March 10, 1942. A. BARNA 2,275,491

UNDER WATER TORCH

Filed Oct. 30, 1939 3 Sheets-Sheet 1

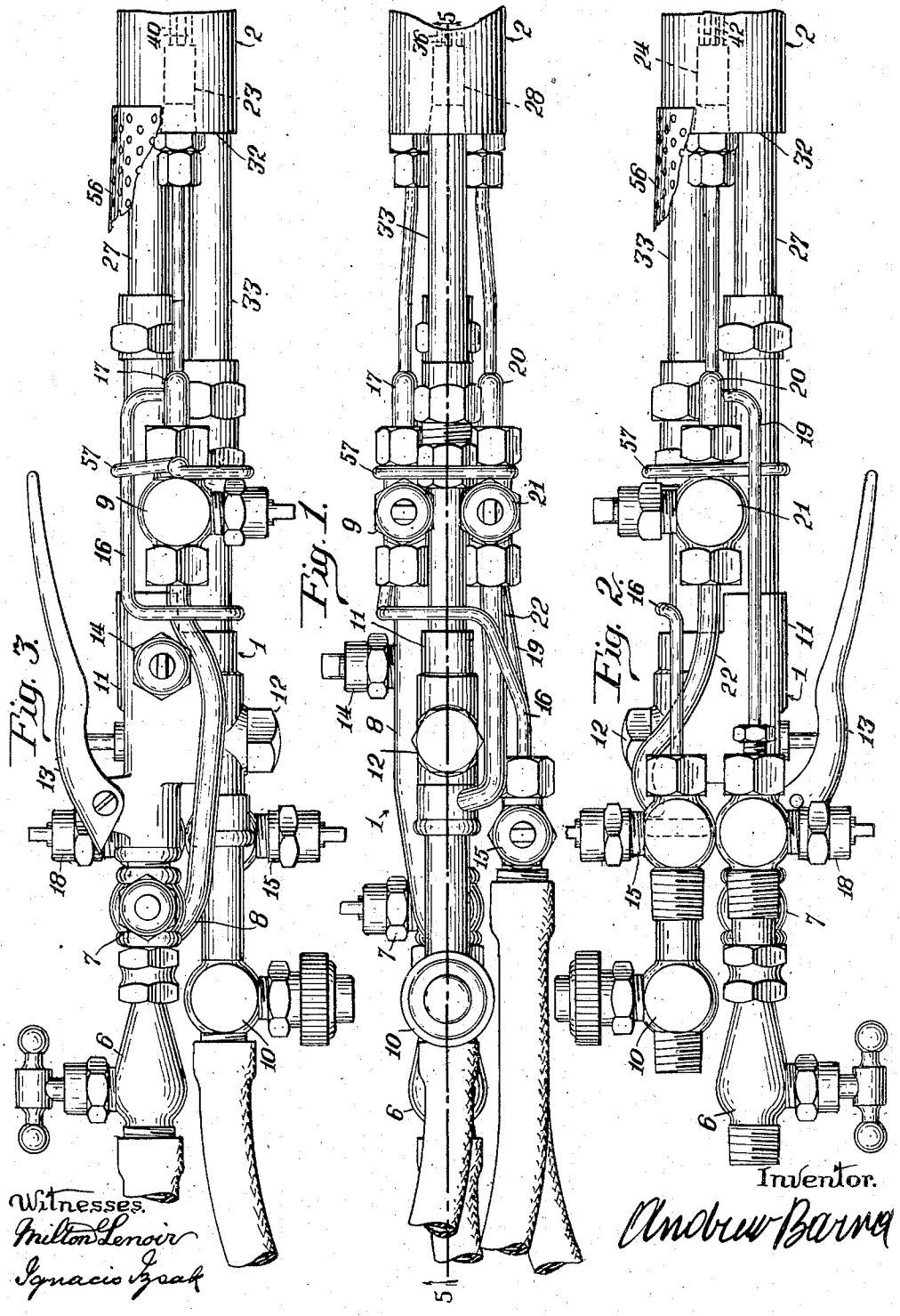


Fig. 3.

Fig. 1.

Fig. 2.

