

J. F. WILLIAMS.

BLOWPIPE.

APPLICATION FILED DEC. 20, 1909.

981,342.

Patented Jan. 10, 1911.

3 SHEETS-SHEET 1.

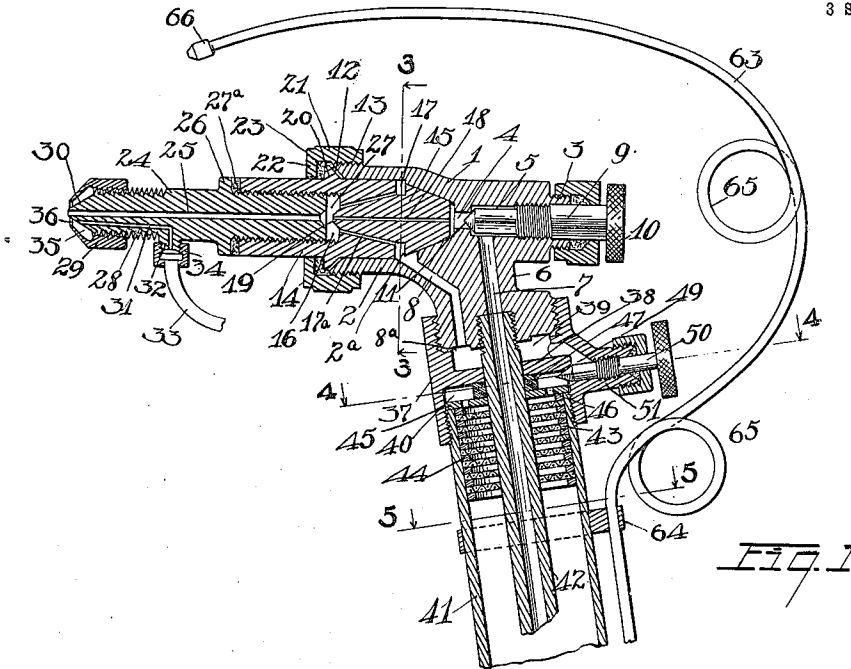


FIG. 1

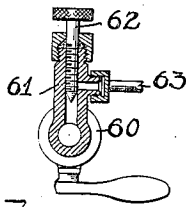
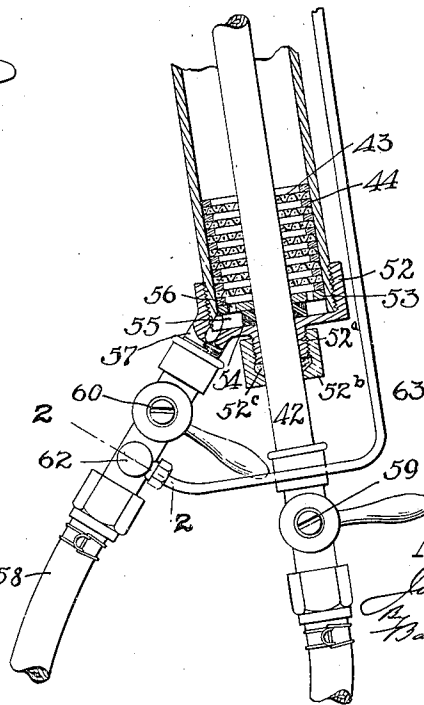


