Jan. 5, 1932. F. C. HASSE 1,840,196

TIP FOR BLOWPIPES

Filed Jan. 2, 1929

Fig. 1.

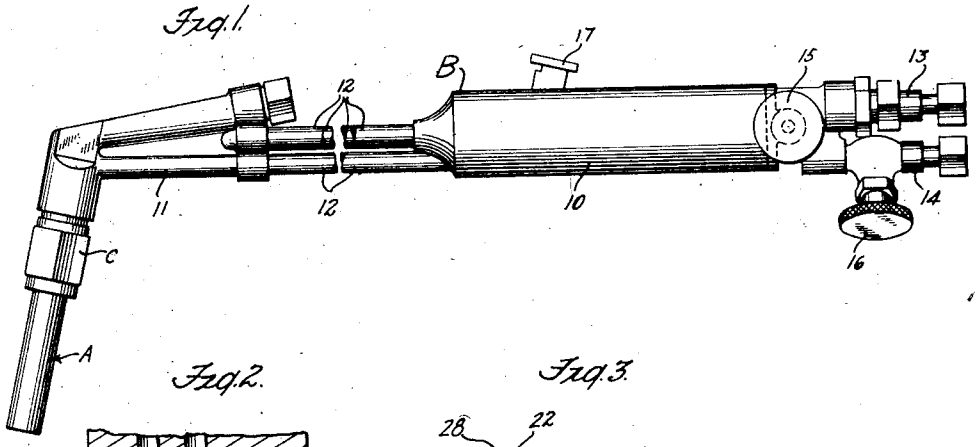


Fig. 2.

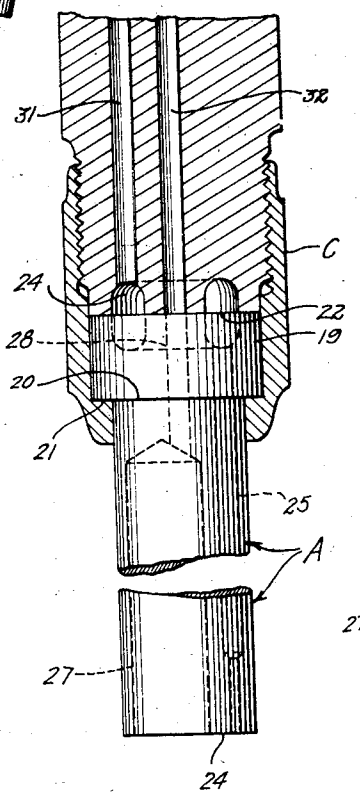


Fig. 3.

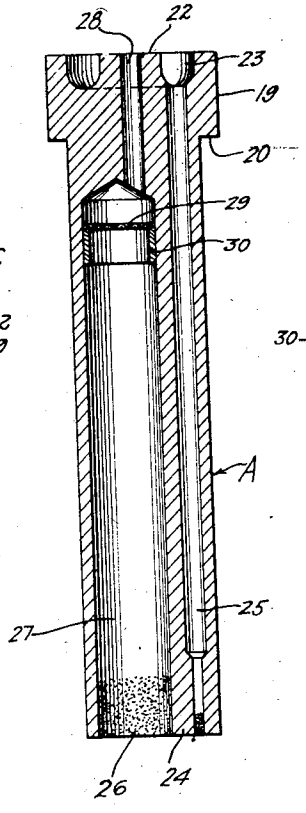
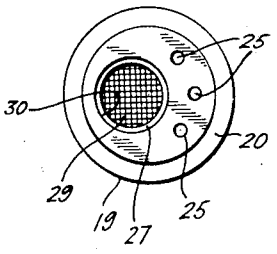


Fig. 4.



Frank C. Hasse, INVENTOR,

BY

Byrnes, Townsend & Brickenstein, ATTORNEYS.

