Dec. 19, 1950 N. BEDINI ET AL 2,534,568

SUBMARINE MASK

Filed Aug. 27, 1947

FIG. 1

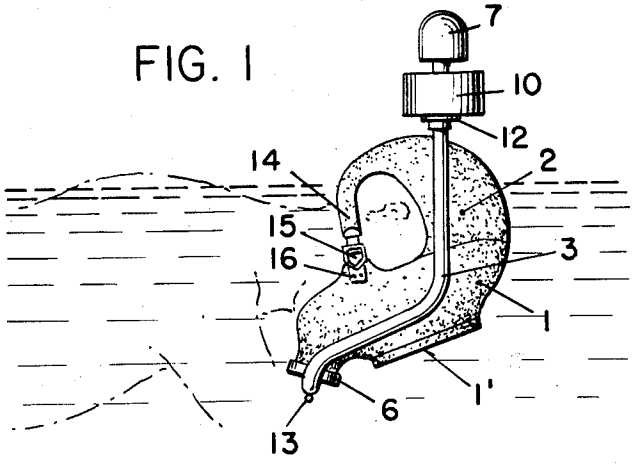


FIG. 5

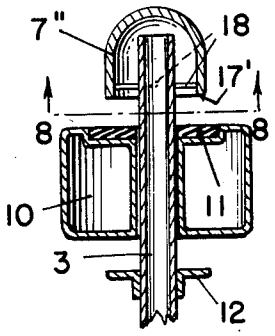


FIG. 2

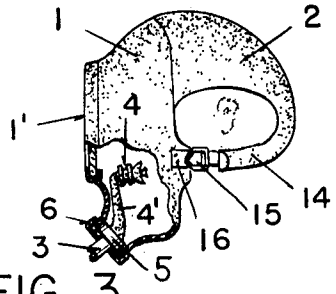


FIG. 7

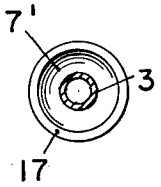


FIG. 8

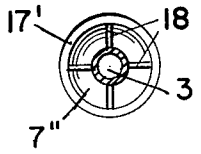


FIG. 3

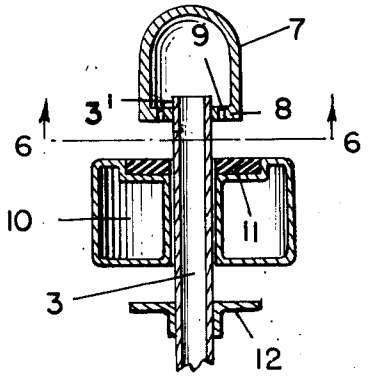


FIG. 4

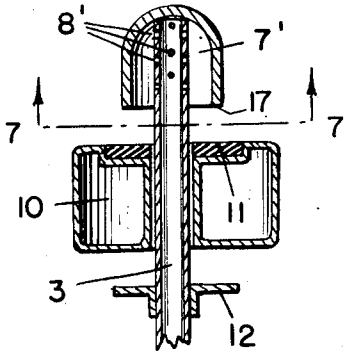
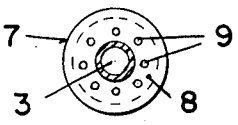


FIG. 6



Inventors

NERINO BEDINI,
ROSCILD VESIGNA,
PASQUALE GIULIANI,

By Stone, Boyden & Mack, Attorneys.

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SUBMARINE MASK

Nerino Bedini, Roscild Vesigna, and Pasquale Giuliani, Milan, Italy, assignors to Pirelli Società Per Azioni, Milan, Italy

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6 Claims. (Cl. 128—145)

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This invention relates to a submarine mask provided with a breathing tube which enables its wearer to breathe air from the atmosphere above the water when submerged. More particularly, the invention relates to a device of this type in which a float actuates a mechanism to close the breathing tube when the upper end of the tube is submerged. Previous devices of this type employed a number of metal operating parts, which were subject to the corrosive action of salt water and soon became inoperative. In the present invention these parts have been eliminated.

