United States Patent

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[15] **3,684,187**

[45] **Aug. 15, 1972**

[54] **MACHINE MOUNTED CUTTING TORCH**

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[22] Filed: **June 5, 1970**

[21] Appl. No.: **43,810**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 2,048, Jan. 12, 1970, Pat. No. 3,604,631.

[52] **U.S. Cl.** **239/414,** 137/625.19, 137/625.47, 251/207

[51] **Int. Cl.**.....**F23d 13/38**

[58] **Field of Search** 239/414, 569; 251/207; 137/625.19, 625.47

[56] **References Cited**

UNITED STATES PATENTS

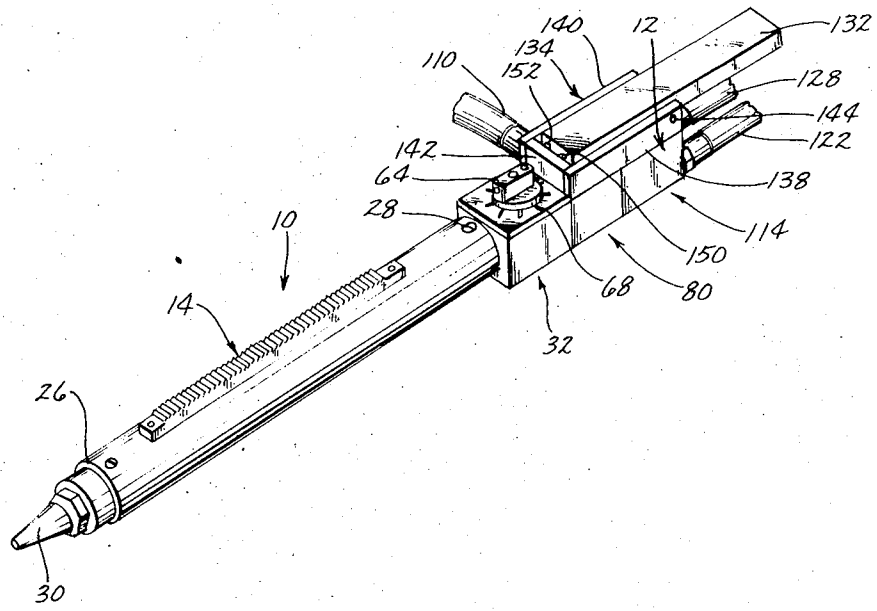
3,530,892	9/1970	Charlop et al.	137/625.19
2,520,591	8/1950	Wilmarth	239/414 X
1,316,681	9/1919	Burritt	239/416.3
1,989,468	1/1935	Spencer	239/414
2,101,356	12/1937	Zak	251/207
3,108,614	10/1963	Navara	137/625.19 X

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Assistant Examiner—Edwin D. Grant
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[57] **ABSTRACT**

A machine mounted cutting torch comprising a valve block assembly and a head assembly. First, second and third valve assemblies are provided in the valve block assembly and are connected to sources of oxygen, oxygen and industrial gas respectively. The valve assemblies are actuated by a trigger lever pivotally mounted on the valve block assembly which is movable between first, second and third positions. All of the valve assemblies are normally closed when the trigger lever is in its first position. The second and third valve assemblies are opened when the trigger lever is moved to its second position so that oxygen and industrial gas can flow therethrough respectively. The first, second and third valve assemblies are opened when the trigger level is in its third position. The second and third assemblies are in communication with a rotatable volume control valve mounted in the valve block assembly which is adapted to permit the proper oxygen-gas mixture to flow therethrough when the first and second valve assemblies are opened. The volume control valve is in communication with the torch nozzle or tip at the forward end of the head assembly. The torch also includes an oxygen line which connects the first valve assembly and the nozzle so that additional oxygen can be supplied to the nozzle when the actual cutting operation is to be performed.

