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BLOWPIPE

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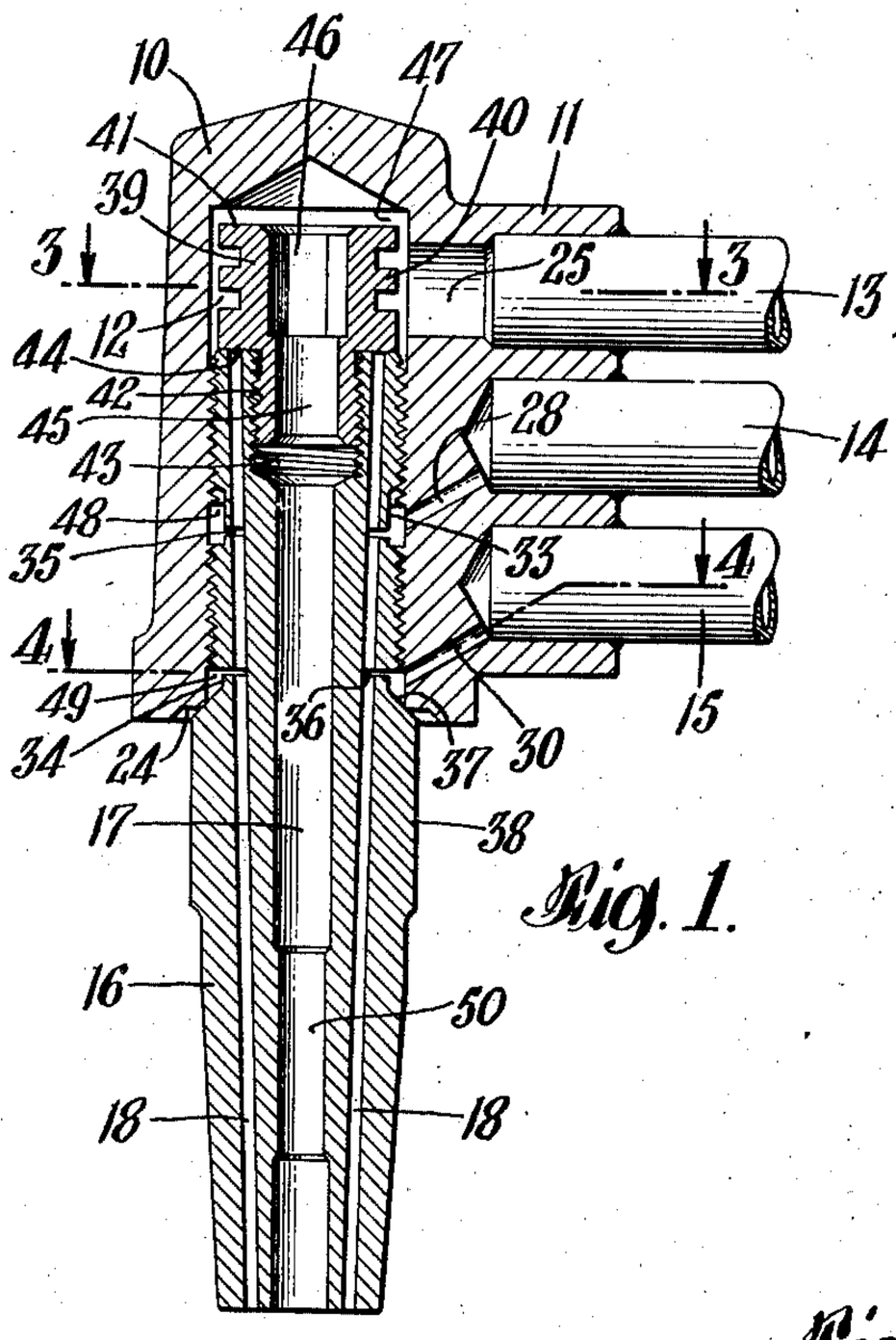


Fig. 1.