Heretofore, in certain types of diving, particularly in shallow water where only the diver's head needs to be protected, masks have been provided which protect the wearer's face, particularly the eyes, so that he can observe objects more readily when submerged. The time of submersion, however, is limited to the length of time the diver can hold his breath, and he must repeatedly return to the surface to refill his lungs with fresh air. The apparatus of this invention, which provides an upwardly extending breathing tube attached to the mask, allows the wearer to refill his lungs with his head under water; only the upper end of the breathing tube coming above the surface. Thus the diver is not subjected to the necessity of readjusting his vision from sub-surface to above-surface conditions, and vice versa, every time he takes a breath. He can continuously observe a submerged object for a much longer period of time than if he had to take his head out of water to breathe.

This improved equipment is provided with a self-acting mechanism, operated by a float, to prevent the entrance of water into the open end of the breathing tube when it is submerged, while allowing the passage of air into it when it is above the surface of the water. Thus a diver can work long periods of time beneath the surface, holding his breath when the end of the breathing tube is submerged, and returning to a point just below the surface of the water where the open end of the tube will project into the air allowing him to breathe while he himself remains submerged.

In previous devices of this general character, an amount of water spray frequently entered the breathing tube when its open end projected only slightly above the surface of the water. However, in this invention the end of the breathing tube is protected by a spray shield which acts as a baffle to keep the water spray out of the tube until, just before it is submerged, the self-acting mechanism closes the tube entirely.

Now referring to the drawing:

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Figure 1 is a view, from the right side, of the device as worn by a diver in a position to breathe while submerged;

Figure 2 is a view, from the left side, of the device as worn, but with the breathing tube detached. The lower portion of the mask is cut away to show the arrangement of the mouthpiece;

Figure 3 is a cross-sectional view of one form of spray shield and self-acting valve;

Figure 4 is a cross-sectional view of another form of spray shield and self-acting valve;

Figure 5 is a cross-sectional view of still another form of spray shield and self-acting valve;

Figure 6 is a cross-section taken on the line 6—6 of Figure 3;

Figure 7 is a cross-section taken on the line 7—7 of Figure 4; and

Figure 8 is a cross-section taken on the line 8—8 of Figure 5.

Referring now to the drawing in detail, the front portion of the mask is shown at 1, and the rear portion at 2. These two portions may be formed of a single piece of suitable material, such as rubber. Straps 14, integrally formed with the rear portion, are provided with buckles 15 which engage the hooks 16, attached to the front portion, to hold the mask in place.

The front portion 1 is provided with a removable eyepiece 1', made of any suitable transparent material such as glass, and in its lower portion is provided with an opening to allow the insertion of a breathing tube 3. At the point where the breathing tube passes through the mask it is provided with a radially extending collar 5. The opening in the mask is so shaped as to fit the collar 5 snugly, while the removable clamp 6 fits over the mask at this point to make an air-tight connection between the collar 5 and the front portion 1. On the inside of the mask there is a short length of flexible tubing 4' connected to the breathing tube 3. A mouthpiece 4 is detachably secured to the flexible tubing 4'. The portion of the breathing tube 3 which extends outwardly and upwardly from the front portion of the mask may be formed of any suitable rigid material. For the sake of convenience a drainage valve 13 is provided at its lower end.

To prevent the entrance of water spray into the open end of the breathing tube 3 when it projects only slightly above the surface of the water there is provided a spray shield, one form of which is shown in Figures 3 and 6. In this modification the spray shield consists of an annular flange 8 attached to the outer surface of the breathing tube 3, just below its open end,

and a bell-shaped dome 7 which encloses the end of the breathing tube and is joined to the annular flange 8 at its outer edge. One or more vertically extending openings 9 in the flange 8 allow for the passage of air into the breathing tube. The portion of the breathing tube 3', which extends above the flange 8, forms a gutter which forces any water spray which may be blown through the openings 9 to drain back down again through these same openings without entering the breathing tube.