8 Claims, 6 Drawing Figures



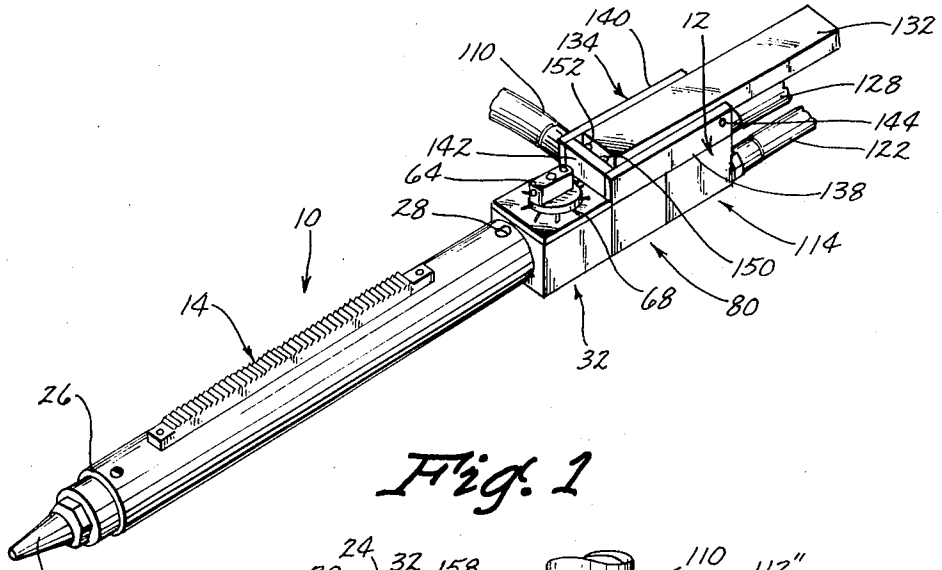


Fig. 1

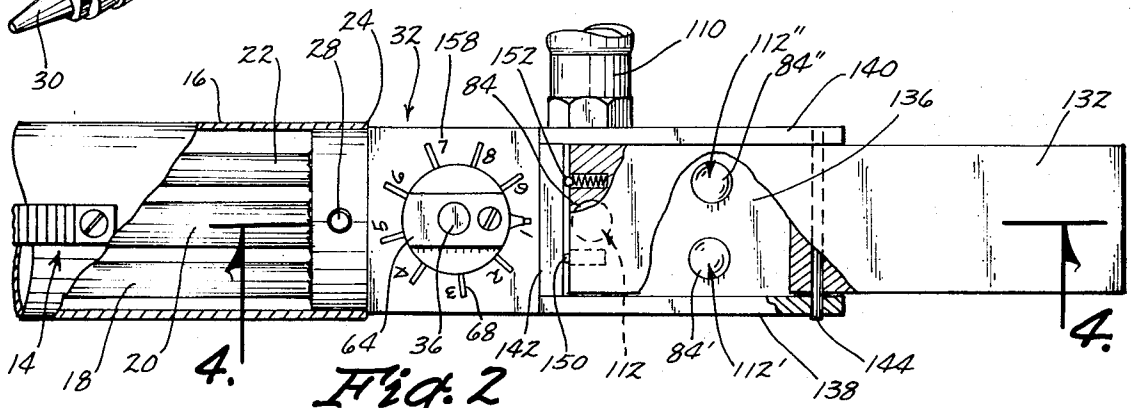


Fig. 2

