

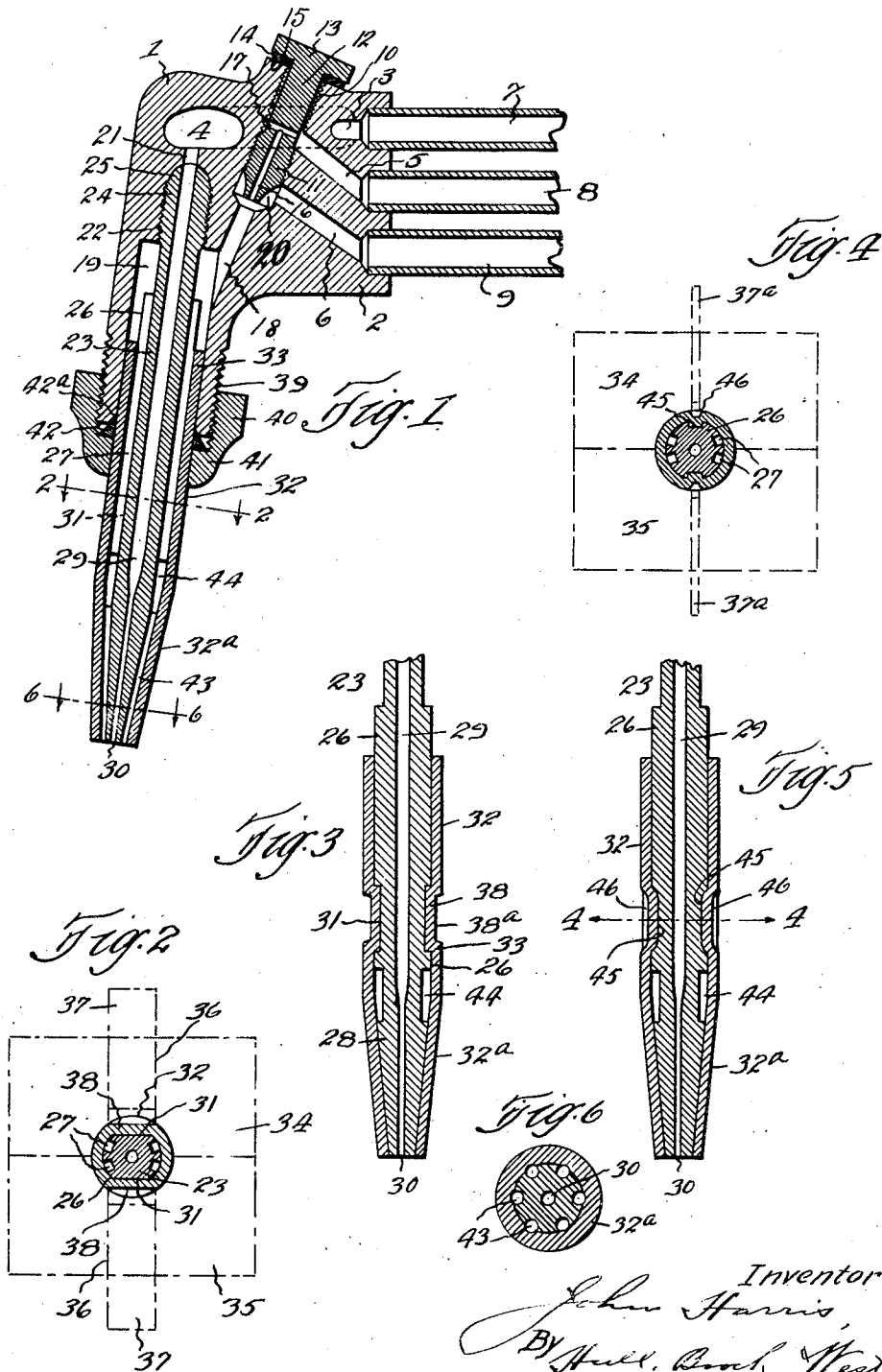
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BLOWPIPE

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UNITED STATES PATENT OFFICE.

JOHN HARRIS, OF CLEVELAND, OHIO.

BLOWPIPE.

