

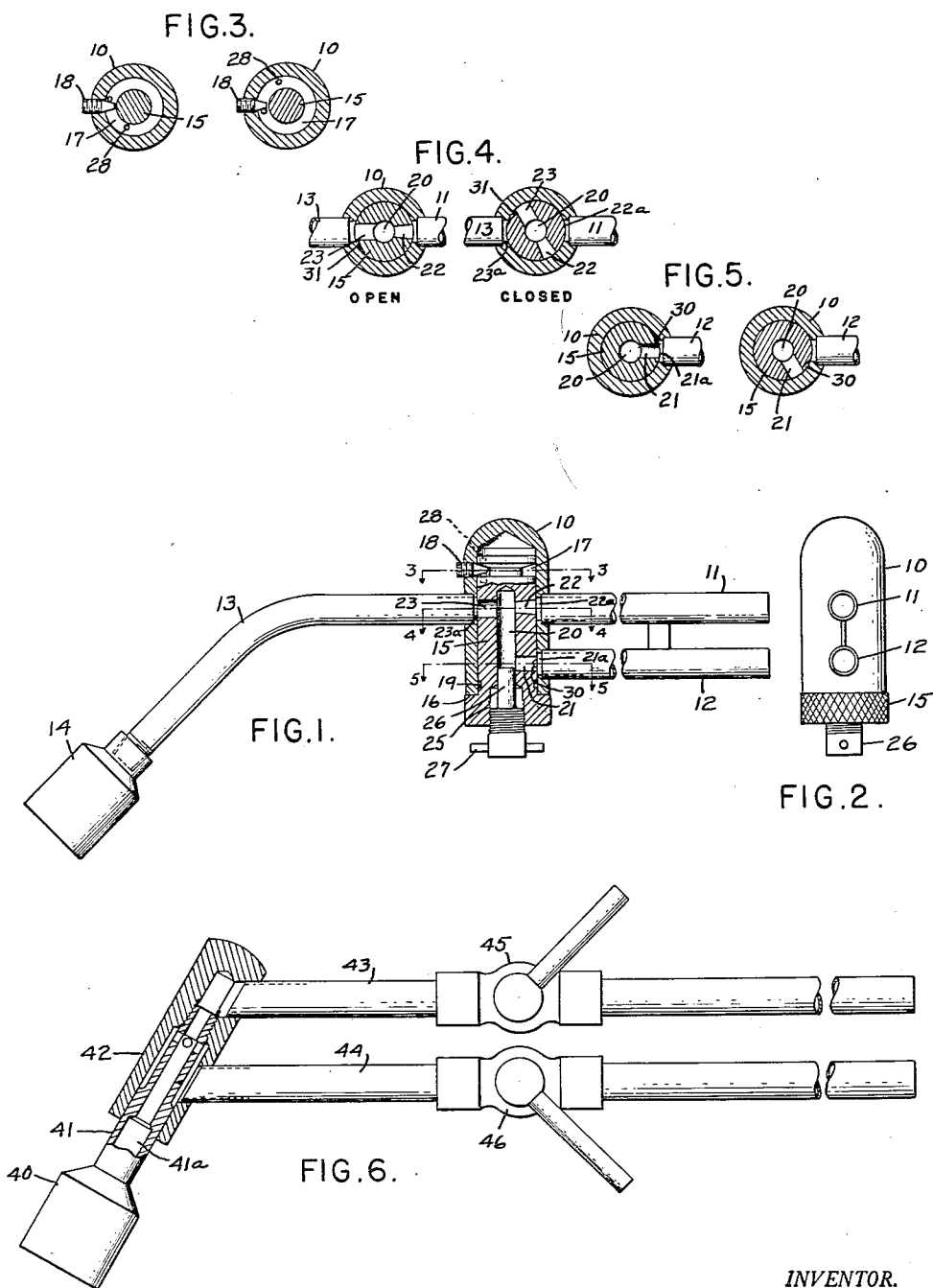
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BLOWPIPE ASSEMBLY

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BLOWPIPE ASSEMBLY

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The present invention relates to blowpipe structures and more particularly to a combination blowpipe and control valve assembly constructed and arranged so that the operator may regulate, control and direct the fire with one hand while retaining complete freedom of use of his other hand in holding or adjusting the work, in applying fluxes and solders, and in performing such other operational tasks as the nature of the work may require. A primary aim of the invention is to provide a simple and more efficiently operated tool for laboratory use than has been known or available heretofore.