FIG. 2



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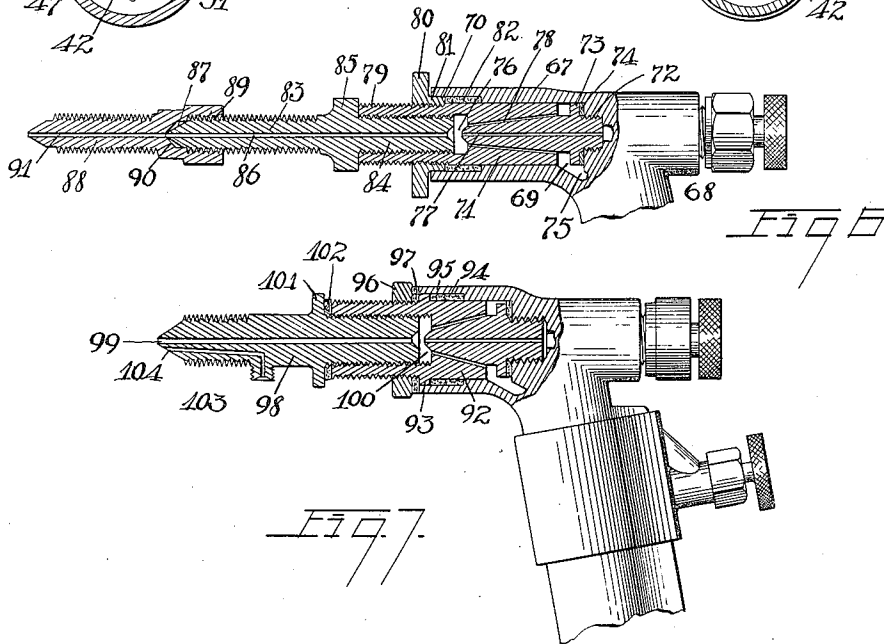
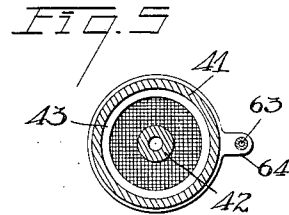
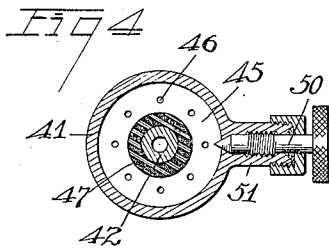
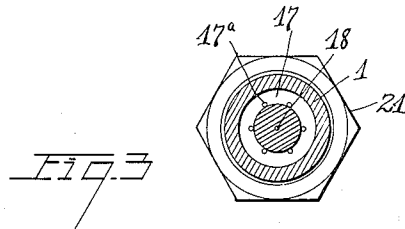


FIG. 7

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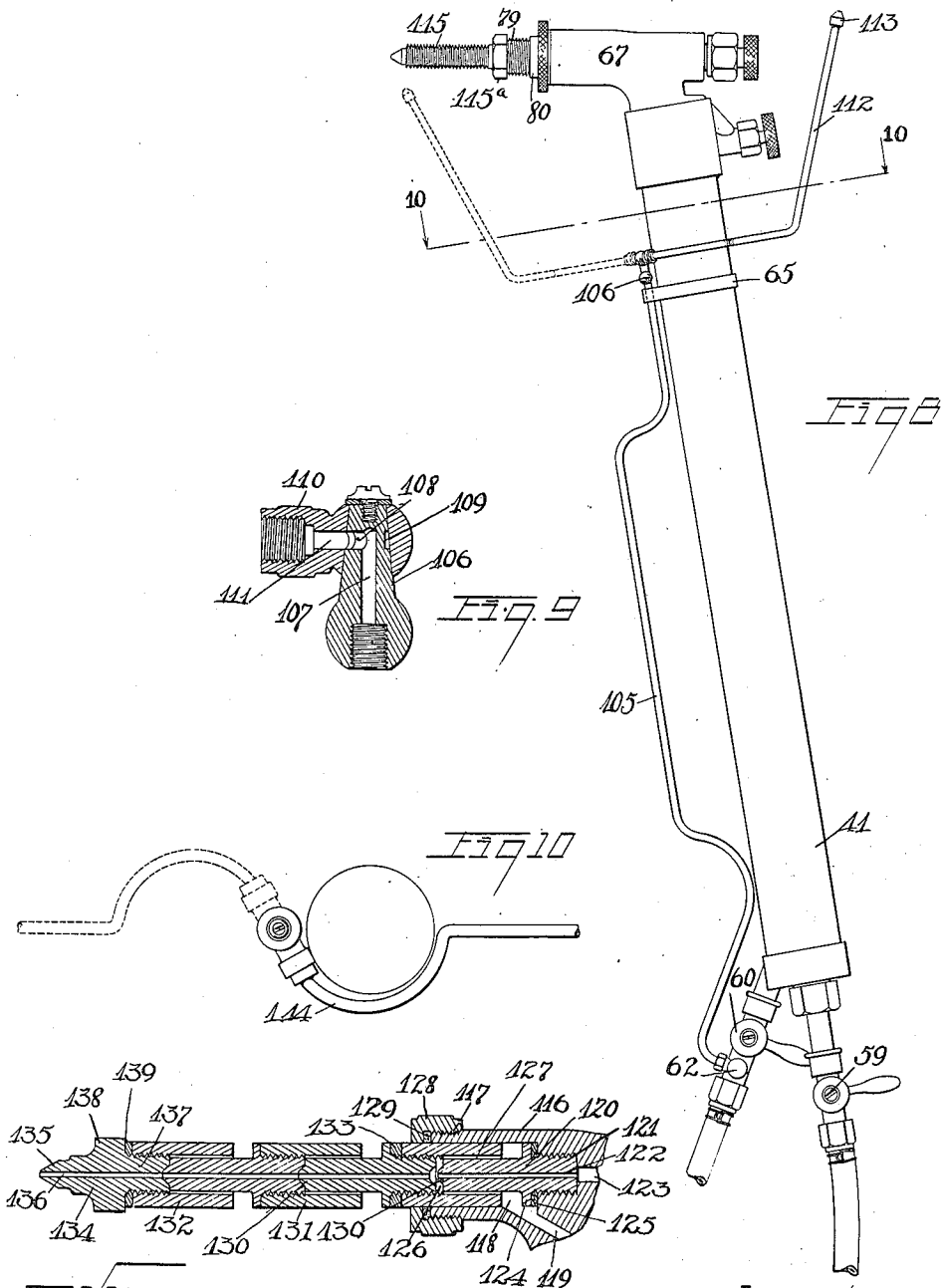
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3 SHEETS-SHEET 3