A float 10 is provided with a hole therethrough which enables it to be slidably positioned on the breathing tube 3, below the flange 8. A stop 12 is also provided on the tube 3 to limit downward movement of the float. Attached to the upper surface of the float and fitting closely around the tube 3 is a flat washer 11. This washer is made of any suitable material, such as rubber, and is shaped so that when the float is in its uppermost position the washer will press against the flange portion of the spray shield to effectively close the openings 9. Thus it will be seen that when the breathing tube 3 projects sufficiently far out of the water, the float 10 will be resting against the stop 12, and the wearer of the mask will be able to breathe through the tube. However, when he descends the buoyancy of the float 10 will cause it to slide up along the tube 3 until the washer 11 closes the openings 9, which will occur just before the spray shield is about to become submerged, and thus no water will enter the breathing tube. As long as the open end of the breathing tube is submerged the buoyancy of the float will effectively keep the tube closed. Due to the relative thickness of the float 10, the openings 9 will be closed while the flange 8 is still a short distance above water; this provides added protection against the entrance of water spray.

When the diver ascends the process is reversed. The openings 9 will remain closed until the flange 8 is a short distance above water, at which point the float will drop down along the tube 3 until it hits the stop 12. The diver will be able to breathe again as soon as the washer 11 on top of the float 10 falls away from the openings 9.

A modification of the spray shield is shown in Figures 4 and 7. The bell-shaped dome 7' is securely attached to the breathing tube 3 so as to seal off its open end. The dome extends downwardly and around the breathing tube to form the annular rim 17. Air is admitted to the breathing tube through the opening around the tube formed by the annular rim and thence through the holes 3' provided in the side of the tube above the rim 17. The washer 11 is actuated by the float 10 in the same manner as with the previously described form of spray shield, but in this case the washer forms a tight seal with the tube 3 and the annular rim 17 to prevent the entrance of water when the device is submerged.

Still another modification of spray shield is shown in Figures 5 and 8. In this case a bell-shaped dome 7'' is supported by a plurality of arms 18 attached to, and extending radially from the breathing tube 3. The dome 7'' encloses the open end of the breathing tube, but does not seal it off, and extends downwardly and around the tube to a rim 17'. This rim is annularly spaced from the tube and located below the open end of the breathing tube. The operation of the float 10 and washer 11 are the same as in the other modifications. When the spray shield is above water, air enters through

the opening around the tube 3 formed by the annular rim 17' and thence passes into the open end of the breathing tube 3. When the device is submerged the washer 11 forms a tight seal with the tube 3 and the rim 17' to prevent the entrance of water.

In all three modifications it should be noted that the washer attached to the top of the float, coacting with an opening in the lower portion of the spray shield forms an effective valve mechanism to prevent the entrance of water when the device is submerged, yet allows air to enter the breathing tube when projecting above the surface. Due to the relative thickness of the float the opening in the spray shield is effectively closed before it enters the water. In addition, the point at which air enters the spray shield is located below the point at which air enters the breathing tube. It will be clear, also, that in all three forms of the device illustrated, the bore of the breathing tube is unobstructed from the mouthpiece to its intake openings within the spray shield and it will also be clear that the interior of the spray shield is unobstructed from its intake end to the opening or openings leading into the breathing tube. Because of this construction, the movement of air through the spray shield and breathing tube is substantially direct and unhampered.

We claim:

1. A submarine breathing device comprising in combination, a helmet to enclose the head of an under water swimmer, a breathing tube having at one end within said helmet a mouth piece, said tube extending to the exterior of said helmet and slightly above the same, a float provided with a hole therethrough permitting it to be slidably positioned on said tube, a spray shield attached to that end of said tube exteriorly of said helmet, an opening provided in the lower portion of said shield to allow the passage of air into said tube, a washer mounted at the upper surface of said float and positioned so as to close the opening in said spray shield to prevent the passage of water when the device is submerged, said float having an effective vertical thickness substantially greater than the radial displacement of the outer margin of said opening with respect to said breathing tube, so that the buoyant force exerted by the float will make said washer effective before water can reach the interior of the spray shield.