Patented Jan. 5, 1932

1,840,196

UNITED STATES PATENT OFFICE

FRANK C. HASSE, OF LA GRANGE, ILLINOIS, ASSIGNOR TO UNION CARBIDE & CARBON RESEARCH LABORATORIES, INC., A CORPORATION OF NEW YORK

TIP FOR BLOWPIPES

Application filed January 2, 1929. Serial No. 329,833.

This invention pertains to blowpipes and more specifically to a nozzle adapted for being coupled to a blowpipe to convert it into a low velocity rivet removing blowpipe such as that described in my United States patent application bearing Serial Number 307,720, filed Sept. 22, 1928.

Metal cutting blowpipes or, as they are commonly known, cutting torches are ordinarily arranged to use a heating flame to heat the metal to be cut, and a jet of substantially pure oxygen traveling at high velocity to oxidize the metal and blow the oxide or slag away from the heated area. For some classes of work, such as removing rivet heads, greater speed and economy may be obtained by using a jet of oxygen traveling at a low velocity insufficient to blow the oxide away from the heated area. Such a low velocity rivet removing blowpipe is described in my patent application referred to above. By the use of a properly constructed tip or nozzle with an ordinary metal cutting torch or blowpipe it may be converted into such a low velocity rivet cutting blowpipe, thereby increasing its range of usefulness and, at the same time, giving the owner the advantages of the low velocity oxygen cutting process without the expense of purchasing a complete blowpipe.

Therefore one object of this invention is to provide a nozzle or other apparatus such as shown in my copending application Serial No. 307,720 adapted for being coupled to a blowpipe to convert it into a rivet removing blowpipe having a heating flame and an oxidizing stream of oxygen with insufficient velocity to blow the oxide or slag formed thereby out of its path or away from the heated area. Other aims, objects, and novel features will be apparent from the drawings and the following description.

The objects of the present invention are attained by the mechanism shown in the accompanying drawings, in which:

Fig. 1 is a side view of a blowpipe with my improved nozzle attached thereto;

Fig. 2 is a fragmentary sectional view of the blow-pipe head of Fig. 1 showing the method of coupling the nozzle to the blowpipe;

Fig. 3 is a longitudinal section of my improved nozzle, and;

Fig. 4 is a view of the outer end of the nozzle shown in Fig. 3.

The invention may be embodied in a nozzle A that is adapted for being coupled to a blowpipe B by the gland nut C.

The blowpipe B may comprise a handle body 10 that is joined to a head 11 by three gas conducting pipes or tubes 12. Extending to the rear of the body 10 is a nipple 13 that may be connected to a source of oxygen supply, such as a tank of compressed oxygen, by a suitable length of flexible hose; and a nipple 14 that may be connected to a source of inflammable gas supply, such as a tank of compressed acetylene, by another suitable length of flexible hose. Suitable conduits within the blowpipe conduct the acetylene and oxygen to the head 11 where they are combined to form a combustion supporting mixture. The amount of oxygen in the mixture may be controlled by the manually operable valve 15, and the amount of acetylene in the mixture may be controlled by the manually operable valve 16. A knob 17 controls the position of another valve that permits a stream of auxiliary oxygen to flow through the blowpipe body 10 and head 11 in a conduit that is independent of those supplying gas to the combustion supporting mixture. So far the construction and arrangement of the blowpipe follows that of a style well known in the art.

Attached to the forward end of the head 11 by a gland nut C is my improved nozzle A, shown in section in Fig. 3, having an inner end 19 somewhat enlarged to form an exterior shoulder 20 for the interior shoulder

21 of the gland nut C to press against to hold the seating face 22 securely against the outer end of the head 11. The seating face 22 may have an annular mixture distributing recess 23 therein that registers with a similar mixture distributing recess 24 in the outer end of the head 11 thereby forming a distributing chamber. Extending longitudinally through the nozzle A from the distributing recess 23 to the outer end 24 is a plurality or eccentric group of combustible mixture passages 25 that are larger at the inner end 19 of the nozzle A than at the outer end 24 so the combustible mixture passages 25 are reduced in area in passing through the nozzle in the direction of gas flow. Extending longitudinally through the nozzle A from the outer end 24 to the seating face 22 of the inner end 19 is an oxygen passage 26 that is formed by a large eccentric bore 27 in the outer end of the nozzle A that is joined to a small concentric bore 28 at the inner end of the nozzle A so the oxygen passage 26 is increased in area in its passage through the nozzle A in the direction of gas flow. Near the inner end or bottom of the eccentric bore 27 is a transversely extending turbulence reducing screen 29 that is held in place by a metal sleeve 30 which is a snug fit in the bore 27.