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UNITED STATES PATENT OFFICE.

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BLOWPIPE.

981,342.

Specification of Letters Patent. Patented Jan. 10, 1911.

Application filed December 20, 1909. Serial No. 534,138.

To all whom it may concern:

Be it known that I, JOHN F. WILLIAMS, residing at Sandusky, in the county of Erie 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 blow pipes, and especially pipes which are designed for the burning of acetylene with oxygen.

The objects of my invention are to provide a pipe of this kind which will be extremely efficient and economical in operation, the length of which may be conveniently changed to suit varying conditions of use, which shall possess means whereby the pipe may be conveniently relighted in case the same is extinguished, and which shall have efficient means for producing a cutting flame.

With the above general objects in view, my invention may be defined further as consisting of the combinations of elements embodied in the claims hereto annexed and illustrated in the drawings forming a part hereof, wherein—

Figure 1 represents a view, mainly in longitudinal section, of a blow pipe constructed in accordance with my invention; Figs. 2, 3, 4 and 5 represent sectional details, respectively, corresponding to the lines 2—2, 3—3, 4—4, and 5—5, of Fig. 1; Figs. 6 and 7 represent longitudinal sectional views of modifications of the tip construction shown in Fig. 1; Fig. 8 represents an elevation of the blow pipe and connections, the pipe proper being similar to that shown in Fig. 6, and showing a modified form of the pilot burner shown in Fig. 1; Fig. 9 represents a sectional detail of the connection between the pilot burner of the preceding figure and its supply pipe; Fig. 10 represents a detail in plan of the pilot burner supply; and Fig. 11 a longitudinal sectional view of the further modified form of the blow pipe tip arrangement.

Describing the parts by reference characters, 1 denotes the casing of the blow pipe proper, said casing being generally cylindrical in shape and provided with a chambered front end 2 and an externally threaded rear end 3. The front end of the casing has

therein an enlarged chamber having a tapered rear end which merges with a central bore 4, which bore communicates with a chamber 5 in the rear portion of the casing and in line with the threaded end of the same.

6 denotes a neck projecting downwardly from the casing 1 and provided with a passageway 7 communicating with the chamber 5 and a passageway 8 which communicates with the chamber formed in the front end of the casing 1.

9 denotes the stem of an adjusting valve projecting through the threaded rear end of the casing and having an operating handle 10. This valve stem is threaded into the casing, at the rear of the chamber 5, and is provided with a conical end 11 coöperating with the valve seat formed at the junction of the chamber 5 and bore 4.

The front end of the casing 1 is flared, as shown at 12, and is provided with an external thread 13.

14 denotes a plug which is adapted to be applied to the front end of the casing 1. This plug is generally cylindrical in shape and has a frusto-conical rear end 15 which is adapted to be forced to a seat against the correspondingly shaped rear end of the chamber 2^a. At its front end, the plug 14 is provided with a cylindrical chamber 16 extending inwardly from the front end thereof. Between the frusto-conical front portion thereof, there is provided an annular recess or chamber 17 which, when the plug is in place in the front of the blow pipe casing, communicates freely with the passageway 8. The plug is provided with a bore 18 extending axially therethrough and communicating at one end with the bore 4 and at its other end with the chamber 16. The plug 14 is preferably formed as an integral casting and the bottom of the chamber 16 is projected forwardly into said chamber, as shown at 19, to form a nozzle through which the front end of the bore 18 discharges. The plug 14 is provided with an outwardly projecting flange 20, having its rear face tapered complementally to the flared front of the casing 1.