Witnesses.
Milton Lenoir
Ignacio Izaak

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UNDER WATER TORCH

Filed Oct. 30, 1939 3 Sheets-Sheet 2

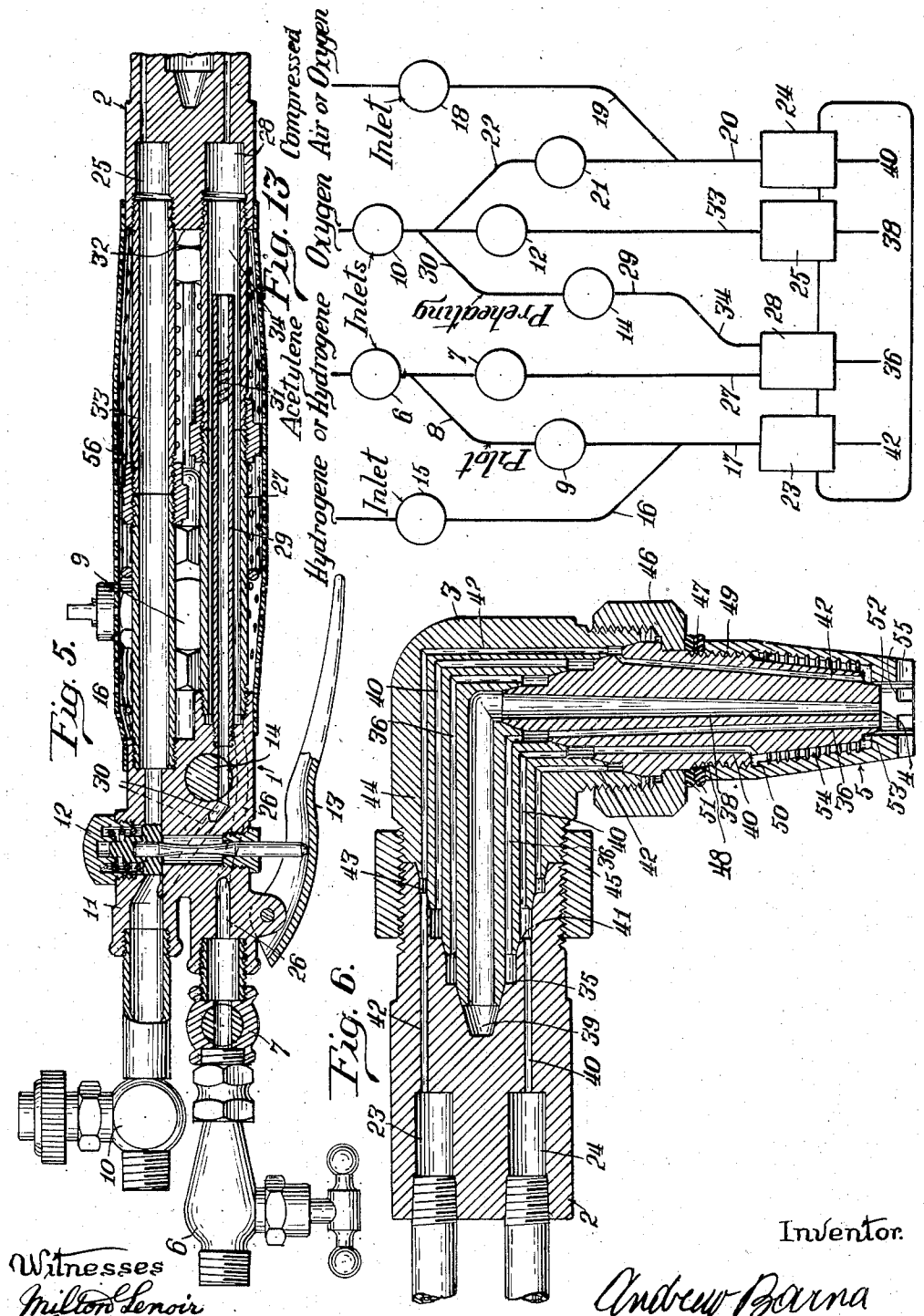


Fig. 13

Fig. 5.

Fig. 6.