A further aim of the invention is to provide a single-hand blowpipe assembly that may conveniently be altered from one producing a relatively small flame to one that will produce a relatively large flame. Heretofore it was the common practice for the laboratory worker, auto mechanic and others having use for a blowpipe to have on hand an assortment of sizes of blowpipes, varying from small to large and it was necessary for the user to disconnect hose lines from one blowpipe and reconnect the lines to another whenever the work in hand required a different quality fire. By this invention the worker need be provided with but one tool that may remain connected with the air and gas lines and with one or more burner heads that may be interchanged in only a moment's time. By way of further improvement the invention aims to provide a single-hand blowpipe combination having interchangeable heads with separate means whereby the tool is adaptable to any one of the various fuel gases such as manufactured, natural, mixed, and the bottled gases (butane, propane, etc.).

Prior to this invention blowpipes were customarily provided with a burner head in intimate association with a gas and air mixing chamber to which independent gas- and air-supply lines were connected. In the several supply lines, some distance away from the mixing chamber and burner head, separate valves were incorporated by which the operator while holding the blowpipe in one hand could with his other hand separately adjust each valve until the proper flame for the work was produced. Regulating the flame of such a blowpipe necessitated the two hands of the operator which meant that the work had to be most carefully supported to be self-sustaining while the flame was being adjusted or the blowpipe laid aside and then the work assembled. If a change in the fire appeared warranted during the operation the blowpipe was removed, its valves separately adjusted, and thereafter returned to the work. By the present invention such awkward and inefficient manipulation of the blowpipe and its flame regulating and control means has been eliminated and in its place a single combined dual-valve and mixing chamber is provided in the handle of the tool at a region that is conveniently accessible to the thumb and forefinger of the hand in which the tool is held and at a remote distance from the burner head so as to remain unaffected by the heat therefrom.

A further aim of the invention is to provide an improved blowpipe structure with a means for holding a

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fire "on" the burner head during intervals of work changing or during a temporary lull or hesitation in the performance of a given heating operation. In many cases it may not be desirable to have the fire on all the time and with the single-handed control afforded by the present invention the operator has complete control of the fire with one hand and may give uninterrupted attention to the work with the other with consequent saving of time as well as resulting in a marked improvement in the quality of the joint or seam that has been worked upon.

In attaining the objectives of this invention it is proposed to construct a combination valve and fuel mixer in the handle of the blowpipe and to provide therein a single element, movable by the thumb and forefinger of the hand, for regulating both gas and air simultaneously. The improved combination further incorporates a normally fixed but adjustable ratio-valve located preferably in the gas conduit leading to the mixing chamber by which the proper mixture, according to the type of fuel gas being used, may be initially obtained, and also a means located preferably in the gas conduit leading to the mixing chamber by which a restricted quantity of gas may continue to flow and furnish a pilot fire at the burner head when the combination valve is moved to its normally closed position. The outgoing side of the combination valve of this improved blowpipe assembly may, therefore, be furnished with a single tube that conducts the fuel mixture to the burner head at its free end. As above indicated the burner head of the present construction may be located some distance from the combination valve and mixer so that the latter is not effected by the heat and also so that the conducting tube is caused to function as a continuation of the mixing chamber within the combination valve whereby assuring delivery to the burner head of a more thoroughly and uniformly mixed fuel.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:

Figure 1 of the drawings is an assembled view of the blowpipe of this invention with the combination valve and mixer illustrated in vertical cross section.

Fig. 2 is an end elevational view of Fig. 1.

Figs. 3, 4, and 5, are transverse sectional views taken in planes 3—3, 4—4, and 5—5, respectively, of Fig. 1, illustrating the relations of the ports in valve-open position (at the left) and valve-closed position (at the right) in each of the several planes.