21 denotes a gland nut which is adapted to be threaded upon the front end of the

casing 1 and which has an inwardly projecting flange 22, between which and the flange 20 there is interposed suitable packing material 23. By adjusting this nut, the plug 14 may be forced home to its seat in the casing 1 and a tight joint be formed between the plug and the casing.

A series of inclined passageways 17^a connect the annular chamber 17 with the rear end or bottom of the chamber 16. These passageways converge from the annular port 17 toward the discharge end of the bore 18.

24 denotes a tip which is adapted to cooperate with the plug 14. This tip is provided with a bore 25 extending therethrough and adapted to aline with the bore 18. The rear end of the tip is threaded, to adapt it for connection to the internally threaded cylindrical end of the plug 14, and the tip is provided with a flange 26 which is adapted to limit its adjustment with respect to said plug. Between this flange and the front end of the plug there is interposed packing material 27^a. By increasing or diminishing the thickness of this material, the width of the mixing chamber 27 formed between the rear end of the tip 24 and the bottom of the chamber 16 may be varied. The front end of the tip 24 is threaded, as shown at 28, for the reception of a nozzle 29, or other tips, such as shown in Fig. 6. The front of the tip 24 is tapered, as shown at 30, and the bore 25 discharges through the center of this taper portion. For the purpose of furnishing a cutting flame, the tip 24 may be provided with a passageway 31 extending rearwardly from the front end of the tip through a lateral threaded projection 32, to which the oxygen supply pipe 33 may be connected by means of a nut 34. The front end of the nozzle 29 is tapered and forms with the front end of the tip a chamber 35, which may receive the oxygen supplied through the passageway 31 and discharge the same in a converging sheet through the discharge orifice 36 into the flame produced at the end of the tip.

The neck 6 is provided at its lower end with an external thread which is adapted to receive a connecting sleeve 37. This connecting sleeve is provided with a transverse partition 38 above which there is formed a chamber 39 and below which there is formed a chamber 40. The lower end of the sleeve is threaded for the reception of the upper end of the casing 41, through which acetylene is supplied to the blow pipe. The partition 38 is provided with a central bore for the pipe 42 through which oxygen is supplied to the blow pipe. The upper end of this pipe is threaded into the base of the neck 6 and the passageway through the pipe 42 forms a continuation of the passageway 7. The base of the neck 6 is pro-

vided with an annular groove 8^a to which a packing ring may be applied and the lower end of the passageway 8 communicates with this groove.

The space within the casing 41 and between the same and the pipe 42 is provided with a series of alternating wire gauze disks 43 and washers 44, as shown in my Patent #942,690, issued December 7, 1909. The purpose of this construction is to prevent the propagation of flame through the casing 41.

45 denotes a disk which extends across the top of the casing 41 and is provided with a plurality of ports 46 through which acetylene may be discharged into the chamber 40.

47 denotes a washer of suitable material surrounding the pipe 42 and interposed between the disk 45 and the partition 38, the ports 46 being located outside of the periphery of said washer.

49 denotes a passageway by means of which communication may be established between the chambers 39 and 40, said passageway being controlled by a regulating valve 50, said valve being of the ordinary needle type and reciprocally mounted in a projection 51 of the sleeve 37. The valves 10 and 50 constitute adjusting valves by means of which the proportions of acetylene and oxygen to the blow pipe may be regulated.

The lower end of the casing 41 is closed by a connection 52 threaded thereon. Between the bottom of this connection and the disk 53, which extends across the bore of the casing 41, there is interposed a washer 54, similar to the washer 47. This construction provides a chamber 55 at the bottom of the casing 41, said chamber discharging acetylene into the casing through the ports 56 in the disk 53. The connection 52 has a central projection through which the pipe 42 passes, and a lateral projection 57 to which the acetylene supply pipe 58 is connected. The central projection 52^a is threaded and a gland nut 52^b having packing 52^c therein is threaded onto said projection.

The pipe 42 is provided with a valve 59, and the pipe 58 with a valve 60 by means of which the supply of oxygen and acetylene may be turned onto the blow pipe. At a point beyond the valve 60, that is to say, between said valve and the acetylene tank, there is provided a valve-controlled connection 61, said connection having an ordinary valve 62 controlling the supply of acetylene to a branch pipe 63. This branch pipe is conveniently extended along the rear side of the casing 41, being supported by a sleeve 64 on said casing through which it extends. This pipe has a small bore and is bent rearwardly to clear the valves 10 and 50. The pipe is provided with a plurality

of spirals 65 which normally hold the discharge end thereof away from the blow pipe tip a sufficient distance to prevent interference with the working of the pipe. At its discharge end, the pipe 63 is provided with a tip 66, which may be of any approved type adapted for the burning of acetylene. This tip serves to maintain a pilot flame in such proximity to the blow pipe that, if the latter should be extinguished by merely bending the pipe 63, the tip 66 may be brought in proximity to the blow pipe tip and the blow pipe be re-ignited. At the same time, the flame burning at the tip 66 serves to illuminate any objects upon which the blow pipe may operate.

