F. W. SMITH.

OXYACETYLENE WELDING TORCH.

APPLICATION FILED MAR. 6, 1919.

1,365,796. Patented Jan. 18, 1921.

Fig. 1

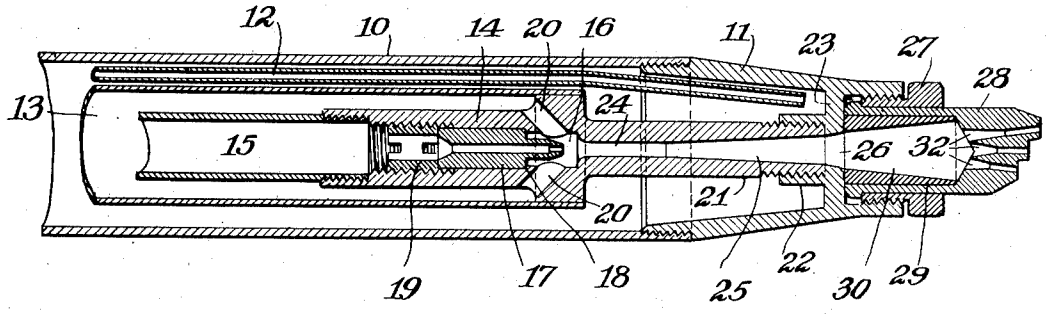


Fig. 3.

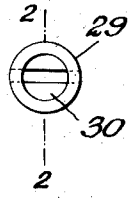


Fig. 2.

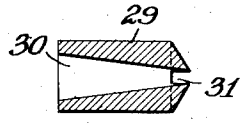


Fig. 4.

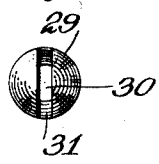


Fig. 5.

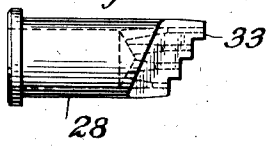
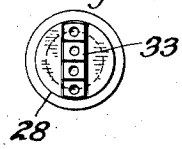


Fig. 6.



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Inventor

by his Attorneys
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UNITED STATES PATENT OFFICE.

FRANK W. SMITH, OF CRANFORD, NEW JERSEY, ASSIGNOR TO OXWELD ACETYLENE COMPANY, OF NEWARK, NEW JERSEY, A CORPORATION OF WEST VIRGINIA.

OXYACETYLENE WELDING-TORCH.

1,365,796. Specification of Letters Patent. Patented Jan. 18, 1921.

Application filed March 6, 1919. Serial No. 280,945.

To all whom it may concern:

Be it known that I, FRANK W. SMITH, a citizen of the United States, residing at Cranford, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Oxyacetylene Welding-Torches, of which the following is a full, clear, and exact description.

This invention relates to blowpipes or torches for welding metals, especially torches using acetylene as the combustible gas. In many cases it is desirable to have the combustible mixture discharged in a plurality of jets, which may burn as separate flames or may merge into a single flame according, in general, to the arrangement of the jet orifices, the velocity of the gas, etc. Heretofore, "multiple jet" torches have been capable of use only with high pressure acetylene, primarily because of the impossibility of getting a neutral or non-oxidizing flame with low pressure acetylene. On the other hand it is highly advantageous to have the acetylene under low pressure say within a pound or so of atmospheric, either way, and it is therefore the object of my present invention to provide a torch, particularly a multiple-jet torch, which will give a neutral flame with the acetylene under low pressure. To this and other ends the invention consists in the novel features and combinations hereinafter described.

In the course of considerable study and experiment with torches of the injector type, that is, torches in which a jet of oxygen issuing at relatively high velocity entrains the other combustible gas under low pressure into a mixing chamber or passage, I have found that in a multiple-jet torch the production of a neutral flame depends largely on maintaining the momentum of the mixture, particularly at points near the burner passages. Heretofore the gases have been allowed to expand suddenly, with decrease of velocity and momentum and resultant choking back of the low pressure gas and the consequence is that the acetylene is not entrained in sufficient amount. The mixture delivered to the nozzle therefore contains an excess of oxygen. In its preferred form my improved torch includes a mixing passage or chamber having a portion in which slight expansion may occur to permit thorough commingling. Beyond, however, the shape and proportions are such that no further expansion can occur, at least not to any material extent. Indeed I prefer to decrease the cross sectional area of the passage so that tendency will be toward an increase of velocity of the mixture. A construction embodying these features is illustrated in the accompanying drawing, in which—

Figure 1 shows the torch in longitudinal section, omitting rear parts, including the valves and gas connections. It is to be understood that these parts may be of any suitable construction.

Fig. 2 is a central longitudinal section, on a plane at right angles to that of Fig. 1, of the part 29, forming part of the passage for the combustible mixture of acetylene and oxygen.

Fig. 3 is a rear end view and Fig. 4 is a front end view of the member shown in Fig. 2.

Fig. 5 is a side view and Fig. 6 is an end view of the burner tip.

In the form illustrated the torch comprises a tubular outer jacket or casing 10, into the front end of which is screwed a tapered nozzle carrier 11. Water for cooling purposes may be introduced by means of a supply pipe 12.

The acetylene supply pipe 13 is concentric with the outer jacket and at its forward end, near the nozzle carrier 11, it is fitted with a tubular member 14. The latter is connected at its rear end with the oxygen supply pipe 15. In its front end is a chamber 16 into which the oxygen nozzle 17 extends, held in place against the shoulder 18 by means of a threaded locking bushing 19. Inclined passages 20 are provided, through which acetylene may be delivered to the injector chamber 16, said passages terminating preferably adjacent to the orifice of the oxygen nozzle or jet 17.

