an upper plate 210 forming a circular valve seat 212 coaxial with opening 200 of air inlet tube 199. Valve cage 208 also includes a lower plate 213 forming an aperture 214 and a plurality of valve guides 216 connecting plates 210 and 213. A ball valve 218 is positioned within valve cage 208 such that air may normally flow through valve seat 212 into tube 198, but should water attempt to enter tube 199 it will carry floatable ball valve 218 into seating engagement with valve seat 212.

Horizontal disc 190 includes an upper surface 220 and a lower surface 222 spaced apart at their centers as shown in FIGURE 17. It should be apparent that horizontal disc 190 isolates valve 206 from any wave action initiating from water surface 14 except for a breaker, which will necessarily approach valve 206 from an upwardly direction thus allowing valve seat 212 to be open under ordinary conditions. It is apparent that this construction provides a substantially continuous source of air for an underwater swimmer.

It is now seen that there is herein provided an improved underwater breathing device having all the objects of this invention and others, including many advantages of great practical utility and commercial importance.

Since many embodiments may be made of the instant inventive concept, and since many modifications may be made in the embodiments hereinbefore shown and described, it is to be understood that the foregoing is to be interpreted as illustrative and not in a limiting sense.

We claim:

1. An underwater breathing device comprising

a float including means for horizontally supporting said float on a surface of water, a vertical air passage tube secured to said support means having air inlet means and air outlet means, said float further including a horizontal disc secured to said vertical air passage, said disc having an upper and lower surface and providing an interior air conduit in communication with said vertical air passage tube, said lower surface being formed with at least one downwardly facing opening in communication with said interior air conduit to provide a fresh air supply thereto;

said vertical air passage having an upper valve seat positioned adjacent an upper end of said passage, a lower valve seat positioned below said upper valve seat, and an opening adjacent a lower end of said passage, a floatable valve member positioned in said air passage for selectively closing said valve seats upon the entry of water into said opening, said valve member having an upper closure member configured to seal against said upper valve seat, a lower closure member configured to seal against said lower valve seat, means fixedly connecting said upper closure member and said lower closure member in spaced apart relation, said upper closure member being positioned below said upper valve seat and said lower closure member being positioned below said lower valve seat;

said air outlet means of said vertical tube communicating with said vertical air passageway between said valve seats;

support means comprising an encompassing strap of a size sufficient to fit about the torso of a user, fresh air conduit means of substantially uniform cross sectional area on said strap, exhaust air conduit means on said strap;

fresh air conduit means operably connecting said air outlet means on said float and said fresh air conduit means on said support means;

a mouthpiece having means adapted to be gripped by the teeth of a user providing a fresh air inlet and an exhaust air outlet;

conduit means operably connecting said fresh air conduit means on said strap and said fresh air inlet means on said mouthpiece;

conduit means operably connecting said exhaust air outlet of said mouthpiece and said exhaust air conduit means on said support means for emitting exhaust air rearwardly of said user.

2. The structure of claim 1 wherein said closure member and said floatable member are spheres and said means connecting said closure member and said floatable member is a rod.

3. The structure of claim 1 wherein said air passage includes guide means for limiting movement of said valve member to a substantially vertical direction.

4. An underwater breathing device as defined in claim 1 wherein

said mouthpiece includes a first valve interposed in said fresh air inlet and means normally biasing said first valve to its closed position, a second valve interposed in said exhaust air outlet, and means normally biasing said second valve to its closed position, said first valve opening and closing, alternately, upon inhalation and exhalation by the user, and said second valve closing and opening, alternately, upon inhalation and exhalation by the user.

5. An underwater breathing device as defined in claim 1 wherein

valve means is disposed in said exhaust air conduit means on said support means, said last named valve

means including a pair of normally closed valve disposed in said air exhaust conduit means in axially spaced relation relative thereto, and means normally biasing said pair of valves to their respective normally closed positions.

6. An underwater breathing device as defined in claim 1 wherein

said mouthpiece includes a first valve interposed in said fresh air inlet and means normally biasing said first valve to its closed position, a second valve interposed in said exhaust air outlet and means normally biasing said second valve to its closed position, said first valve opening and closing, alternately, upon inhalation and exhalation by the user, and said second valve closing and opening, alternately, upon inhalation and exhalation by the user; and

valve means disposed in said exhaust air conduit means on said support means, said last named valve means including a pair of normally closed valves disposed in said exhaust air conduit means in axially spaced relation relative thereto, and means normally biasing said pair of valves to their respective normally closed positions.

References Cited

UNITED STATES PATENTS

908,690	1/1909	Neubert	128—145
1,324,514	12/1919	Mueller	128—145 X
1,824,512	9/1931	Szamier	128—145 X
2,780,224	2/1957	Wallace	128—145 X
2,974,331	3/1961	Dize	9—11 X

FOREIGN PATENTS

1,177,002	12/1958	France.

RICHARD A. GAUDET, *Primary Examiner.*

W. E. KAMM, *Examiner.*