In Fig. 6 there is shown a modified form of the blow pipe illustrated in Fig. 1. In this view, the blow pipe casing is indicated at 67. This casing is provided with a neck 68, similar to neck 6, and has a cylindrical chamber in its front end, the rear of said chamber being shown at 69. Within its extreme front end, the casing 67 is provided with an annular recess 70. The plug 71 cooperating with this casing is similar to the plug 14, differing from the latter mainly in that its rear end is not tapered, but is cylindrical and is provided with a thread 72, by means of which the plug is connected to the casing. The rear portion of the plug is also provided with a flange 73, between which and the bottom of the chamber 69 there is interposed packing 74. An annular space is provided in front of the flange 73 for the reception of acetylene supplied through the passageway 75. The plug is provided with a mixing chamber 76 similar to the mixing chamber 27, which mixing chamber is supplied through the bore 77 and convergent passageways 78 which correspond respectively to the bore 18 and passageways 17^a of Fig. 1. The outer end of the plug 71 is threaded internally, as is the case with the plug 14. It is also threaded externally, as shown at 79, for the reception of a packing nut 80, said nut having a sleeve 81 adapted to project into the recess 70 and to compact therein packing material 82. 83 denotes a tip which is provided with a cylindrical extension 84, by means of which it is threaded into the front of the plug 71, the tip being provided with a flange or shoulder 85 adapted to abut against the end of the plug. This tip is provided with a longitudinal bore 86 and is threaded beyond the shoulder 85, both for the purpose of enabling it to receive another tip and for the purpose of providing, in effect, radiating flanges. The end of the tip 83 is shown as beveled at about an angle of 30°, as shown at 87. 88 denotes a second tip which is provided at its rear end with an internally

threaded connection 89 by means of which it may be screwed upon the front end of the tip 83. This connection 87 is provided with a beveled surface 90 converging toward the bore 91. The inclination of the surface 90 is greater than the inclination of the front end of the tip 83, the inclination with the surface 90 being shown as approximately 45°. This construction provides a gripping and centering action between the front end of the tip 83 and the cooperating portion of the tip 88. The tip 88 may be provided with threads similar to the threads on the tip 83 and for the same purpose.

In Fig. 7 there is shown a still further modification of the blow pipe, which differs from that shown in Fig. 6, mainly in providing the plug 92 with a flange 93, which flange, by the adjustment of the plug rearwardly, is adapted to compress the packing 94 which is placed in the annular recess in the front end of the casing 95. By means of a lock nut 96 mounted on the threaded end of the plug and packing 97 interposed between said lock nut and the end of the casing 95, a tight joint is formed between the casing and the plug. In all other particulars, the plug 92 and casing 95 are substantially the same as the corresponding parts of Fig. 6. 98 denotes a tip which is provided with a longitudinal bore 99 adapted to receive a mixture of oxygen and acetylene from the chamber 100. This tip is similar to the tip 24 shown in Fig. 1 and is provided with a shoulder or flange 101 between which and the front end of the plug 92 there is interposed packing 102. The front end of the tip is threaded, as shown at 103, and the tip is also provided with a passageway 104 for the same purpose as the passageway 31 in the tip 24.

In Figs. 8, 9 and 10 there is shown a modification of my invention in which a different construction of pilot light supply is provided than is shown in Fig. 1. In the last-mentioned figures, 105 denotes a pilot light supply pipe. At its outer end, this supply pipe extends through a projection in a band 65, carried by the casing 41. The upper end of the pipe is connected to a plug 106 having a vertical bore 107 communicating by a lateral port 108 with the annular passageway 109 formed in the plug. The connection 110 is swiveled upon the tapered end of the plug 106 and is provided with a port 111 adapted to receive acetylene from the annular passageway 109 in any position of the connection 110 upon said plug. The pipe section 112 is threaded into the connection 110 and is provided at its end with a burner 113 of any suitable type adapted for acetylene. The pipe 105 is preferably offset from the casing 41 to accommodate the hand of

the operator therebetween. The pipe section 112 is provided with a band 114 which enables it to be conveniently folded out of the way of the tip 115 when the pilot burner is not required to relight the gases emerging from the tip. The blow pipe casing 67 and plug 79 may be identical with the correspondingly numbered parts shown in Fig. 6. In Fig. 8 the nut 80 is shown as reversed in position from that of the correspondingly numbered nut on Fig. 6. This nut is adapted to abut against the end of the casing 67 or against the shouldered flange or nut 115^a on the tip 115 and provide with the latter nut means whereby the plug 79 may be conveniently removed by rotating the nut 80.