As the nozzle A may be used with blowpipes of a style different from that shown in the drawings, the inner end 19 of the nozzle A may therefore be of a form different from that shown so the nozzle may be attached to blowpipes of the various kinds now in use. The arrangement of the passages 25 in an eccentric group at one side of the nozzle is not imperative as other arrangements may be employed but, greater economy of the gases and better operating characteristics have been secured with the arrangement shown. The turbulence reducing screen 29 may be replaced with other means for accomplishing the result such as a tuft of steel wool, a perforated metal plate, or a maze of tortuous passages, whereby the turbulence of the oxygen is reduced so it emerges from the nozzle in a torpid stream. Also, the turbulence reducing means 29 may be made self retaining in the bore 27 or means other than the sleeve 30 may be employed for the purpose.

The outer surface of the nozzle A, and the surface of the mixture passages 25 and the oxygen passage 26 near the outer end 24, may be covered with a protective coating of chromium applied by one of the well known electrolytic processes. This coating of chromium is not obligatory as the nozzle will perform its function in a satisfactory manner without it, but I have found that a chromium plated nozzle will last longer and cause less delay during operation as slag does not adhere to it as readily and cause clogging and backfiring. In some cases it may be desirable to remove the coating of chromium from the attaching end 22 to secure a tighter joint between the nozzle A and the head 11 of the blowpipe B.

When the blowpipe shown and described herein is in operation the combustible mixture formed in the head 11 by a mixture of inflammable gas and oxygen flows outward through the passage 31 in the head 11, the distributing chamber formed by the distributing recesses 24 and 23 in the head 11 and nozzle A respectively, and the mixture passages 25 in the nozzle A, where it is ejected from the outer end 24 of the nozzle A forming the heating flame used to raise the temperature of the iron or steel operated upon to a point where it will burn or oxidize when a stream of oxygen is impinged against it.

The oxygen that is released by the valve controlled by knob 17 passes outward through the passage 32 in the head 11 and passage 26 in nozzle A. The passage 26 is much larger than the ordinary oxygen passage in a cutting torch nozzle or tip so, instead of ejecting the oxygen in a turbulent stream of high velocity around 2,000 feet a second, it ejects the oxygen in a torpid stream of low velocity around 92 feet a second. The oxygen at this low velocity will not blow the oxide or slag formed thereby out of its path or away from the heated area as is customary with the high velocity oxygen stream of the usual cutting torch.

When the usual cutting torch having a high velocity oxygen stream or jet is used for removing a rivet head, the torch is held so the heating flame is as nearly parallel to the surface of the fabricated structure holding the rivet as it is possible to get it. The torch is then removed toward the rivet until the edge of the rivet head is in the heating flame and the torch is held in this position until the rivet head is heated to a point where it will sustain combustion in an atmosphere rich in oxygen such as that created when a stream of oxygen is impinged on the heated portion of the rivet head. Then the auxiliary oxygen valve is opened and a fine stream of high velocity cutting oxygen is directed upon the heated portion of the rivet. This stream of oxygen burns or oxidizes the portion of the rivet head in its path and also blows the oxide or slag away from the heated area and out of the path of the oxygen stream. As fast as the metal is burned and blown away the torch is slowly moved in a direction parallel to the surface of the fabricated structure so the head of the rivet is cut off as close to this surface as possible. Usually a portion of the rivet head is left attached to the body of the rivet because the flame will cut into the fabricated structure and injure it when the cut in the rivet head is made too close to the surface of the struc

ture. As a consequence much difficulty is experienced in removing the rivets from a fabricated structure after their heads have been cut off by this method.