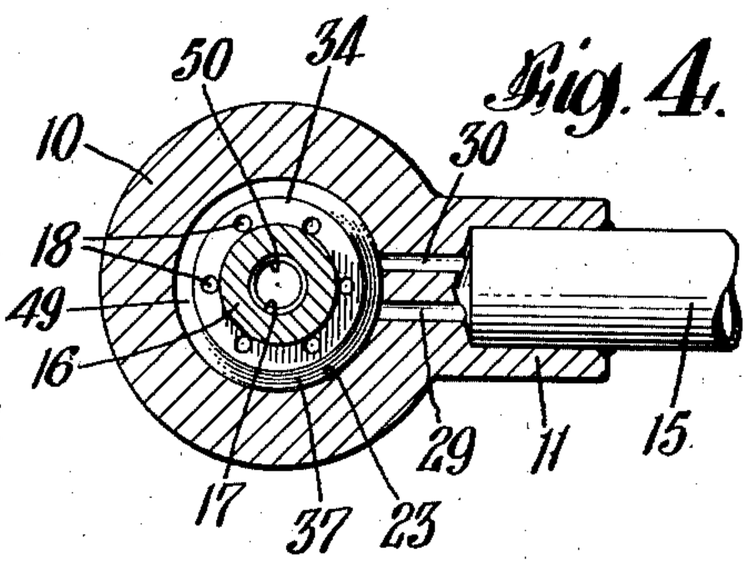


Fig. 4.

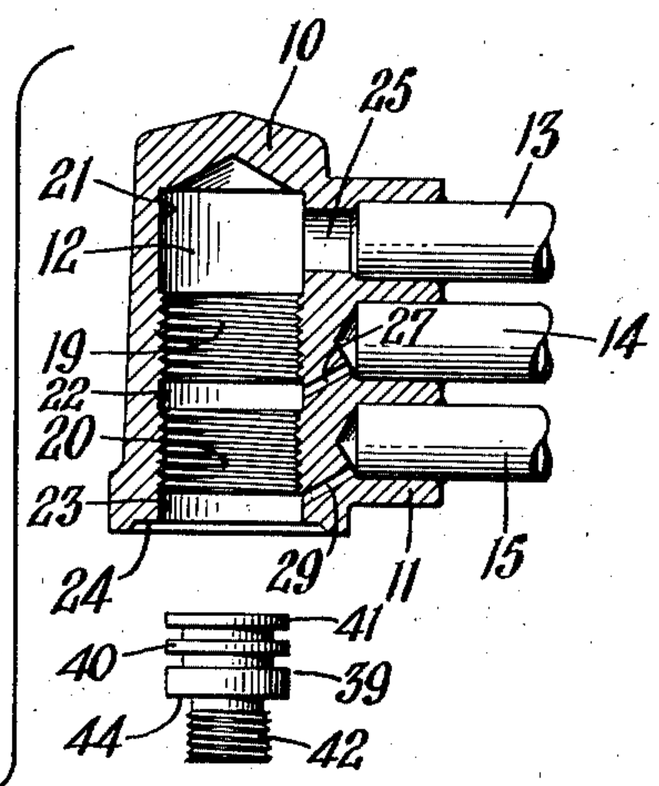


Fig. 5.

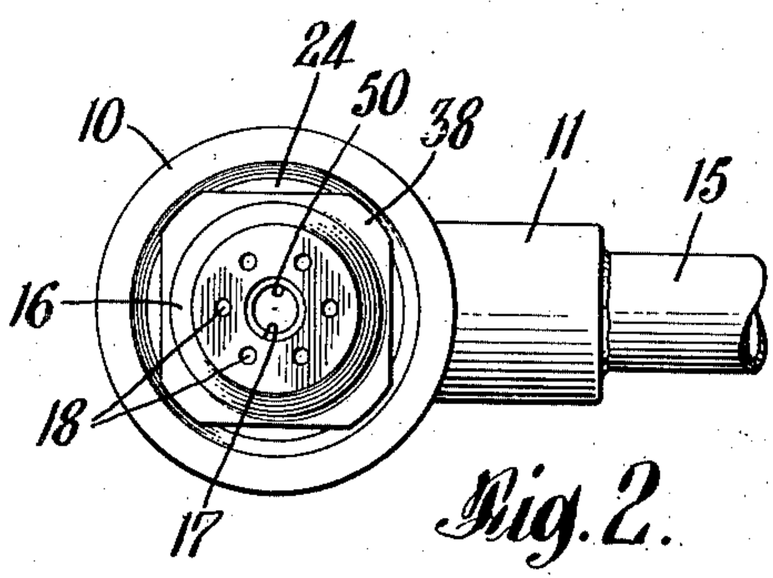


Fig. 2.