In Fig. 11 there is shown a still further modification of the tip construction of my blow pipe. In this view, 116 denotes the casing, said casing having a threaded end 117 and cylindrical chamber 118 which communicates with the acetylene passageway 119. 120 denotes a plug having a reduced threaded rear end 121 adapted to be threaded into the casing and having a central bore 122 adapted to register with the oxygen bore 123. The plug is provided with a flange 124 between which and the adjacent portion of the casing there is interposed packing 125. The front end of the plug is cylindrical in shape and substantially sizes the enlarged bore of the casing 116. The front end of the plug is provided with a chamber 126, the interior of said chamber being threaded. 127 denotes a plurality of passageways which place the chamber 126 in communication with the chamber 118. The front end of the plug is supported by a gland nut 128 threaded upon the front end of the casing and having an inwardly projecting flange between which and the front end of the casing there is interposed packing 129. The bore 122 is extended by means of a front nozzle 130 projecting into the chamber 126. For the purpose of extending the length of the pipe shown in this last figure, a plurality of tips may be employed, each tip being in effect a duplicate of the plug 120. Two of these tips are shown at 131 and 132, and each comprises a cylindrical internally threaded front portion which is adapted to receive an external cylindrical projection of another tip or plug, the rear end of which is preferably of such shape as will form a close connection with the nozzle portion of the plug or tip to which it may be attached. Each of these extensions will have a shoulder similar to shoulder 124 and between which and the cylindrical end of the tip or plug by which it is supported, packing may be interposed, as shown at 133. The passageways 127 will be closed in the external plugs or tips by the rear ends of the plugs or tips secured thereto. The tip proper for the blow pipe having these extensions may be as shown at 134, which comprises a body hav-

ing a tapered end 135, a central bore 136, a threaded rear end 137, and a shoulder 138, which shoulder 138 may be squared for the reception of a wrench. Between this shoulder and the front end of the plug 132 packing may be interposed, as shown at 139.

It will be apparent that by increasing or diminishing the thickness of the packing shown at 27^a, 102 and 133, the depth of the chamber which receives the mixture of oxygen and acetylene may be varied.

Among the advantages of my invention is its adaptability to practically all of the incidents of use. Extending the length of the blow pipe by comparatively short interconnected extensions enables me to provide a fine bore extending the length of the blow pipe, which bore would be practically impossible of production if it were attempted to make the same in a single long tip or extension.

Having thus described my invention, what I claim is:

1. The combination, with a blow pipe casing having a passageway, of a conduit for supplying gas to said passageway, a series of transverse perforated members in said conduit, a pipe within said conduit and communicating with said casing, a valve carried by the casing and regulating the flow of fluid supplied by said pipe therethrough, a valve-regulated duct connecting the conduit with the passageway in the casing, and valves controlling the supply of fluid to said conduit and to said pipe.

2. The combination, with a blow pipe casing having a pair of passageways for supplying gases therethrough, valves for regulating the flow of fluid through said passageways, conduits communicating with said passageways, and a valve for each of said conduits.

3. The combination, with a blow pipe casing having a pair of passageways, a casing located outside of the blow pipe casing, a sleeve connecting said casings, said sleeve having a partition extending transversely thereof and providing a pair of chambers within said sleeve, one of said chambers communicating with one of the passageways, a valve regulating the flow of fluid from one chamber to the other, means in said casing for preventing the propagation of flame therethrough, a fluid supply pipe within said casing and communicating with the other passageway of the blow pipe casing, valves controlling the supply of fluid to said casing and pipe, and a valve for regulating the flow of fluid through the passageway with which said pipe communicates.

4. The combination, with a blow pipe casing having a pair of passageways, a casing located outside of the blow pipe casing, a sleeve connecting said casings, said sleeve having a partition extending transversely

thereof and providing a pair of chambers within said sleeve, one of said chambers communicating with one of the passageways, a valve regulating the flow of fluid from one chamber to the other, a fluid supply pipe communicating with the other passageway of the blow pipe casing, valves controlling the supply of fluid to said casing and pipe, and a valve for regulating the flow of fluid through the passageway with which said pipe communicates.

