

May 26, 1959

B. B. GIRDEN

2,888,010

SWIMMING MASK WITH SNORKEL MEANS

Filed Nov. 28, 1956

2 Sheets-Sheet 1

Fig. 1.

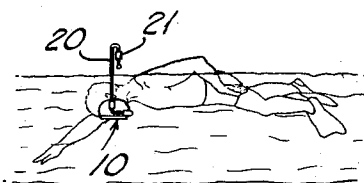


Fig. 2.

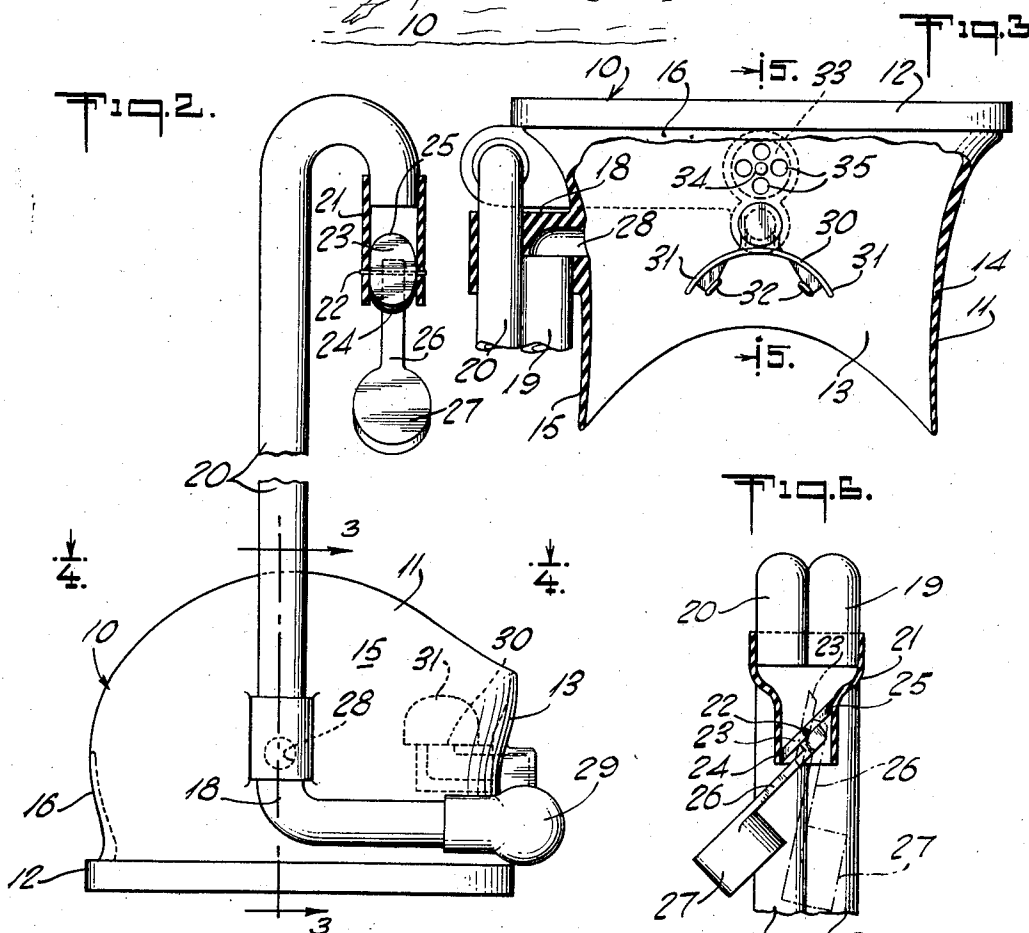


Fig. 3.

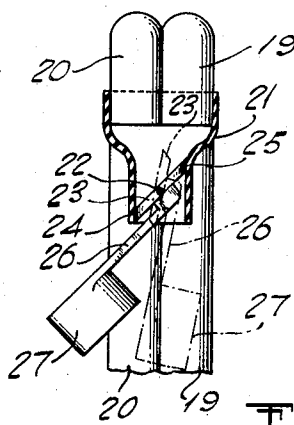


Fig. 4.