The aforesaid member 14 has a forward extension 21, threaded into and supported by a nipple 22 on a flange 23 formed on the inside of the nozzle-carrier 11. In the construction illustrated the bore of the extension 21 has a short portion, 24, next to the injector chamber 16, of substantially uniform cross section, while the forward portion 25 has an increasing cross section. The opening 26, at the center of the flange 23 and the flaring bore or passage 25 are in registry with each other, as shown.

The forward end of the carrier 11 is in-

ternally threaded to receive a gland 27, the inner end of which coöperates with a shoulder on the rear of the nozzle 28. The latter incloses a member 29, which has its forward end coned to fit a correspondingly shaped seat on the inside of the nozzle, while its rear end is seated on the flange 23. When the gland is screwed in, the nozzle and the member 29 are seated tightly together and the latter is seated firmly on the flange 23, as will be readily understood.

At its rear end the passage 30 in the aforesaid member 29 is in registry with the opening 26 and is of substantially the same diameter; but beyond, the passage narrows on one diameter and widens on the diameter at right angles thereto, forming in effect a relatively wide slot 31 registering with the row of burner jet passages 32 in the nozzle. Preferably the variation of these diameters is such as to provide a passage of decreasing cross section, thereby causing the stream of gas to flatten and converge toward the burner passages. The gas therefore does not lose momentum, and the tendency is not for the jet of oxygen to bore its way through a motionless or slow-moving body of acetylene, setting up eddy currents and carrying only part of the acetylene with it to the burner passages. On the contrary, if the two gases are not thoroughly commingled before leaving the mixing chamber 25 and if the stream is in consequence richer in acetylene at its sides than in the center, the passage 30—31, by compelling the stream to flatten, thereby causing the outer stratum of gas to converge toward and into the central portion of the stream, and compelling the central portion to diverge toward and into the outer stratum along another diameter, thus further mixing the two. At the same time the gas undergoes no sudden change of direction, its travel being chiefly forward at all stages, with less tendency to the formation of eddy currents, and when the stream reaches the burner passages its velocity is substantially uniform throughout its cross section, with the result that each passage (assuming them to be of the same size of bore) gets its proper proportion or share of a mixture which has the same proportions of oxygen and acetylene throughout. In other words, each burner passage gets the same proportion of oxygen and the same proportion of acetylene.

As before stated, the acetylene may be under low pressure, depending somewhat upon the resistance it encounters, due chiefly to friction, in the piping between the torch and the tank or other source. In general the pressure in the latter need not be more than a pound or so (per square inch) greater than atmospheric and may even be less than atmospheric.

The preferred type of burner nozzle is shown in detail in Figs. 1, 5 and 6. Its outer end is cut away on opposite sides to form a narrow tongue 33 which may be stepped, as shown, to give the end of the flame or the series of flames a corresponding slant. Steps for three jets are shown in Fig. 1 and four in Figs. 5 and 6.

It is to be understood that the invention is not limited to the construction herein specifically described but can be embodied in other forms without departure from its spirit. Nor is it limited to use with acetylene, though that gas is preferred.

I claim:—

1. In a multiple jet oxyacetylene torch, in combination, a burner nozzle having a plurality of burner jets, an oxygen injector jet and a pipe for conveying acetylene thereto, and means for supplying to each burner jet in proper proportion a uniform mixture of the oxygen and acetylene, said means including a gas mixing and converging passage extending from the injector jet to the inner end of the burner jets, said passage being free from abrupt changes of cross sectional area throughout its length.

2. In a multiple jet oxyacetylene torch, in combination, a burner nozzle having a plurality of burner jets, in the same plane, oxygen and acetylene supply pipes, and means including a passage free from abrupt changes of cross sectional area extending from the said pipes to the burner jets for mixing the gases and converging the mixture into the plane of the burner jets.

3. In a multiple jet oxyacetylene torch, in combination, a burner nozzle having a plurality of burner jets in the same plane, oxygen and acetylene supply pipes, and means between said pipes and the burner jets, having a smooth bore gas-mixing and conducting passage extending from the supply pipes to the burner jets, the forward portion of said passage being flattened gradually to a slot-shaped orifice in the plane of the burner jets for completing the mixing of the gases and supplying the mixture in uniform proper proportions to the burner jets.

4. In a multiple-jet oxyacetylene torch, in combination, a burner nozzle having a plurality of burner jets in the same plane, an oxygen injector-jet, means for delivering acetylene to the injector-jet for entrainment by the oxygen discharged therefrom, a gas-mixing and conveying tube extending from the injector-jet toward the burner nozzle, and a member between the mixing tube and the burner jets, having a passage registering at its rear with the forward end of the gas-mixing and conveying tube, said passage being flattened forwardly on one diameter and widened on the diameter at right angles to the other to form at the forward end

transverse slot in the plane of the burner jets.

5. In a multiple jet oxyacetylene torch, in combination, a burner nozzle having a plurality of burner jets in the same plane, and means for mixing the gases and delivering the same to the burner jets, including a member provided with a longitudinal passage flattened forwardly on one diameter and widened on the diameter at right angles to the other to form a discharge orifice in the form of a transverse slot in the plane of the burner jets.

6. In a multiple-jet oxyacetylene torch, in combination, a hollow nozzle-carrier having an internal inwardly extending flange, a forwardly extending gas-mixing and conveying member seated on the flange and having a longitudinal passage spreading and flattening to a narrow transverse slot at its front end, a burner nozzle inclosing the said member and extending rearwardly into the nozzle carrier and having a plurality of burner jets arranged side by side in the plane of the said slot, and a gland threaded into the nozzle-carrier between the same and the burner nozzle and coöperating with the latter to hold the same in position and clamp said member between the burner nozzle and said flange.

In testimony whereof I hereunto affix my signature.

FRANK W. SMITH.