5. The combination, with a blow pipe casing having a lateral projection and provided with passageways extending through said projection, a pipe communicating with one of said passageways, a sleeve connected with said projection and provided with a pair of chambers, one of said chambers communicating with the other passageway, a casing surrounding the pipe and connected to said sleeve, transverse perforated partitions in the latter casing surrounding the pipe, a perforated disk interposed between the discharge end of said casing and the adjacent chamber in the sleeve, a passageway connecting said chambers, valves regulating the flow of fluid through said passageways, and additional valves controlling the flow of fluid to said passageways.

6. The combination, with a blow pipe casing having a lateral projection and provided with passageways extending through said projection, a pipe communicating with one of said passageways, a sleeve connected with said projection and provided with a pair of chambers, one of said chambers communicating with the other passageway, a casing surrounding the pipe and connected to said sleeve, a passageway connecting said chambers, and valves regulating the flow of fluid through said passageways.

7. In a blow pipe, the combination of a blowpipe casing having a lateral projection and provided with a pair of passageways in said projection, a sleeve connected with said projection and provided with a transverse partition providing chambers above and below the same, a casing connected to the lower chambered end of the sleeve, a pipe mounted within said casing and extending through said partition and communicating with one of the passageways in the blow pipe casing, perforated partitions in the second casing, a washer surrounding the pipe beneath the partition in the sleeve, a perforated disk beneath said washer and extending across the top of the second casing, said sleeve being provided with a passageway connecting the chambers thereof, a valve for regulating the flow of fluid through said passageway, a valve for regulating the flow of fluid through the first-mentioned passageway, and additional valves for controlling the supply of fluid to the first-mentioned passageways.

8. In a blow pipe, the combination of a blowpipe casing having a lateral projection and provided with a pair of passageways in said projection, a sleeve connected with said projection and provided with a transverse partition providing chambers above and below the same, a casing connected to the lower chambered end of the sleeve, a pipe mounted within said casing and extending through said partition and communicating with one of the passageways in the blow pipe casing, said sleeve being provided with a passageway connecting the chambers thereof, a valve for regulating the flow of fluid through said passageway, a valve for regulating the flow of fluid through the first-mentioned passageway, and additional valves for controlling the supply of fluid to the first-mentioned passageways.

9. In a blow pipe, the combination of a blowpipe casing member having a chamber and provided with passageways communicating with such chamber, a plug in said chamber and having a mixing chamber and provided with a central bore adapted to receive fluid from one of said passageways and discharge the same into the mixing chamber and having a plurality of longitudinal passageways surrounding said bore and adapted to receive fluid from the second passageway and discharge the same into the mixing chamber independently of the central bore, means for adjusting the proportions of gases supplied through said passageways, and a tip carried by said plug.

10. In a blow pipe, the combination of a blowpipe casing member having a chamber and provided with passageways communicating with said chamber, a plug detachably connected with the casing and having a mixing chamber and provided with a central bore adapted to receive fluid from one of said passageways and discharge the same into the mixing chamber and having a plurality of longitudinal passageways surrounding said bore and adapted to receive fluid from the second passageway and discharge the same into the mixing chamber independently of the central bore, means for adjusting the proportions of gases supplied through said passageways, and a tip detachably carried by said plug.

11. In a blow pipe, the combination of a blowpipe casing member having a centrally arranged chamber and provided with a centrally arranged passageway provided with an adjusting valve and with a second passageway communicating with said chamber, a plug having its rear end in said chamber and provided with a centrally arranged bore adapted to receive fluid from the first-mentioned passageway and provided with a mixing chamber into which said bore discharges, said plug having a plurality of converging passageways communicating with the pas-

sageway in the casing and discharging into the mixing chamber, means for detachably securing said plug to the blow pipe casing, and a blow pipe tip having a bore adapted to communicate with the mixing chamber and having means whereby it may be detachably secured to said plug.

12. In a blow pipe, the combination of a blowpipe casing member having a central bore provided with an adjusting valve and a chamber at the front end thereof communicating with said bore, said casing member having a second passageway communicating with the said chamber, a plug detachably connected to said casing, said plug having a mixing chamber and provided with a projection extending rearwardly from said mixing chamber and having a bore adapted to receive fluid from the first-mentioned bore, said plug being provided with an annular chamber communicating with the chamber in the casing and having a plurality of converging passageways extending between the annular chamber and the casing chamber and surrounding the central bore of said plug and discharging into said mixing chamber, a tip connected to said plug and having a bore communicating with the mixing chamber, and means whereby said tip may be adjusted with respect to the plug to vary the depth of the mixing chamber.