When a torch equipped with my improved tip or nozzle is used for removing a rivet head the torch is held so the heating flame is substantially parallel to and in alignment with the body or axis of the rivet and the flame is directed upon the center of the rivet head and held there until the head has been heated to a point where it will sustain combustion in the presence of atmosphere rich in oxygen such as that created when a stream of oxygen is impinged on the heated rivet head. Then the knob 17 is depressed thereby opening the auxiliary oxygen passage permitting a stream of non-turbulent low velocity oxygen to emerge from the opening 26 in the nozzle A and envelop the rivet head. The velocity of the oxygen stream is so low that the oxide formed thereby is not blown away from the heated area and, therefore, the oxygen does not burn a hole into the rivet as a high velocity jet from a cutting torch would but, instead, the entire rivet head and part of the body are rapidly burned or oxidized and, as the velocity of the oxygen stream is insufficient to blow the oxide away, it runs away leaving the surface of the fabricated steel and the edge of the rivet hole therein entirely uninjured. The oxygen stream is not only of such low velocity that it does not blow the oxide away from the heated area, but it is of such low velocity that it does not even break hrough the protecting or insulating film of oxide that forms on the surface of the fabricated structure in the rivet hole and under the rivet head by the oxidizing action of the atmosphere, so there is no danger of injuring the structure containing the rivets when they are removed in this manner. As the entire rivet head is removed when a torch equipped with my improved nozzle is used, it follows that the rivet may be easily removed from the fabricated structure.

When a rivet head is removed with a torch equipped with my improved nozzle there are several features that distinguish the process from that of removing a rivet head with the ordinary cutting torch. With a torch equipped with my nozzle the preheating flame is directed upon the center of the rivet head from a direction at right angles to the surface of the fabricated structure, while with the ordinary torch it is directed upon the edge of the rivet head from a direction paralel to the surface of the fabricated structure. With the ordinary torch, after the rivet head has been preheated and the auxiliary oxygen has been turned on, the oxygen burns or oxidizes only that portion of the rivet head that is in its path and it blows the slag or oxide out of its path and away from the heated area so it progressively cuts through the rivet head in the direction in which the oxygen jet is moved. Thus, the action of this torch in cutting through a rivet head is like that of a needle flame cutting through a wax candle. With a torch equipped with my improved nozzle, when the rivet head has been preheated and the auxiliary oxygen has been turned on the oxygen envelops the entire head which is quickly and entirely burned or oxidized. As the velocity of the oxygen is not high enough to blow the oxide away it, consequently, runs away like the melted wax from the end of a candle held in a Bunsen flame. The high velocity oxygen jet of the ordinary cutting torch will cut into the surface of a bifurcated steel structure just as easily as it will into the head of a rivet, so considerable care must be exercised when cutting a rivet head to not direct the jet upon the fabricated structure or it will be injured.

With the low velocity oxygen stream formed by my improved nozzle the fabricated steel is not injured while the rivet head is being removed. While the entire rivet head and part of the body is burned or oxidized by the oxygen the temperature of the fabricated structure is not raised to even a red heat but remains dark in color while the rivet head is burned and the slag or oxide runs away. This very desirable feature appears to be due to the fact that the velocity of the oxygen stream formed by the nozzle is not high enough to blow the slag or oxide away from the heated area or out of the path of the stream and thereby or otherwise break through the protecting coating of oxide on the surface of the fabricated structure and ignite the metal underneath.

This invention is deemed to occupy that portion of the field of the oxy-gas welding and cutting art lying between the metal cutting torch or blowpipe on the one hand and the auxiliary oxygen welding torch or blowpipe on the other. A torch equipped with my improved nozzle and embodying this invention is distinguished from a metal cutting torch by its faculty of producing an oxidizing flame or an oxygen stream and a flame having a velocity insufficient to blow the oxide or slag out of its path or away from the heated area. On the other hand, a torch or blowpipe embodying this invention is distinguished from welding torches or blowpipes, including those using auxiliary oxygen, by its faculty of producing a highly oxidizing flame or effect.