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To all whom it may concern:

Be it known that I, JOHN HARRIS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Blowpipes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to blowpipes, and more particularly to the means for securing together the component parts of the tip and for effecting a tight joint between the tip and the lower end of the head. The aforesaid objects will be realized in and through the construction shown in the drawing forming part hereof, wherein Fig. 1 represents a central longitudinal sectional view through the head and the tip of a blowpipe embodying my invention; Fig. 2 a sectional view corresponding to the line 2—2 of Fig. 1, showing in dot-and-dash lines the arrangement of the dies by which the inner and the outer member of the tip are secured together; Fig. 3 a detail in central longitudinal section, the view being taken at right angles to Fig. 1; Figs. 4 and 5 are details in section, corresponding respectively to Figs. 2 and 3, and showing a modification of the invention disclosed in Figs. 1—3 inclusive; and Fig. 6 is a sectional detail corresponding to the line 6—6 of Fig. 1.

Describing by reference characters the various parts illustrated herein, 1 denotes the head of my blowpipe, said head being provided with a neck 2 having in the upper portion thereof a branched passage 3 communicating at its forward end with a chamber 4, an upwardly inclined passage 5 and a second upwardly inclined passage 6. Communicating with the rear or receiving ends of the passages 3, 5 and 6 are the pipes 7, 8 and 9 which serve to conduct cutting oxygen, pre-heating oxygen, and a combustible gas respectively thereto. The upper end of the passage 5 communicates with a chamber 10 formed by a bore extending downwardly and forwardly into said head and having threaded therein the body 11 of an injector, the said injector having a stem 12 mounted in said chamber and an operating head 13, there being packing 14 interposed between said head and a seat 15 on top of the head. This injector is provided with a central bore 16 the upper end of which communicates by lateral ports 17 with

the chamber 10. The lower end of the injector is adapted to discharge centrally into an inclined passage 18 which in turn discharges into an annular chamber 19 provided in the lower portion of the blowpipe head and surrounding the inner tip member, to be described hereinafter. The passage 6 discharges into a chamber 20 surrounding the lower end of the said injector and communicating with the passage 18.

Extending downwardly from the chamber 4 is a short passage 21, which merges with an enlarged threaded bore 22 extending to the chamber 19.

Threaded into the said bore 22 is an inner tip member, indicated generally at 23. This member comprises an upper threaded portion 24 cooperating with the thread in the bore 22 and provided with a rounded head 25 adapted to seat against the rounded upper end of said bore. Below the threaded projection 24, the said member is provided with a cylindrical enlargement or projection 26 adapted to fit within the upper end of the outer tip member, to be described hereinafter. The cylindrical projection 26 is provided with a plurality of slots 27 (four such slots being shown) each extending the full length of the projection and being preferably rectangular in shape. Below the projection 26, the said member is provided with a projection 28, generally tapered, or of frusto-conical shape. The said inner member is provided with a central bore 29 constituting a passage for conducting cutting oxygen from the chamber 4 to the central orifice 30.

The slots 27 are arranged in pairs on opposite sides of the enlargement or projection 26. While the slots of each pair are in fairly close proximity to each other, the pairs of slots are spaced a considerable angular distance apart, for a purpose to be explained hereinafter, and the enlarged portion 26 of the inner tip member is flattened on opposite sides thereof, as indicated at 31, to provide transversely extending recesses. This flattening may be effected in any convenient manner, as by grinding or otherwise machining away opposed parts of such tip member, the flattened portions or recesses being preferably parallel with each other, of the same angular extent and spaced equidistantly from the adjacent slots. It will be noted that this reduction in size of the inner tip member is provided between the top and the

bottom of the enlargement, leaving an ample length of metal above and below the flattened or recessed portions.

Fitting within the lower end of the head 1 and surrounding the lower portion of the inner tip member is the outer tip member. This outer member, indicated generally at 32, has a cylindrical upper portion 33 adapted to fit within the lower end of the head and to fit snugly about the cylindrical projections 26 of the inner tip member, thus sealing the outer sides of the slots 27 and forming passages through which the mixture of preheating oxygen and combustible gas is supplied to the lower passages and the jet orifices.