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UNDER WATER TORCH

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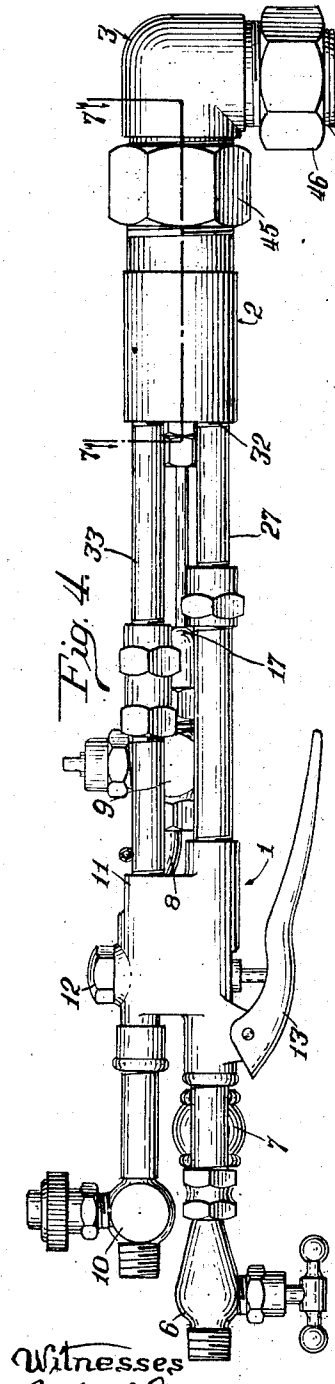


Fig. 4.

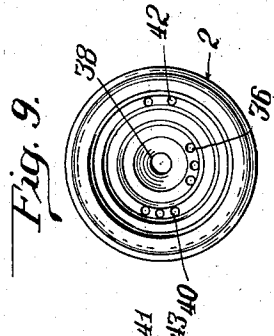


Fig. 9.

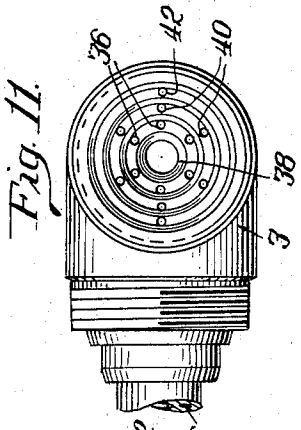


Fig. 11.

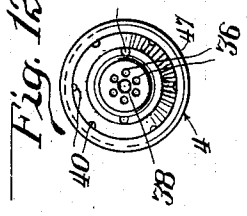


Fig. 12.

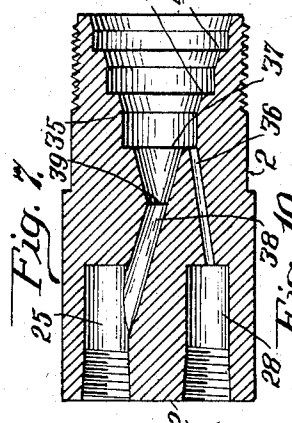


Fig. 7.

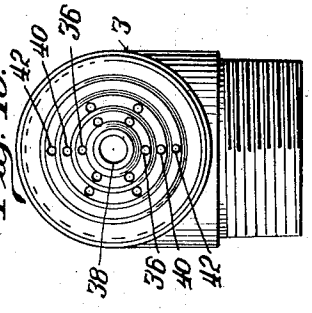


Fig. 10.

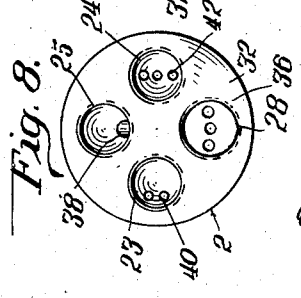


Fig. 8.

Witnesses
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Patented Mar. 10, 1942

REISSUED

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2,275,491

UNITED STATES PATENT OFFICE

2,275,491

UNDERWATER TORCH

Andrew Barna, Chicago, Ill.

Application October 30, 1939, Serial No. 301,893

3 Claims. (Cl. 158—27.4)

This invention relates to a novel and improved under water torch, which permits the torch to relight automatically under water.

The main object of the invention is to remove the chance of having the torch extinguished under the water and force the diver to come to the surface for re-igniting same.

Another object of the invention is to permit the use of more than one type of gas at the same time.

A further object of the invention is to permit the device to be used either as a straight torch or to be changed by the attachment of a goose-neck to a torch with any desired angle.

A still further object of the invention is to permit a reduction in the numbers of lines leading from the surface, to provide more free movement to the diver.

A further object of the invention is to permit the use of a branchless torch nozzle-shield.

A still further object of the invention is to prevent the mixing chamber from overheating in case of back flash.

A still further object of the invention is to use the device on the surface or below the surface.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists in certain novel features of construction and arrangements of parts hereinafter more fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, quantity, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

I have illustrated in the accompanying drawings a preferred embodiment of the invention, from an inspection of which, when considered in connection with the following description, the invention, its mode of construction and assembly, and many of its advantages, shall be readily understood and appreciated.