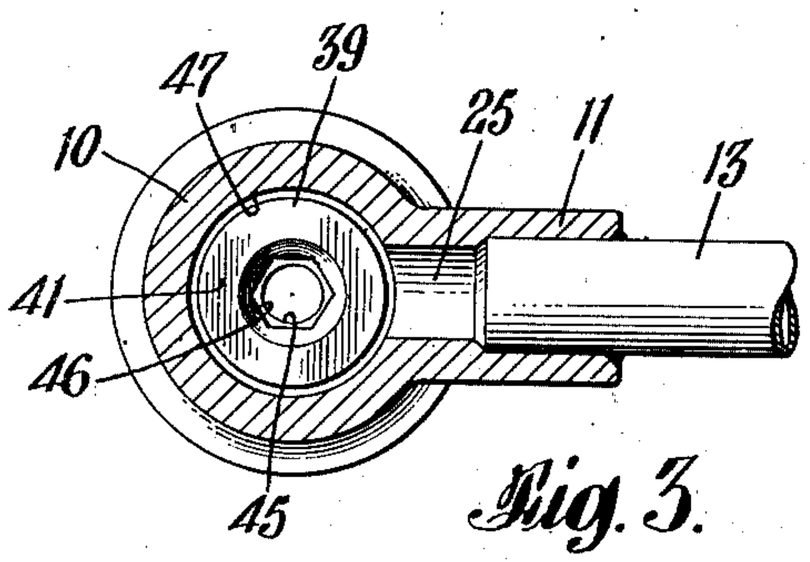
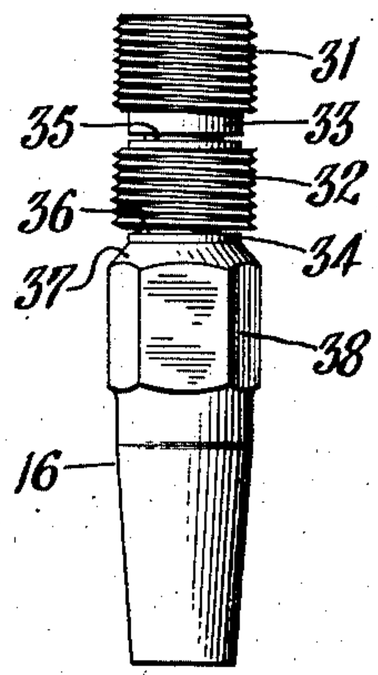


Fig. 3.



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BLOWPIPE

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14 Claims. (Cl. 158—27.4)

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This invention relates to blowpipes, and more particularly to a head and nozzle assembly involving the self-mixing principle.

In blowpipe heads heretofore proposed, the gas chambers are commonly separated by conical seats in a series of three steps, each step necessarily having its angle properly maintained with relation to its mating angle in the head and having its diameter properly gauged for correct seating. The allowable angle for this type of seat varies approximately from 180° to 30° included angle. The nozzle member having this type of seat is frequently exposed to damage from careless handling. Damaged seats permit cross-leakage which results in back-firing, flashbacks, and, in some cases, blowing out of preheat flames when the cutting oxygen valve is opened.

It is therefore the main object of the present invention to avoid seating difficulties in the assembly of nozzles and blowpipe heads.

According to the present invention, the gas chambers are separated by cooperating threaded portions of the blowpipe head and nozzle. Also, the nozzle has an inner extension which is provided with cooling fins and projects into one of the gas chambers for the purpose of cooling the nozzle. This extension also serves to protect the threaded portions when the nozzle is removed.