Fig. 6 is a view partly in section of a typical blowpipe of the type commonly used prior to this invention.

Referring more particularly to Figure 1, the blowpipe assembly illustrated comprises a main valve housing 10 with which an air-supply tube 11 and a gas-supply tube 12 are connected on one side and a delivery tube 13, that leads to a burner head 14, is connected at the other side. As illustrated in the drawing the valve housing 10 is constructed in the form of a hollow cylinder closed and rounded at its upper end. The interior of the cylinder is finished to cooperate with a closely fitting valve element 15. The valve element projects from the open end of the cylinder and is enlarged to form a shoulder 16. The periphery of the enlarged portion may be knurled to provide a good grip for turning the valve element about its axis. The inner end of the valve element is formed with

a wedge shaped annular groove 17, which, in cooperation with a complementally tapered screw 18 threaded through the housing, provides a simple means for securing the valve element within the housing yet providing for relative rotary movement. If desired a sealing gasket 19 may be provided between the inner and outer members near the enlarged portion of the valve, which, in conjunction with the close fitting of the parts and the shouldering provided at 16, eliminates the possibility of leakage.

The valve element 15 is also formed with an axial bore 20 from which a radial port 21 situated in one transverse plane, and radial ports 22, and 23 situated in another transverse plane communicate. The housing 10 is provided with similarly located ports 21a, 22a and 23a that communicate with the tubes 12, 11, and 13, respectively. Preferably the tubes 11-12-13 are brazed to the housing but may be secured thereto by threading or other suitable means. The valve port 22 and port 23 are aligned and opposite, and port 22 is cone-shaped and converges toward port 23. In the present embodiment the purpose and effect of the cone port is to increase the velocity of the flow of air across the mixing chamber 20, and the increased velocity and resulting pressure reduction, aspirates gas from the port 21 and the two fluids commingle in the outgoing port 23. Port 23 communicates with the burner tube 13 and a mixture of the gases is conducted to the burner head 14, further mixing occurring as the gases move through the tube 13. Thus by the time the mixture reaches the burner head it has become thoroughly mixed and is of uniform quality.

The central bore 20, extends to the exterior of the valve element and is enlarged and threaded as at 25 to receive the stem end 26 of a ratio valve. The inner end portion of the valve stem 26 slidingly fits the central bore 20 and is arranged so that its end may pass across the gas port 21. The outer end of the ratio-valve may be provided with a cross pin 27 by which the valve 26 may be adjusted relative to port 21 from a full open position to a partially closed position. Normally the ratio-valve occupies a fixed position but is capable of adjustment to obtain an efficient gas-air mixture with a given type of fuel. When the proper proportions have been obtained, variations in the size of the blow-pipe flame is obtained by adjusting the knurled projection of the dual valve 15 which effects a shifting of ports 21 and 22 simultaneously and relatively to their respective supply tubes 11 and 12. For convenience in establishing the extreme limits of rotary movement of the valve 15 relative to the housing 10, the inner end of the valve element may be drilled axially to receive a pair of angularly spaced pins 28 located in the path of the securing screw 18 and at each side thereof. When the valve 15 is at one extreme position (open) one of the pins engages the securing screw 18 and when in its other extreme position (closed) the other pin 28 engages the screw 18. Fig. 3 illustrates in sectional view the relative position of the valve 15 and housing 10 when the valve is turned to fully opened position (left figure) and fully closed position (right figure) and in Fig. 4, the corresponding positions of the ports in the plane 4-4 of Fig. 1, and Fig. 5, the corresponding positions of the ports in plane 5-5 of Fig. 1. When the valve element is rotated to an intermediate position the cross sectional areas of the several ports are varied proportionately with resulting variations in flame size.

So that there will always be a small quantity of gas flowing to the burner head, when the valve is otherwise closed, it is proposed to provide a circumferential groove 30 in the valve element leading from the gas port 21 thereof to the gas inlet port in the housing. When the valve has been turned to the position shown at the right in each of Figs. 3, 4, and 5, the main ports for both gas and air are closed off from the source of supply but a small quantity of gas is allowed to pass via circumferential port 30 into the mixing chamber and thence to the burner

head via a similarly positioned circumferential port 31 at the outlet end of the mixing chamber 20.