For the purpose of securing the two members together, the outer member having first been fitted about the inner member in the manner shown in Fig. 1, the assembled tip is inserted into a die, the two main members of which are indicated generally at 34 and 35 in Figs. 2 and 4. These two die members are provided with lateral guide-ways 36 of the width of the flattened portions 31 of the inner tip member. Punches 37, mounted in said guides, are then moved inwardly, with the result that the cylindrical portions of the outer tip member engaged thereby are pressed inwardly into the widened recesses provided therefor in the inner member, the outer member, at the end of this operation, being provided with a pair of opposed inwardly projecting lugs or locking members 38, integral therewith, and most firmly and rigidly connecting the two members together. The body of the outer member above, below, and between the recessed portions of the inner member is held against distortion by the die members 34 and 35, and there can be no distortion of the outer member during this operation, with the result that the slots 27 will be completely and tightly closed at their outer sides by the surrounding wall of the outer member.

For the purpose of effecting a leak-proof joint between the lower end of the head and the cylindrical wall of the outer tip member (which is made to fit closely within the cylindrical bore of the head), the lower end of the head is provided with a thread 39 and a gland nut 40 is threaded thereupon, the said nut having an inwardly projecting shoulder 41 adapted to surround the outer tip member, with a ring 42 resting on said shoulder, the said ring being of frusto-conical shape with its tapered or wedged end 42^a engaging the joint between the bottom of the head and the adjacent cylindrical wall of the outer tip member. This ring is preferably of copper and provides a most efficient packing, preventing the leakage of gases from the chamber 19 between the head and the outer tip member.

It has been proposed to unite the inner and outer tip members by providing a slot extending the length of the enlargement 26, a slot in the inner wall of the outer tip member, and a key driven into these slots and thus locking the parts together. The slot used for this key has been one of the slots designed for the supply of the mixture from the chamber 19 to the preheating passages 43, which are provided in the enlargement 28 at the bottom of the inner tip member and between the same and the tapered lower end 32^a of the surrounding outer member, the upper ends of the passages communicating with a chamber 44 interposed between the bottoms of the slots 27 and the tops of such passages. This has the disadvantage of supplying the mixture non-uniformly to the chamber 44. With the arrangement shown herein, the supply to the chamber is more effectively equalized thereto and to the jet orifices at the delivery ends of the passages 43, resulting in a uniform distribution of the mixture to such orifices.

It has also been found necessary to use, with the former construction, a key which is made of steel. As this steel has a low coefficient of expansion as compared with copper and brass (the material of which the outer and the inner members are respectively made), the key tends to loosen under the heat developed through the operation of the blowpipe and to drop out. Also, with a steel key, when back-firing occurs into the chamber 19, the oxygen consumes or cuts the steel, with a development of such heat as to melt the brass and copper members of the tip.

A further serious disadvantage in the use of the key connection in the assembling operation is that, because of the impossibility of drawing the copper and brass tip members to exact dimensions, a considerable proportion of the tips have to be discarded because of the loose fit between the parts thereof. Where the inner and outer members are connected in the manner described herein, the dies and the punch members draw the outer tip member tightly about the inner member by means of the operation which unites these members. Furthermore, any tendency to initially distort either of the members, due to the operation of the punches 37, is effectually prevented by the embrace of the two die members 34 and 35, with the result that, through the operation of providing locking lugs 38, the blowpipe is materially strengthened. The punching operation draws the metal of the outer tip member evenly from both sides into the slotted portions of the inner member, thus tightening the grasp of the outer member upon the inner member.

Furthermore, in uniting the inner and outer tip members by means of a key, it is

very difficult to make the slots in both members of the tip of proper size to fit a standard key; and where the internal diameter of the outer shell is a little greater than the external diameter of the inner shell, the forcing of the key into the slot draws toward the side to which the key is applied, the portion of the outer shell which is opposite such side and also tends to bulge outward the side to which the key is applied, making it necessary to re-grind the outer tip member in order to fit within the head. These troubles are avoided by the construction shown and described herein. Should any distortion occur, during the connecting operation, it would not affect the fitting of the tip within the head, since the connection between the tip members is made at a point which will be below the head when the parts are assembled.

A further and final advantage of this mode of uniting the tip members is that the flattened outer faces 38^a of the locking lugs pressed in from the outer member provide wrench-receiving surfaces which enable the tip to be assembled and disassembled conveniently and without marring the outer surface thereof, whereas gas pliers have been used for this purpose heretofore.