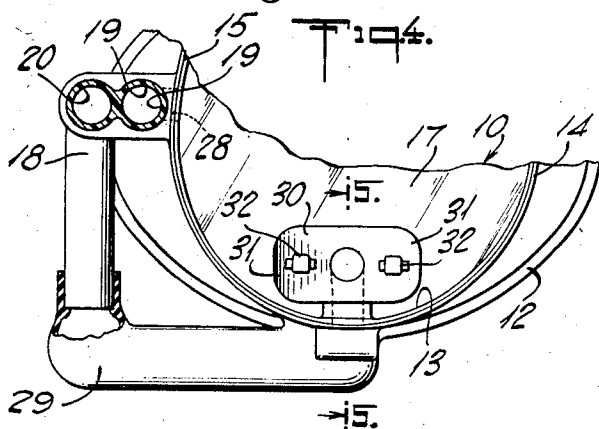
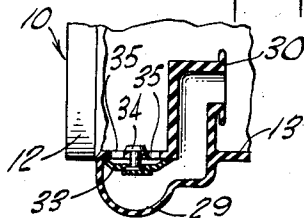


Fig. 5.



INVENTOR
BARNEY B. GIRDEN
BY
Stanley Meder
ATTORNEY

May 26, 1959

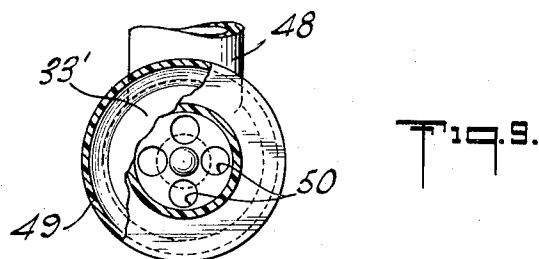
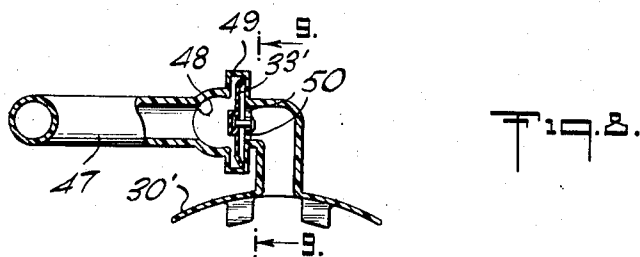
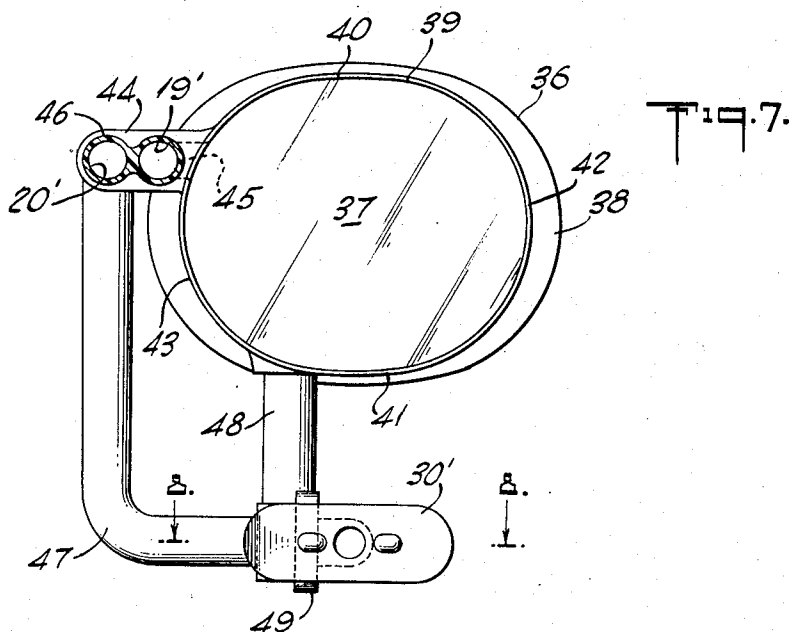
B. B. GIRDEN

2,888,010

SWIMMING MASK WITH SNORKEL MEANS

Filed Nov. 28, 1956

2 Sheets-Sheet 2



INVENTOR
BARNEY B. GIRDEN
BY *Stanley Walden*
ATTORNEY

1

2,888,010

SWIMMING MASK WITH SNORKEL MEANS

Barney B. Girden, New York, N.Y.

