Dec. 8, 1931. P. P. ALEXANDER 1,834,991

ATOMIC GAS TORCH

Filed Aug. 25, 1930

Fig. 1.

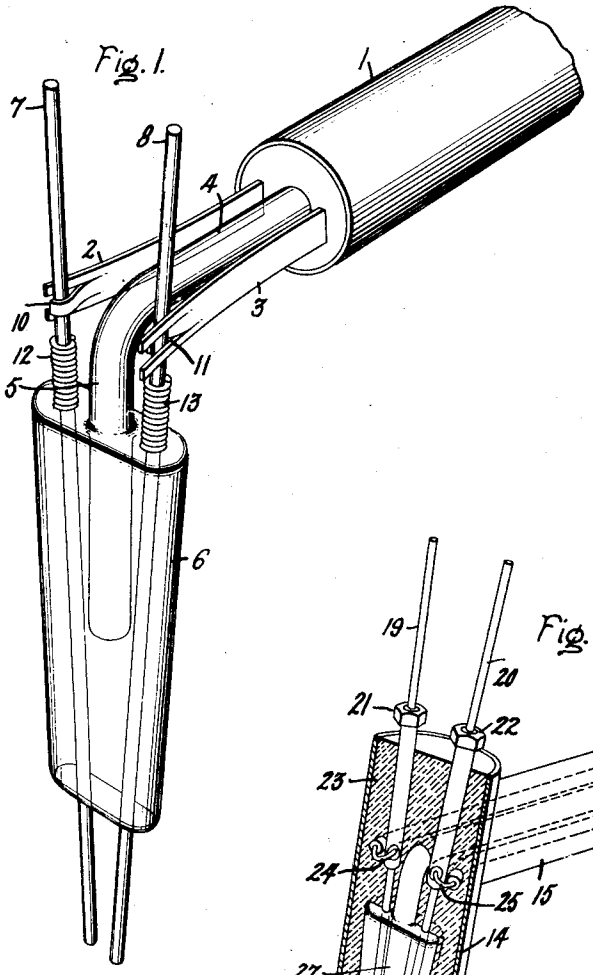
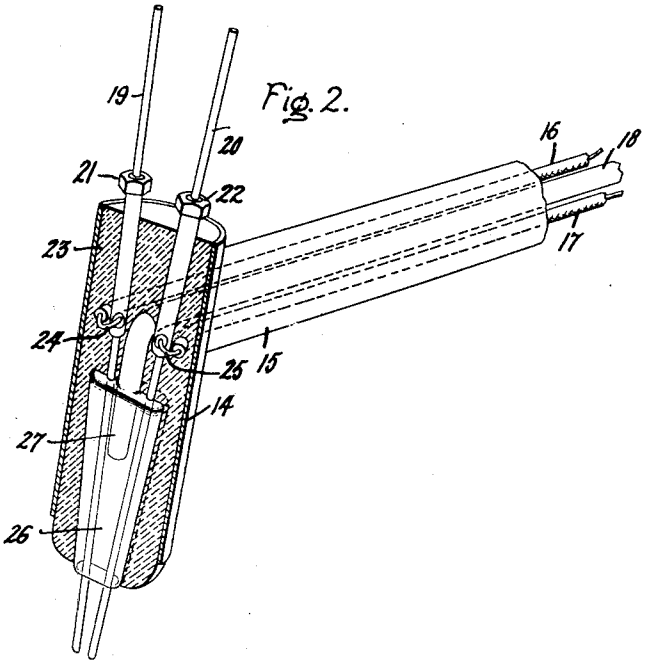


Fig. 2.



Inventor:
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by Chester E. Mullen
His Attorney.

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1,834,991

UNITED STATES PATENT OFFICE

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ATOMIC GAS TORCH

Application filed August 25, 1930. Serial No. 477,542.

My invention relates to gas-arc torches, and particularly to torches of this type adapted for cutting, welding, or other metallurgical operations employing atomic gases.

My invention is particularly applicable to the utilization of the heating effect of flames of atomic hydrogen. Utilization of such atomic hydrogen flames is disclosed and claimed broadly in the copending application of Irving Langmuir, Serial No. 729,185, filed July 30, 1924, for heating process and apparatus, which application is assigned to the same assignee as the present application. As disclosed in that application a flame of atomic gas is produced by supplying molecular gas to an arc where it is dissociated and conveying the dissociation products, i. e., atomic gas, from the arc to the place where it is to be utilized as a heating medium.

An object of my invention is to provide a torch in which the arrangement of parts is such that a single jet of gas may be employed for completely enveloping the arcing terminals of its electrodes.

A further object of my invention is to provide a torch in which the gas is supplied about the electrodes in such a manner as to prevent the entrainment of air in the gas supplied to and about the arcing terminals of the torch.

A further object of my invention is to provide a torch in which the electrodes are arranged in substantially parallel relationship with one another.

My invention will be better understood from the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings Fig. 1 represents one embodiment of my invention, and Fig. 2 a modification thereof.