In Figs. 4 and 5, there is shown a modification of my invention, wherein instead of flattening a considerable portion of the area of the enlargement 26, I provide the same with a pair of opposed narrow slots 45. In this case the metal of the outer member will be pressed into the slots by correspondingly narrow punches 37^a, leaving in the outer member a pair of opposed recesses 46 which are so located and of such shape as conveniently to receive the opposed projections on a pair of pliers or on opposed members of a wrench.

Having thus described my invention, what I claim is:

1. A blowpipe comprising a head, a tip carried by said head and comprising an inner member having a central passage for cutting oxygen and provided intermediate its ends with an enlargement having passages for preheating oxygen and a combustible gas, and an outer member surrounding the inner member and engaging the enlargement thereof, the engaging portion of the inner member being provided with recesses in the exterior thereof, and the surrounding portion of the outer member being pressed inwardly into such recesses to form integral locking lugs, and means for supplying cutting oxygen from said head through the first mentioned passage and a mixture of preheating oxygen and combustible gas through the passages therefor in said enlargement.

2. A blowpipe comprising a head, a tip carried by said head and comprising an in-

ner member having a central passage for cutting oxygen and provided intermediate its ends with an enlargement having slots extending longitudinally thereof for preheating oxygen and a combustible gas, the said inner member having a pair of equiangularly spaced recesses intermediate the ends of such enlargement, an outer tip member surrounding the inner member and engaging the said enlargement and closing the outer sides of said slots and having integral lugs pressed therefrom into such recesses, and means for supplying cutting oxygen from the head through the first mentioned passage and a mixture of preheating oxygen and a combustible gas through the passages constituted by said slots and the surrounding portion of the outer tip member.

3. In a blowpipe, the combination of a head, a tip comprising an inner member having a central bore for cutting oxygen and provided with an enlargement intermediate the ends thereof, the said enlargement having a pair of opposed recesses formed therein, intermediate the ends thereof, and also having between such recesses and on opposite sides of such enlargement one or more slots extending longitudinally the full length thereof, an outer tip member surrounding the inner tip member and adapted to engage the said enlargement and to close the outer sides of the slots therein, thereby to form passages, the said outer member being pressed into the said recesses thereby to lock the two tip members together, and means for supplying cutting oxygen from the head to the said bore, and a mixture of preheating oxygen and a combustible gas through the passages constituted by the said slots and the surrounding portion of the outer tip member.

4. In a blow pipe, the combination, with a head, of a tip comprising an inner member having a central bore for cutting oxygen and provided with an enlargement intermediate the ends thereof and projecting below said head, the said enlargement having a pair of opposed recesses formed therein, intermediate the ends thereof and below said head, and also having between such recesses and on opposite sides of such enlargement one or more slots extending longitudinally the full length thereof, the outer tip member surrounding the inner tip member and adapted to engage the said enlargement and to close the outer sides of the slots therein, thereby to form passages, the said outer member being pressed into the said recesses thereby to lock the two tip members together, and means for supplying cutting oxygen from the head to the said bore and a mixture of preheating oxygen and a combustible gas through the passages constituted by the said slots and the

surrounding portion of the outer tip member.

5 5. A tip for blowpipes comprising an inner member having a central passage for cutting oxygen and a plurality of preheating passages surrounding the delivery portion of such central passage, and an outer member surrounding the inner member and locked thereto by means of one or more integral lugs pressed from the outer member into a cooperating recess or recesses formed upon the exterior of the inner member.

10 6. A tip adapted for detachable connection with a blowpipe head, the said tip comprising an inner member having a central passage for cutting oxygen, with a plurality of preheating passages surrounding the delivery end of the central passage, the inner tip member having an enlargement intermediate the ends thereof provided with opposed passages for oxygen and a preheating gas, the said enlargement being provided, between such opposed passages,

with recesses, and an outer tip member surrounding the inner tip member, with its interior engaging the said enlargement and closing the outer ends of the passages formed in such enlargement, the said outer member having locking portions pressed therefrom into such recesses.

30 7. A tip for blowpipes comprising an inner member having a central passage for cutting oxygen and an outer member surrounding the inner member, said tip having passages for supplying a mixture of oxygen and combustible gas through a portion of such tip to the delivery end thereof and around the delivery end of said central passage, the outer member being locked to the inner member by means of one or more integral lugs pressed from the outer member into a cooperating recess or recesses formed upon the exterior of the inner member.

In testimony whereof, I hereunto affix my signature.

JOHN HARRIS.