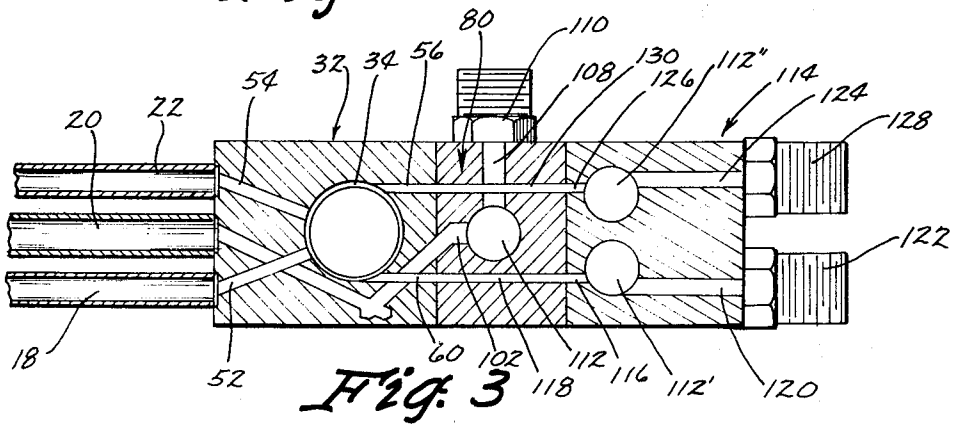


Fig. 3

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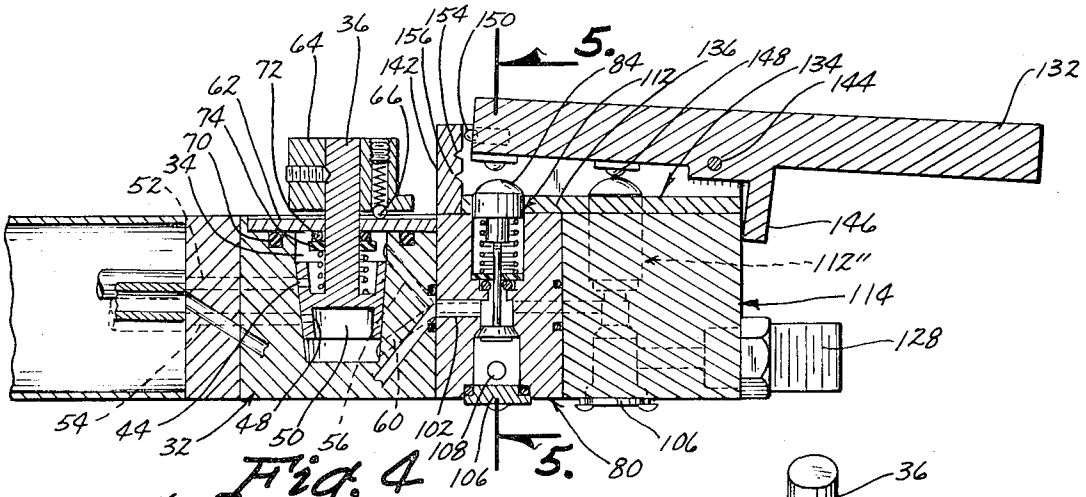