Application November 28, 1956, Serial No. 624,797

11 Claims. (Cl. 128—142)

The present invention relates to a swimming mask with snorkel breathing means affixed thereto and more particularly is directed to a type of swimming masks wherein separate breathing tubes are employed for taking in and exhausting the air.

In existing swimming masks with breathing tubes one of the most disturbing problems which arises stems from the accumulation of residual air in the mask and breathing tubes. By residual air is meant air which has been exhaled by the user and hence air which has a higher carbon dioxide content and lower oxygen content than the atmosphere generally.

By reason of the accumulation of such residual air in the breathing tube or tubes and the consequent inhaling by the user of air with a carbon dioxide content which increases with time, a level is reached where the user becomes an inefficient swimmer and it is necessary to remove the mask.

Another problem encountered with face masks is that of fogging of the face plates and fogging of the glasses of a wearer. Since the temperature of the water is usually lower than the temperature of the wearer's breath, moisture in the wearer's breath condenses on the inside of the face mask and sometimes upon the wearer's glasses and renders the mask either ineffective or useless.

A third troublesome problem stems from the fact that there is always a certain amount of seepage of water into the mask between the sides of the mask and the face and head of the wearer. This accumulation of seepage water reaches a point where it becomes necessary for the wearer to remove the mask in order to evacuate the water. While elaborate pump means have been employed for evacuating seepage water in masks used with tanks of compressed oxygen and and other gas mixtures, there has been no simple means of evacuating such seepage water from snorkel masks without removing them.

Another difficulty with present snorkel arrangements lies in the fact that the float valves used to close the upper end of snorkel tubes when the swimmer submerges frequently become stuck, or, due to the vacuum caused by evacuation of the air in the tubes by the wearer himself, become sealed by atmospheric pressure with the result that there have been a great number of deaths by suffocation due to the fact that the wearer could neither raise the mask from his face nor release the float valve or valves.

Present float valves are also deficient in that, when a swimmer blows air into his mask to balance the pressure of the water as he descends, such increased pressure within the mask transmitted to the float valve is sometimes sufficient to open said valve and of course, if air is released therethrough, water rushes in.

It is, therefore, the purpose of the present arrangement to remedy the defects in equipment above set forth.

Another object of the present invention is to provide a multiple snorkel tube arrangement employing a minimum of valves or other moveable elements.

2

Still another object is the provision of an arrangement of snorkel tubes and masks which will take maximum advantage of the natural breathing system of the wearer and thus minimize the number of co-acting elements employed in such arrangement.

A further object of the present invention is the provision of a balanced float valve to prevent accidental evacuation of air while submerged and to prevent suffocation of the wearer after surfacing.

These and other objects are achieved in a preferred embodiment of the invention by providing a swimming mask covering the wearer's eyes, nose and mouth as is conventional but adding the feature of a separate mouth-piece positioned within the mask in communication directly only with an exhaust snorkel tube, there being a separate inlet snorkel tube directly in communication with the interior of the mask so that, when the wearer inhales air through his nose, fresh air will be drawn through the inlet snorkel tube into the wearer's breathing system, and when the wearer exhales air, none of the air exhaled will be permitted to exhaust into the interior of the mask but will be vented directly through the exhaust snorkel tube to the atmosphere. In this manner no residual air will be built up within the mask and no moist air from the user's breath can cause condensation to form on the inside of the face plate of the mask. The free ends of both tubes are closed by a balanced butterfly float valve which will effectively close the tubes upon submerging thereof and which cannot be opened underwater by increased pressure within the mask or from the user's lungs, and yet will be easily moved to open position upon elevation of the float above the surface of the water.

Other objects, features and advantages of the invention will be apparent in the following detailed description of illustrative embodiments to be read in conjunction with the accompanying drawings, wherein:

Fig. 1 is a perspective view of a swimmer employing a mask embodying the present invention, but with means of detachably securing the mask to the wearer being omitted in this and all following views of the drawings.