2. A submarine breathing device comprising in combination, a helmet to enclose the head of an under water swimmer, a breathing tube having at one end within said helmet a mouthpiece, said tube extending to the exterior of said helmet and slightly above the same, a float provided with a hole therethrough permitting it to be slidably positioned on said tube, a spray shield attached to that end of said tube exteriorly of said helmet, an opening provided in the lower portion of said shield to allow the passage of air into said tube, said opening being lower than the point at which air enters said tube, a washer attached to said float and positioned so as to close the opening in said spray shield to prevent the passage of water when the device is submerged, said float having an effective vertical thickness substantially greater than the radial displacement of the outer margin of said opening with respect to said breathing tube, so that the buoyant force exerted by the float will make said washer effective before water can reach the interior of the spray shield.

3. A submarine breathing device comprising

in combination, a helmet to enclose the head of an under water swimmer, a breathing tube having at one end within said helmet a mouthpiece, said tube extending to the exterior of said helmet and slightly above the same, a spray shield comprising an annularly extending flange attached to that end of said tube exteriorly of said helmet near its open end and a dome attached to the outer edge of said flange which encloses the open end of said tube, an opening provided in said flange to permit the passage of air into the tube, a float provided with a hole therethrough permitting the float to be slidably positioned on said tube, a washer attached to said float coacting with said flange to close said opening when the device is submerged, said float having an effective vertical thickness substantially greater than the radial displacement of the outer margin of said opening with respect to said breathing tube, so that the buoyant force exerted by the float will make said washer effective before water can reach the interior of the spray shield.

4. A submarine breathing device comprising in combination, a helmet to enclose the head of an under water swimmer, a breathing tube having at one end within said helmet a mouthpiece, said tube extending to the exterior of said helmet and slightly above the same, a spray shield comprising an annularly extending flange attached to that end of said tube exteriorly of said helmet below its open end and a dome attached to the outer edge of said flange which encloses the open end of said tube, an opening provided in said flange to permit the passage of air into the tube, the portion of said tube extending above said flange providing a vent to return water spray through said opening, a float provided with a hole therethrough permitting the float to be slidably positioned on said tube, a washer attached to said float coacting with said flange to close said opening when the device is submerged, said float having an effective vertical thickness substantially greater than the radial displacement of the outer margin of said opening with respect to said breathing tube, so that the buoyant force exerted by the float will make said washer effective before water can reach the interior of the spray shield.

5. A submarine breathing device comprising in combination, a helmet to enclose the head of an under water swimmer, a breathing tube having at one end within said helmet a mouthpiece, said tube extending to the exterior of said helmet and slightly above the same, a float provided with

a hole therethrough permitting it to be slidably positioned on said tube, a spray shield attached to that end of said tube exteriorly of said helmet, said shield extending downwardly and around said tube to form an annular rim spaced from said tube and below the end of said tube, an opening in said tube above said annular rim to allow passage of air into said tube, and a washer attached to said float coacting with said annular rim and said tube to prevent the passage of water into said tube when the device is submerged, said float having an effective vertical thickness substantially greater than the diameter of said annular rim, so that the buoyant force exerted by the float will make said washer effective before water can reach the interior of the spray shield.

6. A submarine breathing device comprising in combination, a helmet to enclose the head of an under water swimmer, a breathing tube having at one end within said helmet a mouthpiece, said tube extending to the exterior of said helmet and slightly above the same, a dome-shaped spray shield having an annular rim, which spray shield is attached to that end of said tube exteriorly of said helmet, means to position said shield so that it encloses the open end of said tube with said annular rim spaced from said tube and below the open end of said tube, a float provided with a hole therethrough permitting it to be slidably positioned on the tube, and a washer attached to said float coacting with said annular rim and said tube to prevent the passage of water when the device is submerged, said float having an effective vertical thickness substantially greater than the diameter of said annular rim, so that the buoyant force exerted by the float will make said washer effective before water can reach the interior of the spray shield.

NERINO BEDINI.
ROSCILD VESIGNA.
PASQUALE GUILIANI.

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