The torch illustrated in Fig. 1 comprises a handle 1 through which extend conductors 2 and 3 and a conduit 4. Attached to the terminal 5 of the conduit 4 is a nozzle member 6. Electrodes 7 and 8 arranged substantially parallel to one another are supported in the walls of the nozzle 6 and extend therethrough, their arcing terminals being located a short distance from its discharge opening. The electrodes 7 and 8 are connected through clips 10 and 11 forming an integral part of conductors 2 and 3 to a source of power which in turn is connected through suitable conductors, not shown, to conductors 2 and 3. The longitudinal adjustment of the electrodes 7 and 8 in the nozzle 6 is controlled by spring clamps 12 and 13 located about the electrodes and engaging the upper exterior portion of the nozzle 6 through which the electrodes extend. Gas is supplied to the nozzle through the conduit 4 which terminates within nozzle 6. In the particular arrangement illustrated the terminal portion 5 of the conduit 4 extends into the nozzle 6 and is located centrally with respect to the electrodes 7 and 8. Gas is thus supplied from the conduit 4 in the form of a jet which is discharged between and along the length of the electrodes through the opening in the nozzle member through which these electrodes extend. The nozzle member 6 in the torch shown in the drawings is of oval shape so as to closely surround the electrodes 7 and 8. This construction is employed in order to secure economy in the consumption of gas. In the particular torch illustrated the nozzle member 6 is made of quartz, the conduit 4 of glass, and the electrodes 7 and 8 of tungsten.

By arranging the electrodes in substantially parallel relationship with one another, the gas supplied to their arcing terminals does not appreciably cool the molten tips of the electrodes, and the arc established therebetween consequently operates at a higher efficiency in generating atomic gas than would be the case if the electrodes were placed at an angle to one another. Furthermore, the particular manner in which the gas is supplied to and about the arcing terminals of the electrodes prevents the introduction of air at the point of welding as well as at the arcing terminals of the electrodes. The absence of all oxygen within the shielding gas, or in proximity to the atomic gas renders the torch particularly suitable for welding highly oxidizable metals such as aluminum, chromium, and alloys of these metals. Because of the absence of oxygen about the terminals of the

electrodes, the consumption thereof is considerably less than in other torches where the manner of supplying the gas causes small quantities of oxygen to be entrained and supplied about the arc.

My torch is suitable for use with a single gas or mixtures of gases. I have found it particularly useful when using ammonia gas or mixtures of hydrogen and nitrogen. By employing the particular construction illustrated, it is possible to obtain a light-weight torch which is easy to manipulate and which supplies atomic gas with a minimum of discomfort to the operator. This is due to the fact that the torch operates with a small flame which is confined about the electrodes. In my torch a single jet of gas acts both as an enveloping agency and as a means for carrying the atomic gas from the arc to the point where it is to be employed as a heating medium.

Either direct or alternating current may be supplied to the electrodes. Multiphase alternating current may be used. When more than two electrodes are used the configuration of the discharge opening 9 should correspond to the spaced arrangement of the electrodes in order to secure the desired gas economy.

In Fig. 2 I have illustrated a modification of the arrangement shown in Fig. 1. In this figure the nozzle comprises a hollow member 14 attached to a shank 15 through which conductors 16, 17 and conduit 18 extend. The electrodes 19 and 20 are supported in the nozzle of the torch by means of holders 21 and 22. These holders are held in place within the member 14 by means of a refractory insulating cement 23. This construction by means of which the electrodes are supported in the hollow terminal member by electrode holders held in place therein by refractory means is described and claimed in the application of Boris Vasley Nagashev, Serial No. 477,508 for atomic gas torch, filed concurrently herewith, and assigned to the same assignee as the present application. Current is supplied to the electrodes through conductors 16 and 17 which are attached at 24 and 25 to the electrode holders 21 and 22. A chamber 26 is provided in the insulating material 23. The terminal portion 27 of conduit 18 extends into the upper portion of this chamber 26, the arrangement and proportion of parts being similar to that illustrated in Fig. 1.

Other modifications of my improved torch will occur to those skilled in the art, in view of the arrangements above described. While I have shown and described certain particular embodiments of my invention, such variations and modifications are contemplated as fall within the spirit and scope of my invention as set forth in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A gas-arc torch comprising a plurality of electrodes, means for holding said electrodes in substantially parallel relationship with one another, means for insulating said electrodes from one another, means for supplying to the arcing terminals of said electrodes and along their length a single jet of gas completely enveloping said electrodes, and means for supplying an electric current to said electrodes.

2. A gas-arc torch comprising a nozzle member, means for holding a plurality of electrodes in substantially parallel positions in said nozzle member with their arcing terminals projecting a short distance beyond the discharge opening of said nozzle member, means for supplying gas to said nozzle member, and means for supplying an electric current to said electrodes.

3. A gas-arc torch comprising a nozzle member, a plurality of electrodes, means for holding said electrodes in substantially parallel relationship with one another in said nozzle member with their arcing terminals projecting a short distance beyond the discharge opening of said nozzle member, means in the upper portion of said nozzle member for discharging a jet of gas between and along the length of said electrodes, through the opening in said nozzle member, and means for supplying an electric current to said electrodes.

4. A gas-arc torch comprising a plurality of substantially parallel electrodes, means for insulating said electrodes from one another, a chamber through which said electrodes project, a discharge opening in said chamber near the arcing terminals of said electrodes having a configuration corresponding to the spaced arrangement of said electrodes, means for discharging a jet of gas in said chamber through the opening in said chamber and across the arcing terminals of said electrodes, and means for supplying an electric current to said electrodes.

In witness whereof I have hereunto set my hand this 21st day of August, 1930.

PETER P. ALEXANDER.