Referring to the drawings in which similar characters of reference are employed to indicate corresponding parts throughout the several figures of the drawings:

Fig. 1 is an assembled plan view, with the torch tip end broken away.

Fig. 2 is a side elevation of the right side of Fig. 1.

Fig. 3 is an inverted side elevation of the left side of Fig. 1.

Fig. 4 is a side elevation like Fig. 2 with the valves and the by-passes on the right side being omitted.

Fig. 5 is a sectional view on line 5—5 of Fig. 1.

Fig. 6 is a continuation of Fig. 5 showing the straight head, the goose-neck and the torch tip end with the torch tip shield in section.

Fig. 7 is a sectional view of the straight head on line 7—7 of Fig. 4.

Fig. 8 is the near end elevation of the straight head.

Fig. 9 is the far end elevation of the straight head.

Fig. 10 is the near end elevation of the goose-neck.

Fig. 11 is an inverted plan view of the goose-neck.

Fig. 12 is an inverted plan view of the tip.

Fig. 13 is a diagram of the passages, by-passes, valves and receptacles.

The said under water torch is comprised essentially of a main body 1, a straight head 2, a goose-neck 3, a torch tip 4, and a torch tip shield 5.

The inlet valve 6, at its outer end is attached to the acetylene or hydrogen line, and at its inner end joins the valve 7, which controls the said gases. The valve 7, connects with the passage 26, and the tube 27, (Fig. 5) which is secured in the body portion 11, and enters the receptacle 28, of the straight head 2.

Between valves 6, and 7, is the by-pass 8, leading to valve 9, which regulates the flow of gases to the pilot light, and leads to the receptacle 23, of the straight head 2.

The inlet valve 10, at its outer end is attached to the oxygen line and at its inner end connects to the body portion 11, housing the high pressure valve 12, which controls the flow of the oxygen during the cutting process. The high pressure lever 13, operates the said high pressure valve 12.

The inner end of the valve 10, is communicating through the high pressure valve 12 (see Fig. 5), with the tube 33, and the receptacle 25, of the straight head 2.

The valve 14, controls the oxygen to the preheating flame.

The inlet valve 15, at its outer end connects to the hydrogen line, when the inlet valve 6, is used for acetylene. At its inner end it connects to the by-pass 16, which enters the outlet 17.

The outlet 17, is connected to the inner end of the valve 9, and leads to the receptacle 23, of the straight head 2.

The inlet valve 18, is connected at its outer end either with the oxygen or compressed air line. At its inner end, it is connected to by-pass 19, which enters the outlet 20.

The outlet 20, is secured to the inner end of the valve 21, and leads to the receptacle 24.

The by-pass 22, enters the body portion 11, between the valves 10, and 12, and is leading to the outer end of the valve 21, which at its inner end is connected to the receptacle 24, of the straight head 2.

The tube 29, is within the tube 27, and is secured in the body portion 11. The by-pass 30, leads from the inner end of the valve 10, to the control valve 14, and leads to the tube 29, with the mixer 31, suitably placed at its interior adjacent to its outlet, insuring a whirling motion to the gaseous mixture in the mixing chamber 34, which communicates with the receptacle 28, of the straight head 2.

The straight head 2, consists of a cylindrical body. At its near end 32, it is provided with the receptacles 23, 24, 25, and 28, to secure the outlets 17, 20, and the tubes 33, 27, respectively.

The suitable interior portion 35, of the straight head 2, is provided with a series of passages.

The passages 36, leading from the bottom of the receptacle 28, to the level 37, are conducting the mixed oxygen and gas. The passage 38, leading from the bottom of the receptacle 25, to the level 39, is conducting the oxygen for cutting purposes. The passages 40, leading from the bottom of the receptacle 24, to the level 41, are conducting the oxygen or compressed air. The passages 42, leading from the bottom of the receptacle 23, to the level 43, are conducting the acetylene and hydrogen for the pilot light. The use of hydrogen, or other suitable gases, prevents corrosion and accumulation of carbon at the opening of the pilot light, which would set in when acetylene is used.

The suitable interior portion 44, of the rotatable goose-neck 3, is provided with the continuation of the passages 36, 38, 40, and 42.

The adapter 45, is provided with R. H. and L. H. threads, permitting the goose-neck 3, to rotate freely around the straight head 2, by means of the main body 1, being adapted to take any desired position for the convenience of the diver in using the high pressure lever 13.

The adapter 46, secures the torch tip 4, to the goose-neck 3.