The reason for the novel results obtained by the distinguishing features of apparatus embodying this invention is outstanding when the character of its oxygen stream is compared with that of the oxygen jet of cutting torches on the one hand and with that of welding torches employing auxiliary oxygen

on the other hand. The usual velocity of the oxygen jet in metal cutting blowpipes or torches is approximately 2,000 feet a second. It is the high velocity of this oxygen jet that blows the oxide or slag out of its path and away from the heated area. The velocity of the oxygen stream formed by apparatus embodying this invention is approximately 92 feet a second. At this low velocity the oxygen does not blow the slag out of its path or away from the heated area. The velocity of the auxiliary oxygen jet in welding blowpipes or torches is approximately 75 feet a second, but in torches of this character a means is provided for controlling the volume of the oxygen in the auxiliary jet so the welding flame is not oxidizing after the auxiliary oxygen has been added to it.

The arrangement and size of the openings or passages in the nozzle shown and described herein may be varied to meet the requirements of various working conditions. For example, the passages 25 may be varied in size and number, and they may be arranged in various patterns symmetrical and otherwise around the oxygen passage 26. I have found it advisable, however, to arrange the flame openings 25 in as small a group as structurally convenient to conserve the heat of the flame formed by the combustion of the mixture emerging therefrom. As the distance between the passages 25 is increased, or the size of the group is increased, the temperature of the nozzle A is increased and the effective temperature of the flame is decreased. Therefore, the less the distance between the passages 25, and/or the smaller the group, the greater the effective temperature of the flame, which is the end desired.

The number, variety, and nature of the metals, metallic compositions, and alloys, that may be operated upon by the use of the blowpipe described herein is believed to be the same as those that may be operated upon by the use of metal cutting torches or blowpipes already well known in the art.

The terms fabricated steel, and fabricated structure, as used herein are intended to cover all forms of iron or steel articles that are attached together with rivets, bolts, or similar fastening devices and, also, metal articles having rivets, bolts, studs, screws, and similar devices in or attached to them for other purposes.

Bolts, machine screws, staybolts, cap screws, lag screws, studs, and similar articles are considered the equivalent of rivets and all of them may be operated on by the use of a blowpipe or torch equipped with my improved nozzle. Furthermore, they may be operated on when in metals other than iron or steel, and when in materials other than metals.

The novel device described herein is not limited to the use of acetylene as a fuel but may be used with any fuel gas used in other blowpipes, welding torches, cutting torches, and similar devices.

Various changes in the form and arrangement of the parts embodying this invention, and various substitutions of materials, may be made without departing from the spirit of the invention or sacrificing any of the rights thereunder.

I claim:

1. A blowpipe nozzle having an eccentric group of combustible gas apertures and a single eccentric oxygen aperture with an area much greater than the total area of said combustible gas apertures.

2. A blowpipe nozzle having a plurality of combustible gas passages; a single oxygen passage; and a turbulence reducing means in said oxygen passage.

3. A blowpipe nozzle having a plurality of combustible gas passages; a single oxygen passage; and a turbulence reducing screen in said oxygen passage.

4. A blowpipe nozzle having a plurality of combustible gas passages; a single oxygen passage; a turbulence reducing screen in said oxygen passage; and a metal sleeve in said oxygen passage to hold said turbulence reducing screen in place.

5. A blowpipe nozzle having a plurality of gas apertures adapted for emitting a combustion supporting gaseous mixture to form a heating flame; and an oxygen passage having a larger exit than inlet adapted for emitting oxygen in sufficient quantity to oxidize heated iron and at a velocity insufficient to blow the slag away from the heated area.