In using the improved blowpipe assembly the operator will first select the burner head 14 that he desires to use for the work at hand and screw it on the threaded end of the tube 13. With the main valve 15 turned to its off position the gas and air lines are then connected with tubes 12 and 11 and the line valves are opened. Inasmuch as the present dual valve passes a limited quantity of fuel gas for a pilot fire the burner may be ignited. With the blowpipe held in one hand the user may gradually turn the main valve with his thumb and forefinger and open the main valves to gas and air simultaneously and a combustible mixture is supplied to the burner 14. Meanwhile the operator may be holding or setting the work, applying flux or a solder, etc. as may be needed. During the progress of the heating operation the operator by turning the valve 15 may increase or decrease the gas and air simultaneously with the same hand that holds and directs the fire and at the completion of the operation reduce the fire to a small pilot light without the aid of the other hand. Should another job require a different type of fire, the burner head 14 is removed and replaced by one best suited for the work. If the quality or type of fuel gas is changed the proper combustible mixture is first obtained by adjusting the ratio valve 26, and once the proportions have been established the valve 26 remains fixed and the blowpipe flame controlled by turning the finger-operated dual valve 15.

For the purposes of illustrating the simplicity and efficiency of the improved blowpipe of this invention in comparison with the conventional blowpipe heretofore in use, a conventional blowpipe has been illustrated in Fig. 6. In the conventional blowpipe the burner 40 has a stem part 41 that is ported axially and transversely and forms an inseparable part of a casing 42. Independent air and gas pipes 43 and 44, each having separate valves 45 and 46 therein, are connected with the casing 42 and form an integral part thereof. The mixing chamber 41a is closely adjacent the burner and the possibility of burning raw or at least not thoroughly mixed fuel is continually present. Such a blowpipe, moreover, requires two hands to light and adjust the flame, one hand to hold the blowpipe and the other hand to adjust first the gas valve 46 and then air valve 45 little by little in alternation, until the desired fire was obtained. Only then could the operator adjust the work and make it ready for heating. If a change in the fire was necessary the blowpipe was removed, the two valves separately adjusted, and again returned to the work. This tedious method of operating the prior blowpipe was not only costly in operator's time but sorely inefficient as to the rapidity and quality of work that could be performed therewith.

By the present invention an improved blowpipe assembly has been rendered available, one that is universally adaptable to produce any size fire within its range, merely by interchanging heads. The fire of the blowpipe may be conveniently directed and simultaneously regulated and controlled with one hand. The improved assembly further combines a means for automatically retaining a pilot fire on the blowpipe burner during the dwell periods between successive operations. It will also be seen that with this improved blow pipe the combination mixer and dual-valve is located in the handle of the device not only to promote convenient manipulation and to obtain better tool balance and maneuverability but to obtain a consistently uniform mixing of the gases prior to the delivery thereof to the burner head.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this

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invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

1. A combined valve and mixer for a gas torch comprising a housing member having an open ended cylindrical bore formed therein and a pair of laterally extending ports communicating therewith and adapted to be connected with sources of fuel and air respectively, said housing also having a delivery port formed therein opposite and aligned with the said air supply port for conveying a fuel and air mixture to the point of use, a valve element rotatably mounted within the cylindrical bore of the housing and having an enlarged end portion exteriorly of the housing for manual operation, and said valve element also having a crossport therein in the plane of the air supply port and the delivery port and whose sectional area diminishes in the direction of flow and a second crossport opposite and aligned with the first named crossport and being of uniform sectional area, and a third crossport therein located in the plane of the fuel supply port, said valve element also having a centrally disposed conduit

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with which all of said crossports communicate whereby to provide a mixing chamber within the valve element, all of said crossports being so positioned in the valve element with relation to the supply and delivery ports that rotation of the valve element in the housing varies the flow to and from the mixing chamber through all three crossports simultaneously.

2. The valve combination of claim 1 including valve-element-retaining means normally operative to restrain axial displacement of the valve element and means cooperating therewith to limit the rotary movement of the valve element relative to the housing to less than a full turn.

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