Fig. 2 is a side elevation view of the mask and snorkel arrangement, a portion thereof being broken away to better disclose the internal construction thereof.

Fig. 3 is a sectional view taken along line 3—3 of Fig. 2, but with the views being inverted and conventional portions being shown in perspective.

Fig. 4 is a fragmentary view of the mask of Fig. 2 taken in the direction of the arrows 4—4 on Fig. 2.

Fig. 5 is a sectional view taken along lines 5—5 of Figs. 3 and 4.

Fig. 6 is a side view of the top of the snorkel tubes and of the float valve shown in Fig. 2, portions thereof being broken away to disclose the internal construction.

Fig. 7 is a front view of another embodiment of the present invention.

Fig. 8 is a sectional view taken along line 8—8 of Fig. 7.

Fig. 9 is a sectional view taken along line 9—9 of Fig. 8.

Referring now to Figs. 1 through 6, which illustrate a preferred embodiment of the present invention, it will be seen that the face mask 10, shown in conventional form, includes a body 11 having a front aperture, with the margins of the latter being in the form of a frame 12, and extending rearwardly from said frame a generally cup-shaped face portion having a bottom wall 13, side walls 14 and 15, and a top wall 16. The body 11 is preferably made of a natural or synthetic rubber or other elastomeric material to enable the close fitting thereof to the face and head of the wearer. By means not shown,

e.g. straps and the like, such mask is detachably secured to the wearer's head. A transparent face plate 17 covers the aperture surrounded by frame 12 and is mounted within said frame in a hermetic and watertight sealing relationship thereto. Secured to the left side wall 15 of the body 11, as by a loop 18, is a double snorkel tube consisting of an inlet tube 19 and an exhaust tube 20, which tubes extend upwardly from the mask body 11 and are U-shaped in their terminal portions in conventional fashion. The tubes 19 and 20 may be made of a single or double extrusion as illustrated or may alternately be separate tubes fixed together, concentric tubes, or separate tubes which are not affixed to each other along their length.

To the upper terminal portions of the tubes 19 and 20 there is affixed a funnel-shaped fitting 21 in which there is pivotally mounted, as by a pin 22, a butterfly valve 23. The valve 23 is generally elliptical in shape and is pivoted about its shorter transverse axis so as to be symmetrical about its pivoting axis. The opposite longitudinal side faces 24 and 25 of the valve 23 have parallel bevels, so that, as said valve is rotated to a closed position (Fig. 6) the abutting side walls of fitting 21 act as a valve seat for beveled side faces 24 and 25 of the valve.

Fixedly secured to valve 23 is a float arm 26 which bears, at its free end, a float 27 so that, when float 27 hangs freely, as shown in broken lines on Fig. 6, the valve 23 is open, but when the valve is submerged and float 27 is buoyantly raised, the valve 23 is closed. The lower end of inlet tube 19 is in communication with the interior of the mask through a port 28 in side wall 15. Exhaust tube 20 extends below inlet tube 19 and is connected, by a coupling tube 29 extending through bottom wall 13, to a mouthpiece 30. The mouthpiece 30 consists of a broad flange portion 31 centrally apertured to permit communication with coupling 29. The flange 31 is preferably of an elastic material and is provided with inwardly extending integral lug portions 32 which may be gripped by the wearer's teeth, so that flange portion 31 is then positioned between the inside of the wearer's lips and the wearer's teeth and gums.

Mounted in bottom wall 13 in front of mouthpiece 30 is a diaphragm check valve 33 which opens only outwardly from the interior of the mask and is intended to pass seepage water or other fluids which accumulate within the mask into coupling tube 29 for exhaust as herein-after described. The check valve 33 consists of an elastic disc having a marginal portion which slants upwards toward bottom wall 13, and being secured by means of a rivet 34 through bottom wall 13. Apertures 35 are formed in wall 13 and are in communication with the inner face of valve disc 33.