6. A blowpipe nozzle having a plurality of gas apertures adapted for emitting a combustion supporting gaseous mixture to form a heating flame; and an oxygen passage having a larger exit than inlet adapted for emitting an oxidizing stream of non-turbulent oxygen at a velocity insufficient to blow the slag formed thereby out of its path.

7. A nozzle having an inner end adapted for being coupled to a blowpipe; an annular mixture distributing recess in said inner end; a plurality of mixture passages extending from said distributing recess through said nozzle; and an oxygen passage through said nozzle; the area of said mixture passages being decreased and the area of said oxygen passage being increased in the direction of the gas flow through said nozzle.

8. A cylindrical nozzle having an enlarged inner end adapted for being coupled to a blowpipe; an outer end adapted for emitting gases; an annular mixture distributing recess in said inner end; a group of mixture passages extending longitudinally through said nozzle from said distributing recess to said outer end; and an oxygen passage extending longitudinally through said nozzle from said inner end to said outer end; said oxygen pas-

sage being much larger at the outer end of said nozzle than at the inner end.

9. A nozzle having an inner end adapted for being coupled to a blowpipe; an outer end adapted for emitting gases; a group of mixture passages extending longitudinally through said nozzle; and an oxygen passage extending longitudinally through said nozzle; said oxygen passage comprising a large cylindrical bore extending from said outer end to a point near said inner end, and a small cylindrical bore extending from said large cylindrical bore to said inner end.

10. A nozzle having an inner end adapted for being coupled to a blowpipe; an outer end adapted for emitting gases; a plurality of mixture passages extending through said nozzle; an oxygen passage extending through said nozzle; said oxygen passage comprising a large bore in the outer end of said nozzle joined to a small bore in the inner end of said nozzle; and a turbulence reducing screen in said large bore near where it is joined to said small bore.

11. A nozzle having an inner end adapted for being coupled to a blowpipe; an outer end adapted for emitting gases; an eccentric group of mixture passages extending through said nozzle; an oxygen passage extending through said nozzle; said oxygen passage comprising a large bore in the outer end of said nozzle joined to a small bore in the inner end of said nozzle; said large bore being out of alignment with said small bore; and a turbulence reducing screen in said large bore near the inner end thereof where it is joined by said small bore.

12. A nozzle having an inner end adapted for being coupled to a blowpipe; an outer end adapted for emitting gases; an eccentric group of mixture passages extending through said nozzle; an oxygen passage extending through said nozzle; said oxygen passage comprising a large eccentric bore in the outer end of said nozzle joined to a small concentric bore in the inner end of said nozzle; a turbulence reducing screen in said large bore near the inner end thereof where it is joined by said small bore; a sleeve frictionally held in said large bore to hold said screen in place; and a coating of chromium on all of the surface of said nozzle except said inner end.

13. A cylindrical nozzle having an enlarged inner end adapted for being coupled to a blowpipe; an outer end adapted for emitting gases; an annular mixture distributing recess in said inner end; an eccentric group of mixture passages extending through said nozzle from said recess to said outer end; said mixture passages being smaller at the outer end of said nozzle than at the inner end; an oxygen passage extending through said nozzle; said oxygen passage comprising a large eccentric bore in the outer end of said nozzle joined to a small concentric bore in the inner end of said nozzle; a turbulence reducing screen in said large bore near the inner end thereof where it is joined by said small bore; a sleeve frictionally held in said large bore to hold said screen in place; and a coating of chromium on all of the surface of said nozzle except said inner end.

14. A blowpipe nozzle having oxygen and preheating passages therein, said oxygen passage having an inlet and a larger outlet.

15. A blowpipe nozzle having an oxygen passage therein adapted to deliver a relatively large volume of oxygen at a relative low velocity, said oxygen passage having an inlet and a larger outlet.

16. A blowpipe nozzle comprising an oxygen passage having a larger outlet than inlet adapted to permit the oxygen to expand as it passes towards the outlet, and a group of preheating passages having outlets adjacent to said oxygen passage outlet.