Fig. 4

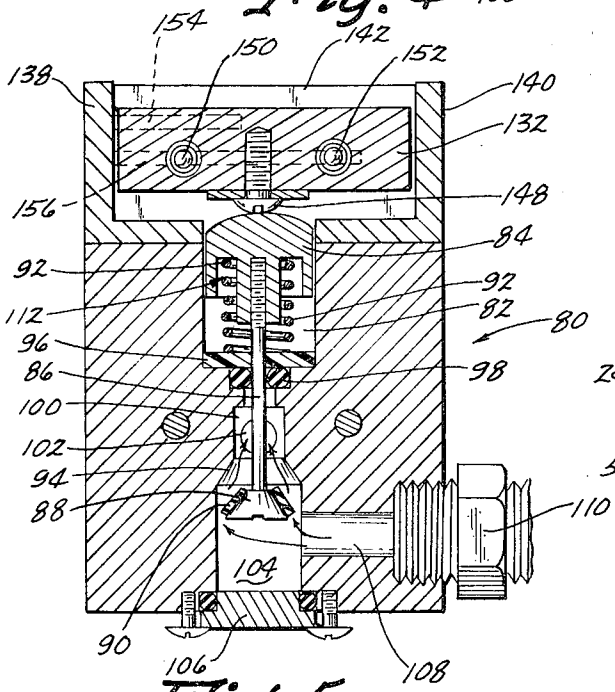


Fig. 5

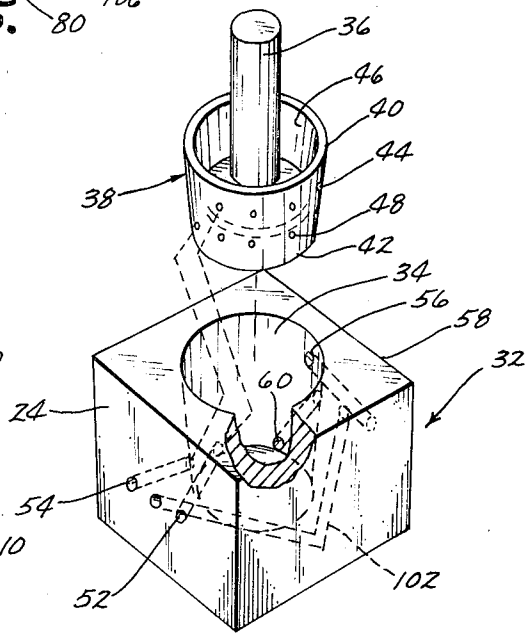


Fig. 6

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MACHINE MOUNTED CUTTING TORCH

This is a continuation-in-part application of the application Ser. No. 2,048 filed Jan. 12, 1970 (U.S. Pat. No. 3,604,631).

Conventional cutting torches generally employ at least two thumbscrew type valves which are connected to sources of oxygen and acetylene and which must be individually operated in an attempt to obtain the desired flow therethrough. It is difficult and time consuming to coordinate the two valves so that the proper mixture and volume is achieved. The device of the co-pending application represents a distinct improvement over the prior art devices and the invention of this application relates to an improvement over the device of the co-pending application. More particularly, this invention relates to a machine mounted cutting torch.

It is a principal object of this invention to provide a cutting torch having a volume control valve therein which coordinates the flow of oxygen and gas therethrough to obtain the proper oxygen-gas mixture.

A further object of this invention is to provide a machine mounted cutting torch having a trigger lever pivotally mounted thereon which actuates the valve assemblies therein.

A further object of this invention is to provide a machine mounted cutting torch which is ideally suited for use with the new types of industrial gas.

A further object of this invention is to provide a cutting torch including an oxygen line therein which bypasses the volume control valve to permit additional oxygen to be supplied to the torch nozzle for cutting operations.

A further object of this invention is to provide a cutting torch which is convenient to use.

A further object of this invention is to provide a cutting torch which is economical to manufacture, durable in use and refined in appearance.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. **1** is a perspective view of the torch of this invention.

FIG. **2** is a partial top view of the torch having portions thereof cut away to more fully illustrate the invention.

FIG. **3** is a sectional view illustrating the relationship of the oxygen, gas and oxygen lines which extend through the valve block assemblies.

FIG. **4** is a sectional view as seen along lines **4—4** of FIG. **2**.

FIG. **5** is an enlarged sectional view as seen along lines **5—5** of FIG. **4**.

FIG. **6** is a partial perspective view of the gas distribution valve block and the distribution shaft, the broken lines indicating the gas and oxygen lines extending therethrough.

The cutting torch of the invention is designated by the reference numeral **10** generally comprising a valve block assembly **12** and a head assembly **14**. Head assembly **12** includes a tubular body portion **16** having pipes **18**, **20** and **22** extending from its rearward end **24** to its forward end **26**. The rearward end **24** of body portion **16** is secured to the valve block assembly **12** by screws **28** in the manner shown in FIG. **2**. A tip of nozzle **30** is mounted at the forward end of body portion **16** and is in communication with the pipes **18**, **20** and **22**.

Gas distribution valve block **32** has a cavity **34** extending downwardly thereinto, as illustrated in FIG. **4** and **6**, having a gas distribution shaft **36** rotatably mounted therein. As seen in FIG. **6**, shaft **36** is provided with a tapered skirt **38** at its lower end which is complementary in shape to the cavity **34**. Skirt **38** includes an upper skirt portion **40** and a lower skirt portion **42**. Upper skirt portion **40** is provided with a row of spaced apart openings **44** formed therein which extend inwardly from the outer surface thereof into a chamber portion **46**. Lower skirt portion **42** is provided with a row of spaced apart openings **48** formed therein which extend inwardly from the outer surface thereof into a chamber portion **50**. Extending around the skirt, the openings **44** progressively increase in diameter while the openings **44** progressively decrease in diameter.