Further objects of the present invention are, therefore, to cool the nozzle and to protect the threads of the nozzle when the same is removed from the blowpipe head.

Other objects and features of novelty will be apparent as the following description proceeds, with reference to the accompanying drawing, in which:

Fig. 1 is a sectional view through the blowpipe head and nozzle assembly according to the preferred embodiment of the present invention;

Fig. 2 is a bottom plan view of such assembly;

Fig. 3 is a view in transverse section taken on line 3—3 of Fig. 1;

Fig. 4 is another view in transverse section taken on line 4—4 of Fig. 1; and

Fig. 5 is an exploded view of the assembly, showing the blowpipe head in section and the nozzle parts in side elevation.

As shown in the drawing, the novel construction comprises a blowpipe head 10 which is essentially hollow to form a socket or cavity 12, and provided with inlets to receive respectively an oxidizing gas tube 13, a combustion supporting gas tube 14, and a fuel gas tube 15. The head 10 and its cavity 12 are preferably generally cylindrical, the cavity extending longitudinally of and

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coaxial with the head 10. The head 10 is preferably provided with a triple boss 11 for the inlets, to receive the tubes or pipes 13, 14, and 15. The gas inlet tubes to the blowpipe head 10 are arranged one above the other, with for example the cutting oxygen tube 13 at the top, the preheat oxygen tube 14 in the middle, and the fuel gas tube 15 at the bottom.

Cooperating with the blowpipe head 10 is a nozzle 16, the gas inlet end of which is adapted to enter the cavity 12. The nozzle is provided with an axial passage 17 for oxygen, and smaller longitudinally extending passages 18 for the preheat mixture, the passages 18 being symmetrically grouped about the central passage 17.

As shown in Fig. 5, the cavity 12 comprises a central bore, which is internally threaded to form a plurality of spaced threaded bands 19 and 20. Between and on each side of the threaded bands are smooth portions comprising the inner end portion 21, an intermediate band 22, and the outer end portion 23 of the wall of the cavity 12. The outer end portion 23 terminates in a rim 24. A lateral passage 25 connects the inner end portion 21 with the oxygen tube 13, while a plurality of passages connect the smooth portions 22 and 23 respectively with the other inlet tubes. In the form shown, paired drillings 27 and 28 extend from the inlet 14 to the intermediate portion 22, and paired drillings 29 and 30 extend from the inlet 15 to the outer end portion 23.

The nozzle 16, as best shown in Fig. 5, also has externally threaded bands 31 and 32 corresponding to the bands 19 and 20. The nozzle 16 also has an annular groove 33 corresponding to the intermediate portion 22, and an annular groove 34 corresponding to the outer end portion 23. The grooves 33 and 34 are narrowed and deepened by annular cuts at 35 and 36 to intersect the preheating gas mixture passages 18. The nozzle is further provided with a conical seat 37 adapted to engage the rim 24, and its external portion is rendered non-circular as at 38, for example by flattening or milling, to form a polygonal or squared portion adapted to receive a wrench.

The gas inlet end of the nozzle has an extension 39 which is annularly grooved to form cooling fins 40. In the form shown the extension is a separate member having a head 41 and an externally threaded stem 42. The inner end of the central passage 17 is enlarged to form a threaded socket 43, which receives the threaded stem 42, and the head 41 forms a shoulder 44 which overlaps and closes the upper ends of the preheat mixture passages 18. Passing through the head

41 and stem 42 of the extension member 39 is an axial passage 45, shown in Fig. 1 as aligned and communicating with the central passage 17. The gas inlet end of the passage 45 is broached at 46 into hexagonal form to receive an Allen wrench, or slotted to receive a screw driver.

When the nozzle 16 is inserted into the cavity 12 of the head 10 in cooperating relation as shown in Fig. 1, the external threads 31 on the nozzle engage the internal threads 19 in the head 10, and seal off the inner end 21 of the cavity to form a chamber 47, the inner ends of the preheat mixture passages 18 being closed and sealed by the overlapping shoulder 44 of the extension member 39. The cutting oxygen from the tube 13 passes through the passage 25 into the chamber 47, around and over the extension member 39 with its cooling fins 40. The extension member 39 and the cooling fins 40 project into the chamber 47 in the path of the incoming stream of oxygen, which cools the nozzle 16. The stream of oxygen then passes into the broached end 46 and through the passage 45, and thus on out through the central passage 17.