The suitable torch tip 4, is provided with four levels, corresponding to the levels of 39, 37, 41, and 43, of the straight head 2, and with the continuation of the passages 36, 38, 40, and 42.

The torch tip 4, is provided with an externally threaded cylindrical portion 47, which retains the adjustable shield 5, at its set position.

The suitable interior 48, of the shield 5, is provided with a cylindrical portion 49, and an offset 50, at its lower end, by means of which it can rest adjustably on the externally threaded portion 47, of the torch tip 4.

The washers 51, are securely held down by the cylindrical portion 49, of the shield 5.

The suitable interior cylindrical portion 52, of the shield 5, has an offset 53. The conical portion 54, between the offsets 50, and 53, is provided with fine threads 55, to induce a whirling motion to the oxygen or compressed air, before passing through the said cylindrical portion 52, and reaching the work. The knurled indentations 55, permit the gases generated during the cutting process to escape.

The perforated handle 56, prevents the mixing chamber 34, from overheating in case of back flash.

The loop 57, holds securely together the various outlets and tubes.

The operation of the torch

When using only one type of gas for "two line method" illustration, acetylene gas and oxygen, the operation is as follows:

Provide an oxygen and acetylene tank. Connect the regulators to the said two tanks. Connect the hoses leading from the said regulators to the acetylene valve 6, and the oxygen valve 10, making the proper adjustment on the regulators as to the work concerned.

First of all, the acetylene valve is to be opened, which in this case is the valve 6. The gas will pass through the adjustment valve 7, the tube 27, the receptacle 28, and the passages 36, leading to the torch tip.

Next the oxygen valve 10, is to be opened. Then the valve 14. The gas is conducted by the by-pass 30, into the inner tube 29, the mixing chamber 34, the receptacle 28, and the passages 36, to the top of the torch tip.

The valve 7, and 14, are to be used to give the proper mixture for the pre-heating flame.

To make use of the pilot light with the said acetylene gas, the valve 9, is to be used for the adjustment of the pilot light. The by-pass 8, for the pilot light starts between the valve 6, 7, and conducts the gas to the valve 9, the receptacle 23, and the passage 42, just below to the top of the torch tip 4, where it impinges against the offset 53, of the tip shield 5, then by mixing with oxygen passes through the interior cylindrical top portion 52, of the shield 5.

The by-pass 22, which starts between the valves 10, and 12, conducts the gas to the valve 21, the receptacle 24, the passages 40, where it impinges against the offset 50, of the lower interior cylindrical portion of the shield 5, then passes between and around the fine threaded portion 54, and around the top of the torch tip 4, where it impinges against the offset 53, before passing through the upper interior cylindrical portion 52, of the shield 5.

"Three line method"

When using it with acetylene in combination with hydrogen as a pilot light, the above described method has to be repeated, with the exception of closing the valve 9.

Provide a hydrogen tank. Connect the regulators to the said tank. Connect the hose to the valve 15, which conducts the gas into the by-pass 16, the outlet 17, the receptacle 23, the passage 42, the offset 53, of the shield 5, passing through the interior cylindrical portion 52. This gas in this case forms the automatic lighter.

"Four line method"

By adding a fourth line, the "three line method" is to be repeated, with the exception of closing the valve 21.

Provide an oxygen or compressed air tank. Connect the regulators to the said tank. Connect the hose to the valve 18, which conducts the gas into the by-pass 19, the outlet 20, the receptacle 24, the passages 40, where it impinges against the offset 50, of the lower interior cylindrical portion 49, of the shield 5, and passes between and around the fine threaded portion 54, of the torch tip 4, impinging on the offset 53, be-

fore passing through the interior cylindrical portion 52, of the shield 5.

When using hydrogen only, repeat the "two line method," substituting hydrogen for the acetylene.

I claim:

1. An underwater torch, comprising a water cooled main body formed as a handle, a straight head on the outlet end thereof, a rotatably adjustable goose neck attached to said head, a torch tip on said goose neck, a torch-tip shield mounted on said tip, four inlet valves on the inlet end of said body, which are adapted for connection to hoses to supply hydrogen, acetylene, oxygen and compressed air, respectively, to said torch; conduits in said body to provide gas passages from said valves to said head, said head being chambered to provide gas receptacles therein; the hydrogen and compressed air valves being adapted to communicate with corresponding receptacles in said head by means of corresponding ones of said conduits; said acetylene inlet valve being adapted to communicate by means of one of said conduits with a corresponding one of said receptacles, a control valve in said acetylene conduit, said acetylene inlet valve also being provided with a by-pass conduit in communication with said hydrogen receptacle, a control valve in said last named conduit, thereby providing an alternative pilot flame gas supply means; a conduit providing communication between said oxygen inlet valve and a corresponding one of said receptacles, a control valve in said conduit, two by-pass conduits providing passage for oxygen from said inlet valve respectively to said acetylene receptacle to provide a preheating gas mixture and to said compressed air receptacle; a control valve in each of said last named by-pass conduits; passages through said head and through said tip adapted to communicate respectively with said four gas receptacles, the passages being so disposed in said tip as to provide a central oxygen discharge passage, a series of preheating gas discharge passages surrounding said oxygen passage, pilot gas discharge passages arranged around said preheating gas passages, and compressed air passages directing air from said air receptacle to the interior of said shield to displace water from around the jets from said tip.

2. An underwater torch, comprising a water cooled main body formed as a handle, a straight head on the outlet end thereof, a rotatably adjustable goose neck attached to said head, a torch tip on said goose neck, a torch-tip shield mounted on said tip, four inlet valves on the inlet end of said body, which are adapted for connection to hoses to supply hydrogen, acetylene, oxygen and compressed air, respectively, to said torch; conduits in said body to provide gas passages from said valves to said head, said head being chambered to provide gas receptacles therein; the hydrogen and compressed air valves being adapted to communicate with corresponding receptacles in said head by means of corresponding ones of said conduits; said acetylene inlet valve being adapted to communicate by means of one of said conduits with a corresponding one of said receptacles, a control valve in said acetylene conduit, said acetylene inlet valve also being provided with a by-pass conduit in communication with said hydrogen receptacle, a control valve in said last named conduit, thereby providing an alternative pilot flame gas supply means; a conduit providing communication between said oxygen inlet valve and a corresponding one of said receptacles, a control valve in said conduit, two by-pass conduits providing passage for oxygen from said inlet valve respectively to said acetylene receptacle to provide a preheating gas mixture and to said compressed air receptacle; a control valve in each of said last named by-pass conduits; passages through said head and through said tip adapted to communicate respectively with said four gas receptacles; the passages leading through the head to the joint of said head with the torch-tip are so disposed that each passage leads into a separate ring-like receptacle; all of said four receptacles being concentrically disposed along the conical contacting surfaces of said head and said tip and being formed by recesses in said surfaces; from said four ring-like receptacles said passages enter the torch-tip and are so disposed in said tip as to provide a central oxygen discharge passage, a series of preheating gas discharge passages surrounding said oxygen passage; pilot gas discharge passages arranged around preheating gas passages; compressed air passages directing air from said air receptacle to the interior of said shield to displace water from around the jets from the said tip.

3. An underwater torch, comprising a water cooled main body formed as a handle, a straight head on the outlet end thereof, a rotatably adjustable goose neck attached to said head, a torch tip on said goose neck, a torch-tip shield mounted on said tip, four inlet valves on the inlet end of said body, which are adapted for connection to hoses to supply hydrogen, acetylene, oxygen and compressed air, respectively, to said torch; conduits in said body to provide gas passages from said valves to said head, said head being chambered to provide gas receptacles therein; the hydrogen and compressed air valves being adapted to communicate with corresponding receptacles in said head by means of corresponding ones of said conduits; said acetylene inlet valve being adapted to communicate by means of one of said conduits with a corresponding one of said receptacles, a control valve in said acetylene conduit, said acetylene inlet valve also being provided with a by-pass conduit in communication with said hydrogen receptacle, a control valve in said last named conduit, thereby providing an alternative pilot flame gas supply means; a conduit providing communication between said oxygen inlet valve and a corresponding one of said receptacles, a control valve in said conduit, two by-pass conduits providing passage for oxygen from said inlet valve respectively to said acetylene receptacle to provide a preheating gas mixture and to said compressed air receptacle; a control valve in each of said last named by-pass conduits; passages through said head and through said tip adapted to communicate respectively with said four gas receptacles, the passages being so disposed in said tip as to provide a central oxygen discharge passage, a series of preheating gas discharge passages surrounding said oxygen passage, pilot gas discharge passages arranged around said preheating gas passages, and compressed air passages directing air from said air receptacle to the interior of said shield, the interior surface of which has fine threads extending along its conical portion to conduct the gas around the torch-tip for displacing water from around the jets from said tip.

ANDREW BARNA.