Block **32** has a bore **52** formed therein which extends forwardly from the cavity **34** to communicate with the pipe **18**. Block **32** also has a bore **54** formed therein which extends forwardly from the cavity **34** to communicate with the pipe **22**. The rearward end of bores **52** and **54** are adapted to register with the individual openings **44** and **48** respectively upon the selective rotation of shaft **36**. Bore **56** extends rearwardly and downwardly from cavity **34** to the rearward end **58** of block **32**. Bore **60** also extends rearwardly from cavity **34** to the rearward end of the block **32**. The forward end of bore **56** communicates with cavity **34** above the upper skirt portion **40** while the forward end of bore **60** communicates with cavity **34** below the lower skirt portion **42**.

Shaft **36** rotatably extends upwardly through a detent plate **62** and has an indicator knob **64** mounted on its upper end. Knob **64** includes a detent ball means **66** mounted therein adapted to yieldably engage grooves **68** formed in the upper surface of detent plate **62** to yieldably maintain knob **64** in various positions of its rotational movement with respect to block **32**. An O-ring **70** is mounted below plate **62** as illustrated in FIG. **4** for sealing purposes. O-ring **72** embraces shaft **36** below plate **62** above a washer **74**. Spring means **76** embraces shaft **36** below washer **74** to yieldably urge shaft **36** downwardly into cavity **34**. Plate **62** is preferably secured to block **32** by screws or the like extending downwardly therethrough.

Valve block **80** is positioned rearwardly of block **32** and has a bore **82** extending downwardly thereinto from its upper end. Plunger **84** is vertically movably positioned in bore **82** and has a plunger rod **86** secured thereto which extends downwardly therefrom. Rod **86** includes a head or valve portion **88** having a gasket **90** mounted thereon. Spring means **92** normally maintains the valve portion **88** in a seated or sealed position on valve seat **94**. Gasket **96** and O-ring **98** are provided to prevent the escape of gas upwardly from compartment area **100**. Compartment area **100** is positioned above valve seat **94** and is in communication with a forwardly extending bore **102** which is in communication with bore **60**.

Bore **104** is formed in block **80** below valve seat **94**, the lower end of which is closed by a cover means **106**. Bore **108** extends laterally from bore **104** to provide communication between bore **104** and the hose connector **110** threadably secured to the block **80**. Hose connector **110** is adapted to be connected to a source of oxygen. Spring means **92** normally yieldably maintains valve **88** in a closed position to prevent the flow of oxygen from bore **104** into bore **102**. For purposes of description the valve assembly just described will be generally referred to by the reference numeral **112**.

Valve block **114** is positioned rearwardly of valve block **80** and has valve assemblies **112'** and **112''** mounted therein. Valve assemblies **112'** and **112''** are identical to valve block **112** and will not be described in detail. Bore **116** is in communication with bore **118** which extends through valve block **80**. The forward end of bore **118** is in communication with bore **60** as illustrated in FIG. **3** Bore **120** extends rearwardly from valve assembly **112'** as shown in FIG. **3**. Hose connector **122** is threadably mounted in valve block **114** and is connected to a source of pressurized industrial gas such as "Chemgas." Valve assembly **112'** normally prevents communication between bores **120** and **116**. Likewise, valve assembly **112''** normally prevents communication between bores **124** and **126** which are in communication with hose connector **128** and bore **130** respectively. The forward end of bore **130** is in communication with bore **56** as seen in FIG. **3**. Hose connector **128** is connected to a source of pressurized oxygen.

Trigger lever **132** is pivotally mounted on trigger lever support **134** which comprises support members **136, 138, 140** and **142**. Support **134** is secured to the valve blocks by any convenient means and pivotally supports the lever **132** by means of pin **144**. Lever **132** has a downwardly extending area **146** which is adapted to engage the rearward end of block **114** to limit the pivotal movement of the lever in one direction with respect to the support **134**.