17. A blowpipe nozzle having an oxygen passage therein adapted to deliver a relatively large volume of oxygen at a relatively low velocity, said passage having a turbulence reducer therein.

18. An apparatus for removing rivet heads comprising a means including a blowpipe for delivering a flame of sufficient temperature and volume to heat a portion of the head to the temperature of rapid oxidation in a low velocity oxygen stream and a means for reducing a stream of oxygen to such low velocity that it is insufficient to blow the slag away from the zone of reaction, and means to direct said low velocity stream of oxygen upon said rivet head in sufficient volume to oxidize said head.

19. In a rivet head removing blowpipe having an oxygen supply and a combustible gas supply the combination of means for forming a suitable mixture of combustible gas to heat a portion of a rivet head to the temperature of rapid oxidation in a low velocity oxygen stream, means for discharging a relatively large volume of oxygen from said blowpipe and means for reducing the discharge velocity of said oxygen to such velocity that it is insufficient to blow the oxidized portion of said head away from the zone of reaction.

20. The combination in a blowpipe of means for forming a flame suitable for heating a rivet head, and means for directing a low velocity stream of oxygen on said head with said flame in sufficient volume to oxidize the heated metal and with insufficient velocity to blow the slag away from the heated area.

21. The combination in a blowpipe of means for forming an oxy-fuel gas flame suitable for heating a rivet head and means for directing a low velocity stream of oxygen

on said rivet head with said flame in sufficient volume to oxidize the heated metal and with insufficient velocity to blow the slag away from the heated area.

22. The combintion in a blowpipe of means for forming a flame suitable for heating a rivet head; means for directing a stream of oxygen on said head with said flame in sufficient volume to oxidize the heated metal and with insufficient velocity to blow the slag away from the heated area; and means for reducing the turbulence in said stream of oxygen.

23. The combination in a blowpipe of means for forming a flame suitable for heating a rivet head; a nozzle for directing said flame on a rivet head; and means for directing a low velocity stream of oxygen on said rivet head with said flame in sufficient volume to oxidize the heated metal and with insufficient velocity to blow the slag away from the heated area.

24. The combination in a blowpipe of a nozzle; means including a series of orifices in the outer end of said nozzle for forming a flame suitable for heating a rivet head; and means including a large orifice in the outer end of said nozzle for adding oxygen to said flame so it is highly oxidizing and yet has insufficient velocity to blow the slag away from the heated area.

25. The combination in a blowpipe of a nozzle; means including an eccentric group of orifices in the outer end of said nozzle for forming a flame suitable for heating a rivet head; and means including a large eccentric orifice in the outer end of said nozzle for adding oxygen to said flame so it is highly oxidizing and yet the combined gases have insufficient velocity to blow the slag away from the heated area.

26. The combination in a blowpipe of a nozzle; means including an eccentric group of orifices in the outer end of said nozzle for forming a flame suitable for heating a rivet head; means including a large sized eccentric orifice in said nozzle for supplying a large stream of low velocity oxygen to said flame so it is highly oxidizing and yet has insufficient velocity to blow the slag away from the heated area; and means for reducing the turbulence in said stream of oxygen.

27. The combination in a blowpipe of a nozzle; means for forming a flame suitable for heating a rivet head; means including an opening in said nozzle for adding a stream of oxygen to said flame; and means including a screen in said opening for reducing the turbulence in said stream of oxygen.

28. The combination in a blowpipe of a nozzle; means for forming a flame suitable for heating a rivet head; means including an opening in said nozzle for adding a stream of oxygen to said flame; means including a screen in said opening for reducing the turbulence in said stream of oxygen; and a ferrule holding said screen in said opening.

29. The combination in a blowpipe of means for forming a flame suitable for heating a rivet head, and means for adding low velocity oxygen to said flame so it is highly oxidizing and yet has insufficient velocity to break through the protecting coating of oxide on the surface of the metal surrounding the rivet.

In testimony whereof, I affix my signature.

FRANK C. HASSE.