At the same time, the external threads 32 on the nozzle engage the internal threads 20 in the head 10 and seal an annular chamber 48 formed by the groove 33 in the nozzle and the intermediate smooth portion 22 of the blowpipe head cavity wall. The preheat oxygen from the tube 14 flows through the paired drillings 27 and 28 into the chamber 48, and is distributed therearound to the intersections of the cut 35 with the preheat mixture passages 18, through which the preheat oxygen flows outwardly or down along the nozzle.

At the same time, the conical seat 37 on the nozzle engages the rim 24 on the blowpipe head and seals an annular chamber 49, which is formed by the groove 34 in the nozzle and the smooth end portion 23 of the blowpipe head cavity 12. Fuel gas, such as acetylene from the tube 15, passes through the paired drillings 29 and 30 into the chamber 49 and is distributed therearound to the cut 36 and the intersections thereof with the passages 18 where it mixes with the preheat oxygen in the same passages coming from the chamber 48. The mixture thus formed is discharged from the outlet ends of the passages 18 to form the preheat flames.

It should be noted that the preheating gases are distributed to the passages 18 in the nozzle 16 by the annular chambers 48 and 49, which are respectively formed for example by removing sections of the screw thread from both the nozzle 16 and the blowpipe head 10. The preheating gases enter the annular chambers 48 and 49 through the paired drillings 27 and 28, and 29 and 30, from the gas inlet tubes 14 and 15. These paired drillings provide substantially even distribution of gas about the chambers 48 and 49, and reduce overfeeding of the preheat flames on the gas inlet side of the chambers. This even distribution of the gases in the inlet chambers 48 and 49 applies to both gases, the preheat oxygen and the fuel gas, the overfeeding of either of which would result in uneven length and unbalanced mixtures in the preheating flames.

The one seat 37 on the nozzle 16 is located between the external portion 38 and the acetylene inlet chamber 49. This seat is provided to prevent leakage of acetylene to the atmosphere and it mates with a seat formed by the rim 24 recessed into the face of the blowpipe head 10. The cutting oxygen passage 17 has a reduced diameter section 50 which is for the purpose of providing higher velocity at the nozzle, more even gas flow, and controlled gas expansion.

When overhaul, adjustment, or replacement is desired, the nozzle 16 may be removed by a suitable wrench applied to the portion 38. The extension member 39 protects the exposed threads of the removed nozzle from damage due to careless handling.

An endwise blow which would otherwise burr the inner end of the threaded portion 31, is received by the head 41. If the nozzle were dropped on a cement floor, for example, the impact is received by the head 41 and the external portion 38 so that the threaded portions 31 and 32 bridge over and are spaced upward from the floor, and thus protected from sidewise flattening.

By means of a wrench inserted in the broached end 46, the threaded stem 42 can be unscrewed from the socket 43 to remove the member 39 and thus expose the upper ends of the preheat passages 18 to facilitate cleaning thereof.

In practically all previous designs of both cutting and welding pipes, when nozzles are threaded into the blowpipe head, seizing or galling of the threads takes place due mainly to a poor bearing condition between nozzle and head or the presence of foreign matter lodged in the threads. Damaged male threads also account for considerable difficulty. In many cases the nozzle is twisted off, leaving the threaded portion lodged in the blowpipe head. This not only renders the apparatus inoperative, but it also necessitates an expensive repair involving removal and replacement of the blowpipe head in many cases. In the present embodiment such difficulties have been practically eliminated through the use of a hard bronze with good bearing properties. This alloy, designated as "Oxweld" No. 17 composition, consists of copper 83%; zinc 10%; silicon 5%; aluminum 1% and manganese 1%. This material does not seize in contact with copper under any conditions tested including temperatures of the order of 900° F.