In operation the mask is donned in conventional fashion, the user positioning mouthpiece 30 in his mouth in the manner above described. As the user swims along the surface of the water as shown in Fig. 1, or just below it, maintaining float 27 above the level of the water, he inhales through his nose thus drawing fresh air into the mask through inlet tube 19. When the wearer exhales he exhales through his mouth and such air is evacuated to the atmosphere through exhaust tube 20. Since the user's breath is not evacuated into the mask no moisture from it may be condensed upon the inside surface of face plate 17 or upon the surface of any eye glasses which the user may be wearing. Should seepage water, spittle or other liquids collect in the mask they will drain through check valve 33 into coupling tube 29, and the wearer may easily exhaust them from the mask-snorkel system by merely exhaling vigorously thus blowing them through exhaust tube 20 into the atmosphere.

Also, since intake always consists of fresh air and the user's breath is exhausted directly to the atmosphere there is no build-up of residual air in the system. It should be observed that if no means to dispose of seepage and the like are incorporated the present system of snorkel

operation would involve no valves at all for controlling the intake and exhaust through tubes 19 and 20.

As the wearer submerges, float 27 is caused to come in contact with the surface of the water and butterfly float valve 23 is closed thus preventing the entry of water into the system. As the wearer descends he may breathe some air into the mask in order to equalize the pressure within the mask with the outside water pressure in order to avoid collapse of the mask upon his face and eyes. He may do this without fear that the float valve 23 will open as is the case with other float valves because the present valve is a balanced valve, i.e. it is pivoted so as to present the same area on either side of its axis of rotation so that no matter what the pressure within the tube the valve will not open. Also, when the wearer surfaces, even though he may have caused a partial vacuum within the snorkel tube by inhaling some of the air, the float 27 upon surfacing will easily rotate valve 23 since the higher atmospheric pressure on the outside of the float will be distributed evenly about the axis of rotation of the valve.

A second embodiment of the invention is illustrated in Figs. 7-9 where mask 36 covers only the eyes and nose and not the mouth, and consists of a face plate 37 set in a frame 38 defining the margin of an aperture in the body 39 of the mask which includes top, bottom and side walls 40, 41, 42 and 43, respectively. Snorkel inlet tube 19' and exhaust tube 20' are the same as snorkel tubes 19 and 20 and may bear the same type of float valve means as illustrated in the previous embodiment. The tubes 19' and 20' may be secured to side wall 43 by an integral bracket portion 44, inlet tube 19' communicating through bracket portion 44 directly to the interior of mask 36 through a port 45 in side wall 43 thereof (Fig. 7). Bracket portion 44 may have a passage 46 extending therethrough, with the exhaust tube 20' connected to the upper end of passage 46 and a coupling tube 47 being connected to the lower end of passage 46 and terminating in mouthpiece 30' of the same construction as mouthpiece 30. A drainage tube 48 may extend, at its upper end, into mask 36 and communicate at its bottom portion with a valve case 49 which is interposed in coupling tube 47 and has apertures 50 formed in a wall of the valve case 49 to permit communication between the interior of the valve case and the section of tube 47 extending from the valve case to mouthpiece 30'. Mounted in the valve case 49 is a diaphragm check valve 33' which normally closes the apertures 50 and which is adapted to open only in the direction away from the mouthpiece. Thus, any moisture accumulating in the mask 36 can drain through tube 48 into tube 47 to be driven through the latter out of exhaust tube 20' along with any moisture in the wearer's mouth upon forceable exhalation through the mouthpiece.

This embodiment is used as the first embodiment is used, the wearer inhaling through his nose and breathing out through his mouth. The same advantages are obtained with the second embodiment.

It should be observed that without departing from the spirit of the invention, many of the portions of the systems illustrated may be made integral or may be formed as separate parts and connected by various fastening means. Similarly, while the snorkel tubes are shown to be closed at their upper end when immersed by a novel float valve of exceptional performance, nevertheless other float valves may be used.

Although the present invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous variations may be employed without transcending the scope of the invention as hereinafter claimed.