The lever **132** has three screws **148** protruding from the lower end thereof which are adapted to engage the upper ends of the plungers **84, 84'** and **84''** to move the same downwardly as the forward end of the lever **132** is moved downwardly. Spaced apart detent ball assemblies **150** and **152** are mounted in the forward end of lever **132** as illustrated in FIG. **2**. Spaced apart detent grooves **154** and **156** are formed in the rearward side of member **142**. In the position of FIG. **4**, the detent ball assemblies **150** and **152** are out of engagement with the grooves **154** and **156**. Plungers **84'** and **84''** are depressed when detent ball assembly **150** engages groove **154**. Plungers **84, 84'** and **84''** are depressed when detent ball assemblies **150** and **152** engage groove **156** (FIG. **5**).

The normal method of operation is as follows. Hose connectors **122** and **128** would normally be connected to a suitable pressure regulator means on the sources of industrial gas and oxygen so as to deliver the gas and oxygen to the gas distribution shaft at a predetermined pressure. The indicia **158** on plate **62** would have previously been calibrated so that the operator could rotate the knob **64** to the proper number depending on the particular cutting operation to be performed. In other words, if the operator rotates knob **64** to the number "8" on plate **62**, oxygen and gas will flow through the openings **44** and **48** at a predetermined rate if the valve assemblies **112'** and **112''** are open. The operator is able to obtain the proper flame at the nozzle by adjustment of the knob **64** so that the material being heated can be done so in a proper manner.

Usually, the object to be cut must be heated prior to the cutting operation and the heating of the object is accomplished by moving the trigger lever **132** so that the detent ball assembly **150** is in engagement with the groove **154**. With the trigger lever **132** so positioned, the plungers **84'** and **84'** are depressed which permit the flow of gas and oxygen through the valve assemblies **112'** and **112''** to the distributor shaft **36**. With the detent ball assembly **150** in the groove **154**, the torch may be ignited and the object heated. When it is desired to perform the cutting operation on the object, the lever **132** is moved until the detent ball assemblies **150** and **152** are in engagement with the groove **156**. With the lever **132** so positioned, the plungers **84, 84'** and **84''** are depressed which permits the flow of oxygen, gas and oxygen through the valve assemblies **112, 112'** and **112''** respectively. The oxygen flowing through valve assembly **112** is supplied to the nozzle without passing through the distributor shaft so as to supply an additional source of oxygen to the nozzle so that the cutting operation may be performed.

The operator may conveniently change the oxygen and gas mixture being supplied to the nozzle at any time by simply rotating the knob **64** to a predetermined position. The torch is preferably mounted on a machine rather than being of the hand held variety. It can be seen that an extremely convenient and efficient torch has been provided which may be used for cutting purposes and which permits the mixture of gas and oxygen being used to be conveniently selected. When the cutting operation has been performed, the torch may be turned off by simply pivoting the trigger lever **132** to the position illustrated in FIG. **4** so that the valve assemblies **112, 112'** and **112''** are closed.

Thus it can be seen that the device accomplishes at least all its stated objectives.

I claim:

1. A cutting torch comprising,

a body portion having a chamber,

a nozzle element at one end of said body portion,

a first conduit extending through said body portion to said nozzle element,

a second conduit extending through said body portion to said nozzle element,

a first valve means movably mounted in said body portion and having first and second valve portions in communication with said first and second conduits respectively, said first and second valve portions having a plurality of first and second passageways formed therein respectively, adapted to register with said first and second conduits respectively, upon selective positioning of said first valve means, said passageways in each valve portion being of a different cross-sectional size,

means adapted to connect said first and second conduits to sources of industrial gas and oxygen respectively, whereupon industrial gas and oxygen can flow through said respective conduits upon the alignment of a passageway in one of said valve portions with said conduits by the movement of said first valve means,

a second valve means in said body portion in communication with said conduits to control the flow of industrial gas and oxygen therethrough,

an oxygen by-pass line extending around said first valve means and being in communication with said source of oxygen and said nozzle element,

a third valve means in said by-pass line,

said second valve means comprising first and second valve members in communication with said sources of industrial gas and oxygen respectively,

said first and second valve members and said third valve means each comprising movable valve plungers, said plungers being normally closed to prevent flow therethrough,

and a lever means pivotally mounted on said body portion adapted to selectively engage and open said plungers.