From the foregoing description it will be readily apparent that the present invention provides a better bearing and non-binding condition between the nozzle and the head, elimination of conical seats by provision of multiple threads, a finned extension projecting into the cutting oxygen inlet chamber which acts as a heat dissipator and thread protector, the same being readily removable if it becomes necessary to clean passages, and paired inlet holes providing for the admittance of the preheating gases to the distribution chambers in the head. More nearly equal pressure and less tendency towards overfeeding preheating flames on the inlet side of the head are thus obtained.

Having thus described the invention, I claim:

1. A blowpipe head having a cavity and spaced inlets for combustion supporting and fuel gases, and a relatively short and thick nozzle extending within and cooperating with said cavity and having a longitudinal passage for combustion supporting gas and other longitudinal passages for preheat gas, said cavity and nozzle having annular chambers respectively communicating with said inlets, said cavity and nozzle having threaded portions interposed between said chambers for securing said nozzle in said cavity in cooperating relation, the innermost of said chambers being larger than the internal diameter of said threaded portions and connected to said inlet for combustion supporting gas, said innermost

chamber being positioned ahead of said threaded portions and being larger than said inlet, the inner end of said nozzle having an extension beyond said threaded portions extending into said chamber but out of contact with the wall of said cavity and following substantially the contour thereof to provide substantial gas contact therewith by combustion supporting gas from said inlet which passes over and around said extension in said innermost chamber and out through the combustion supporting passage in said nozzle to form a cutting jet.

2. A blowpipe head having a cavity and spaced inlets for cutting oxygen, preheat oxygen, and fuel gas respectively, and a nozzle extending within and cooperating with said cavity, said cavity and nozzle having annular chambers respectively communicating with said inlets, said nozzle having an axial passage for cutting oxygen, and other longitudinally extending passages for preheat mixture, said preheat mixture passages intersecting both said preheat oxygen chamber and said fuel gas chamber, and detachable means at the inner end of said nozzle and entering the innermost of said chambers for sealing the inner ends of said preheat mixture passages from the path of the cutting oxygen.

3. A blowpipe nozzle having an axial passage and other longitudinally extending passages grouped about said axial passage, and detachable means at the inner end of said nozzle for sealing the inner ends of said grouped passages.

4. A blowpipe nozzle having an axial passage, and other longitudinally extending passages grouped around said axial passage, in combination with an extension member for said nozzle, said axial nozzle passage having a portion of increased diameter at its gas inlet end and provided with internal threads, said extension member having a stem provided with external threads engaging said internal threads and a shoulder overlapping and sealing said grouped passages.

5. A blowpipe head having a cavity and spaced inlets for combustion supporting and fuel gases, and a nozzle extending within and cooperating with said cavity, said cavity and nozzle having gas chambers respectively communicating with said inlets whereby one of said chambers receives combustion supporting gas and another of said chambers receives fuel gas, said nozzle having an axial passage for combustion supporting gas and other longitudinally extending passages for preheat mixture, said combustion supporting gas passage of said nozzle having an enlarged and threaded inner end, in combination with a member having a head in said combustion supporting gas chamber, a shoulder sealing the ends of said preheat mixture passages, and a stem in said threaded end, said member having a central passage aligned with said combustion supporting gas passage.

6. A blowpipe head having a cavity and spaced inlets for combustion supporting and fuel gases, and a nozzle extending within and cooperating with said cavity, said cavity and nozzle having gas chambers respectively communicating with said inlets, said nozzle having an axial passage for combustion supporting gas and other longitudinally extending passages for preheat mixture, said combustion supporting gas passage having an enlarged and threaded end forming a socket, in combination with a member having a head in said combustion supporting gas chamber and a threaded stem in said socket, the underside of said head forming a shoulder sealing the

end of said preheat mixture passages, said member having a cylindrical passage aligned with said combustion supporting gas passage whereby combustion supporting gas from said inlet passes over said head in said combustion supporting gas chamber through said cylindrical passage and out of said axial passage to form a cutting jet, said head being rotatable within said combustion supporting gas chamber to prevent unscrewing of said stem when said nozzle is removed.