What is claimed is:

1. In combination with a swimming mask adapted to cover at least the wearer's eyes and nose and having a transparent portion for viewing therethrough, breathing apparatus comprising inlet and exhaust snorkel tubes af-

5

fixed to said mask, means connected to the free ends of said tubes to close said free ends upon submersion thereof, the other end of said inlet tube communicating with the interior of said mask, and a mouth piece section positioned at the other end of said exhaust tube for direct engagement by the wearer's mouth so that the wearer's exhalation passes directly into said exhaust tube and is excluded from said mask to avoid the rebreathing thereof as well as to prevent fogging of said transparent portion of the mask and the accumulation of moisture in the latter by condensation of the exhalation.

2. The combination as in claim 1, wherein said means to close the free ends of said snorkel tubes comprises float valve means.

3. The combination as in claim 1, further comprising a check valve affixed to said mask, said check valve being in communication at its input side with said mask and at its output side with said exhaust tube, said check valve opening only in the direction from said input side to said output side to permit any moisture in the mask to drain into said exhaust tube.

4. The combination as in claim 3, said check valve being positioned so as to empty directly into said exhaust tube.

5. In combination with a swimming mask adapted to cover at least the wearer's eyes, nose and mouth and having a transparent portion for viewing therethrough, breathing apparatus comprising inlet and exhaust snorkel tubes affixed to said mask, means connected to the free ends of said tubes to close said free ends upon submersion thereof, the other end of said inlet tube communicating with the interior of said mask, the other end of said exhaust tube entering said mask, and a mouth piece section positioned at said other end of said exhaust tube for direct engagement by the wearer's mouth so that the wearer's exhalation passes directly into said exhaust tube and is excluded from said mask to avoid the rebreathing thereof as well as to prevent fogging of said transparent portion of the mask and the accumulation of moisture in the latter by condensation of the exhalation.

6. The combination as in claim 5, wherein said means to close the free ends of said snorkel tubes comprises float valve means.

7. The combination as in claim 6, further comprising a check valve affixed to said mask, said valve being in communication at its input side with said mask and at its output side with said exhaust tube, said check valve opening only in the direction from said input side to said output side to permit any moisture in the mask to drain into said exhaust tube.

8. The combination as in claim 7, said check valve being positioned so as to empty directly into said exhaust tube.

6

9. In combination with a swimming mask adapted to cover the wearer's eyes and nose and having a transparent portion for viewing therethrough, breathing apparatus comprising inlet and exhaust snorkel tubes affixed to said mask, means connected to the free ends of said tubes to close said free ends upon submersion thereof, the other end of said inlet tube communicating with the interior of said mask, and a mouth piece section positioned at the other end of said exhaust tube for direct engagement by the wearer's mouth so that the wearer's exhalation passes directly into said exhaust tube and is excluded from said mask to avoid the rebreathing thereof as well as to prevent fogging of said transparent portion of the mask and the accumulation of moisture in the latter by condensation of the exhalation, a drainage tube depending from said mask and in communication at its upper end therewith, a check valve mounted in said exhaust tube between said mouthpiece section and the point where said drainage tube communicates with said exhaust tube, said check valve opening only in the direction away from said mouthpiece section.

10. The combination as in claim 9, wherein said means to close the free ends of the snorkel tubes includes a butterfly valve rotatably mounted about a transverse axis thereof proximate the free ends of said tubes so that the valve is substantially balanced about said axis and is free to turn even when substantially different pressures act upon the opposed faces thereof, and float means to close said valve.

11. In combination with a snorkel breathing tube having a terminal section for communication with the atmosphere, a balanced butterfly valve of elliptical configuration mounted in said terminal section to turn relative to the latter about the transverse minor axis of the valve, said section having a circular cross-section in the region thereof where said valve is mounted, said valve having opposed end edge walls at the opposite sides of said transverse axis which are bevelled in opposed directions so as to lie parallel to one another, thereby to permit the valve to seat against the interior surface of said section, a float arm connected at one end to said valve, and a float at the other end of said arm, the connection between said arm and valve being such that said valve is open when the open end of the tube is above water and the valve is closed when said end of the tube is submerged.

References Cited in the file of this patent

UNITED STATES PATENTS

1,824,512	Szamer	Sept. 22, 1931
2,814,292	Girden	Nov. 26, 1957

FOREIGN PATENTS

457,663	Great Britain	Dec. 3, 1936
422,610	Italy	July 20, 1947