13. In a blow pipe, the combination of a blowpipe casing member having a central bore provided with an adjusting valve and a chamber at the front end thereof communicating with said bore, said casing having a second passageway communicating with the said chamber, a plug detachably connected to said casing, said plug having a mixing chamber and provided with a projection extending rearwardly from said mixing chamber and having a bore adapted to receive fluid from the first-mentioned bore, said plug being provided with an annular chamber communicating with the chamber in the casing and having a plurality of passageways extending between the annular chamber and the casing chamber and surrounding the central bore of the plug and discharging into said mixing chamber, and a tip connected to said plug and having a bore communicating with the mixing chamber.

14. In a blow pipe, the combination of a blowpipe casing having a pair of passageways therein, a plug detachably connected to said casing and having a mixing chamber and provided with ducts connecting the same with said passageways, a tip having an extension adapted to extend into said mixing chamber, and means whereby the amount of projection of such extension may be varied to vary the depth of the mixing chamber.

15. In a blow pipe, the combination of a blowpipe casing member having at its front end a chamber and provided with passage-

ways communicating therewith, a plug detachably connected to said casing and having a mixing chamber, a bore extending between said mixing chamber and one of said passageways and a plurality of ducts surrounding said bore and connecting the mixing chamber with the other passageway, the front the thread on the interior of the plug, a tip having an external thread adapted to fit the thread on the interior of the plug, a shoulder carried by said tip, and packing material interposed between said shoulder and the front end of the plug.

16. The combination, with a blow pipe casing having a chamber at its front end and provided with a pair of passageways communicating with said chamber, of a plug detachably fitted to said casing, said plug having at its front end a chamber and having a centrally arranged bore extending rearwardly from said chamber, a plurality of ducts surrounding said bore, the front end of said plug being internally threaded, and a member for extending the length of said pipe, said member having a rearwardly projecting portion adapted to be threaded into the chamber of the plug.

17. In a blow pipe, the combination of a tip having a tapered end and a central bore therethrough and provided with a duct parallel with said bore and piercing said tapered end at one side of said bore, means for supplying oxygen to said duct, and a nozzle adjustably carried by said tip and forming therewith an annular chamber for distributing the oxygen supplied through said duct.

18. In a blow pipe, the combination of a tip having a tapered end and an axial bore and provided with a duct extending longitudinally of said tip parallel with said bore and piercing said tapered end and adapted to discharge at one side of said bore, means for supplying oxygen to said duct, and a nozzle carried by said tip and forming therewith an annular chamber for distributing the oxygen supplied through said duct.

19. In a blow pipe, the combination of a tip having a central bore therethrough and having a duct in the wall of said tip extending rearwardly from the discharge end thereof, and a connection for supplying oxygen to said duct.

20. In a blow pipe, the combination of a tip, means for supplying a mixture of gases thereto, a burner, and means for supplying gas thereto, said burner being adjustable toward and from said tip.

21. In a blow pipe, the combination of a tip, means for supplying gases thereto, a pipe and a pilot burner connected thereto, said pipe having a portion supported so as to be movable toward and from the tip.

22. In a blow pipe, the combination of a tip, means for supplying gases thereto, a

supply pipe, and a pilot burner carried thereby, said supply pipe comprising two parts, and a swivel connection between said parts.

5 23. In a blow pipe, the combination of a casing, a tip carried thereby, regulating valves projecting rearwardly from said pipe, a burner, and a pipe having a section bent
10 around the pipe and adapted to support the burner out of operative relation to the tip.

24. The combination of a blow pipe tip, a pipe, and a burner carried thereby, said pipe comprising a section which is movable toward and from the tip.

15 25. The combination, with a blow pipe casing having a lateral projection provided with passageways, of a casing, means for
20 connecting said casing to said projection, a pipe extending through the central portion of said casing and communicating with one of said passageways, the chamber communicating with the other of said passageways, a connection detachably secured to the lower end of said casing and having a central

threaded projection for said pipe and also 25 having a fluid supply connection, a gland nut surrounding the pipe and threaded onto said projection, and packing interposed between said projection and the bottom of said nut.

26. The combination, with a blow pipe casing having a chambered front end, of an extension for said casing, said extension having a threaded exterior and being threaded into said casing, a tip threaded into 30 said extension and having an integral shoulder or nut adapted to abut against the threaded end of the extension, and a lock nut mounted on the threaded end of the extension and adapted to compress a packing 35 washer against the end of said casing, and simultaneously lock the extension in place.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

JOHN F. WILLIAMS.

Witnesses:

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