7. A blowpipe head having a cavity and spaced inlets for combustion supporting and fuel gases, and a nozzle extending within and cooperating with said cavity and having an axial combustion supporting gas passage with an outlet adapted to project a cutting jet, said cavity and nozzle having gas chambers respectively communicating with said inlets, the innermost of said chambers communicating with the combustion supporting gas inlet, the inner end of the nozzle being provided with an extension having cooling fins extending into said innermost chamber whereby combustion supporting gas from said inlet passes over and around said cooling fins in said innermost chamber and out through said axial nozzle passage to form said cutting jet.

8. A blowpipe nozzle having an axial cutting oxygen passage and longitudinally extending preheat mixture passages grouped around said cutting oxygen passage, said nozzle having passages for introducing fuel and combustion supporting gas to said pre-heat mixture passages intermediate their ends, and a detachable end member for said nozzle having a central passage registering with said cutting oxygen passage and an annular shoulder overlapping and closing the ends of said pre-heat passages, whereby said end member may be removed and cleaning wires pushed entirely through said pre-heat passages.

9. A blowpipe head having a cavity and spaced inlets for combustion supporting and fuel gases, said cavity comprising recesses and threaded portions, the internal diameter of said threaded portions being more restricted than said recesses, said head having passages leading from said inlets and intersecting said cavity recesses, and a nozzle having an axial combustion supporting gas passage with an outlet adapted to project a cutting jet and an externally threaded inlet end adapted to be screwed into said spaced threaded portions, the inner end of the nozzle having cooling fins extending into the innermost of said recesses, whereby combustion supporting gas from said inlet passes over and around said cooling fins in said innermost recess and out through said axial passage to form said cutting jet; said cooling fins being of a smaller diameter than the restricted internal diameter of said threaded portions, whereby said fins may be removed with said nozzle.

10. A blowpipe head having a cavity and an inlet thereto for combustion supporting gas, and a nozzle entering said cavity, said nozzle and the wall of said cavity having contacting portions sealing off the inner end of said cavity to form a chamber receiving combustion supporting gas from said inlet, said nozzle having a longitudinal combustion supporting gas passage with an outlet end adapted to project a cutting jet, the inner end of said nozzle having cooling fins spaced around said passage and extending into said chamber, whereby combustion supporting gas from said inlet passes over and around said cooling fins in said chamber to cool said nozzle

and on through said passage to form said cutting jet.

11. A blowpipe head and nozzle as claimed in claim 10, in which said contacting portions are screw threads, the inner end of said cavity is larger than the internal diameter of said threads, and said cooling fins are of a diameter smaller than the internal diameter of the threads, whereby said fins may be removed with said nozzle.

12. A blowpipe nozzle as claimed in claim 8, and a blowpipe head having a cavity and an inlet thereto for combustion supporting gas, said nozzle and the wall of said cavity having screw threads sealing off the inner end of said cavity to form a chamber receiving combustion supporting gas from said inlet, said detachable end member having a head forming said shoulder and rotatable in said cavity beyond said screw threads, whereby said member turns with said nozzle when the nozzle is unscrewed.

13. A blowpipe nozzle having an axial passage and other longitudinally extending passages grouped about said axial passage, said nozzle having a passage for introducing fuel gas to said grouped passages intermediate their ends, and detachable means at the inner end of said nozzle for sealing the inner ends of said grouped passages.

14. A blowpipe head having a cavity and an inlet thereto for combustion supporting gas, and a nozzle entering said cavity, said nozzle and the wall of said cavity having contacting portions sealing off the inner end of said cavity to form a chamber receiving combustion supporting gas from said inlet, said chamber being larger than said contacting portions, said nozzle having a relatively short straight longitudinal passage for combustion supporting gas and having an outlet end relatively close to its inlet end for projecting

a cutting jet, the inner end of said nozzle having an extension projecting beyond said contacting portions into said chamber but out of sealing contact with the wall thereof and occupying the greater part of said chamber to provide a large surface area for cooling contact with combustion supporting gas from said inlet.

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