2. The torch of claim 1 wherein first, second and third valve plungers are in said first and second conduits and said by-pass line respectively, said lever means adapted to simultaneously open and close said first and second valve plungers and adapted to open said third valve plunger after said first and second valve plungers have been opened.

3. The torch of claim 2 wherein said lever means includes means to maintain it in various selected positions of its pivotal movement.

4. A cutting torch comprising,

a body portion having a chamber,

a nozzle element at one end of said body portion,

a first conduit extending through said body portion to said nozzle element,

a second conduit extending through said body portion to said nozzle element,

a first valve means movably mounted in said body portion and having first and second valve portions in communication with said first and second conduits respectively, said first and second valve portions having a plurality of first and second passageways formed therein respectively, adapted to register with said first and second conduits respectively, upon selective positioning of said first valve means, said passageways in each valve portion being of a different cross-sectional size,

means adapted to connect said first and second conduits to sources of industrial gas and oxygen respectively, whereupon industrial gas and oxygen can flow through said respective conduits upon the alignment of a passageway in one of said valve portions with said conduits by the movement of said first valve means,

a second valve means in said body portion in communication with said conduits to control the flow of industrial gas and oxygen therethrough,

said first valve means comprising a shaft portion having a skirt at its lower end, said skirt including first and second skirt portions,

said first and second passageways being formed in said first and second skirt portions respectively, said first passageways being sealed from said second passageways.

5. The torch of claim 4 wherein said first passageways extend around and through said first skirt portion and have a decreasing cross-sectional area, said second passageways extending around and through said second skirt portion and having an increasing cross-sectional area.

6. A cutting torch comprising,

a body portion having a chamber,

a nozzle element at one end of said body portion,

a first conduit extending through said body portion to said nozzle element,

a second conduit extending through said body portion to said nozzle element,

a first valve means movably mounted in said body portion and having first and second valve portions in communication with said first and second conduits respectively, said first and second valve portions having a plurality of first and second passageways formed therein respectively, adapted to register with said first and second conduits respectively, upon selective positioning of said first valve means, said passageways in each valve portion being of a different cross-sectional size,

means adapted to connect said first and second conduits to sources of industrial gas and oxygen respectively, whereupon industrial gas and oxygen can flow through said respective conduits upon the alignment of a passageway in one of said valve portions with said conduits by the movement of said first valve means,

a second valve means in said body portion in communication with said conduits to control the flow of industrial gas and oxygen therethrough,

said second valve means comprising first and second normally closed valve members in communication with said sources of industrial gas and oxygen respectively,

and a lever means pivotally mounted on said body portion adapted to selectively engage and open said first and second valve members for supplying industrial gas and oxygen to said first valve means.

7. The torch of claim 6 wherein an oxygen by-pass line extends around said first valve means and is in communication with said source of oxygen and said nozzle element, and a normally closed third valve means in said bypass line, said lever means being adapted to open said third valve means after said first and second valve members have been opened.

8. A cutting torch comprising,

a body portion having a cavity formed therein,

a nozzle element at one end of said body portion,

first and second conduits in said body portion and being in communication with said cavity and said nozzle element and extending therebetween,

third and fourth conduits in said body portion and being in communication with sources of industrial gas and oxygen respective, said third and fourth conduits also being in communication with said cavity,

a rotary mixing valve mounted in said cavity adapted to permit selective mixtures of industrial gas and oxygen to flow to said nozzle element,

said body portion having an oxygen by-pass line extending therethrough which is not in communication with said cavity and which extends to said nozzle element, said by-pass line being in communication with a source of oxygen,

a first normally closed valve means in said third conduit,

a second normally closed valve means in said fourth conduit,

a third normally closed valve means in said by-pass line,

each of said first, second and third valve means compressing movable valve plungers,

and a lever means pivotally mounted on said body portion adapted to simultaneously open the valve plungers of said first and second valve means, said lever means adapted to open the valve plunger of said third valve means after said first and second valve means have been opened.

* * * * *