W. I. REICH.

BLOWPIPE.

APPLICATION FILED JUNE 21, 1910.

**1,097,264.** **Patented May 19, 1914.**

Fig. 1

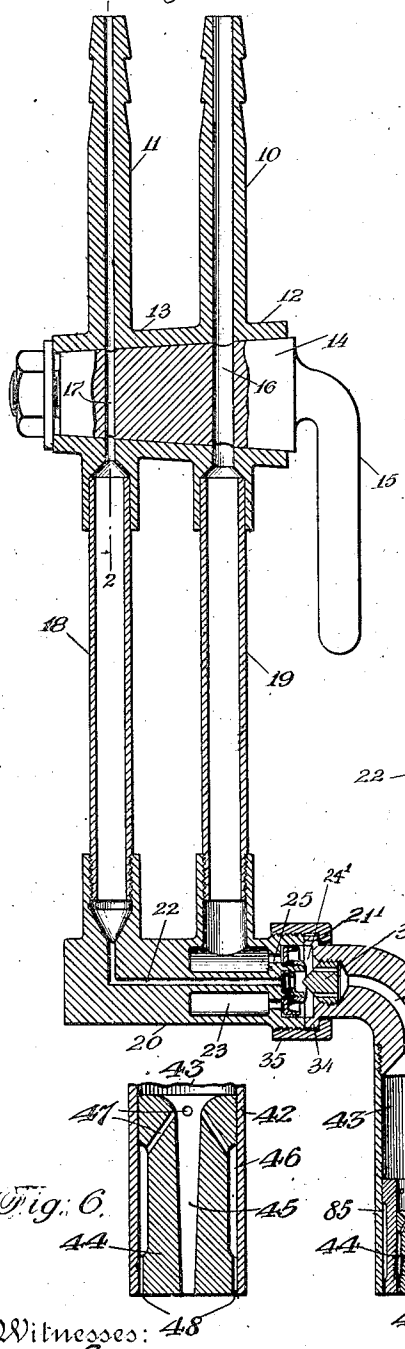



Fig. 2.

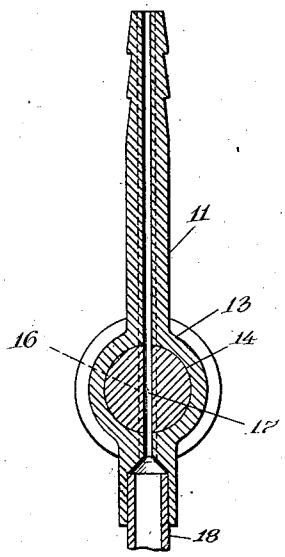



Fig. 3.

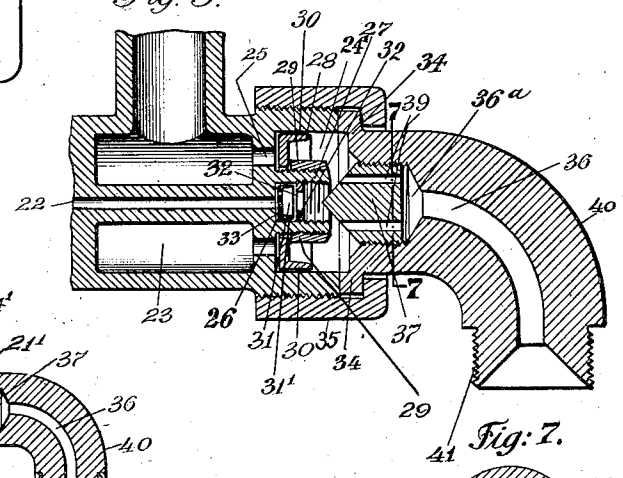



Fig. 7.

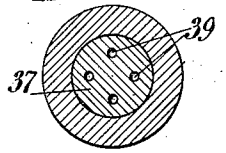



Fig. 4.

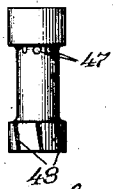



Fig. 5.

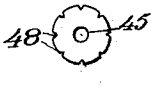



Fig. 6.




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# UNITED STATES PATENT OFFICE.

WILLIAM I. REICH, OF NEW YORK, N. Y.

## BLOWPIPE.

1,097,264. Specification of Letters Patent. Patented May 19, 1914.

Application filed June 21, 1910. Serial No. 568,118.

*To all whom it may concern:*

Be it known that I, WILLIAM I. REICH, a citizen of the United States of America, residing in New York, in the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Blowpipes, of which the following is a specification.

This invention relates to blow-pipes of the kind which are adapted to conduct two streams of gas, for instance, oxygen and a fuel-gas, and discharge them together in a highly heated flame.

The object of this invention is to provide in a device of this kind suitable valves for preventing backflashing into the conducting channels of either gas, and to so arrange these valves that there can be no discharge of any gas backwardly into either of said channels under any circumstances, or, for example, if the end-nozzle of the blow-pipe should become stopped up that gas which has the higher pressure would not be able to force itself back into the channel or reservoir of the other gas.

Another object is to provide a blow-pipe which will very efficiently mix the gases used, both before and after the final discharge from the blow-pipe.

Still another object is to provide adjustable means for controlling the amount of each gas passing through the blow-pipe, and additional means for at will varying said amounts. And another object is to provide means whereby the current of gas and air is so guided as to emanate from the blow-pipe in a whirling manner, by means of which certain metals heretofore not capable of being operated upon, may be successfully manipulated.

In order to accomplish these objects I have provided a unitary cut-off valve for the conducting channels of both gases whereby the openings of said valve through which the gases pass may be varied or simultaneously cut off, and further have provided particular valves in both the fuel and air channels so as to prevent any back-flash. Furthermore, I have provided in consonance with the object of my invention a special form of mixing chamber, and also improved discharge-orifices.

In the accompanying drawing, Figure 1 is a longitudinal sectional view of the blow-pipe, Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, showing the cut off valve, Fig. 3 is an enlarged sectional view showing the improved valves of the blow-pipe for preventing the back-flash, Fig. 4 is a side-elevation of a detachable member of the blow-pipe, Fig. 5 is an end-view of the same, Fig. 6 is another embodiment of my invention, Fig. 7 is a sectional view taken on the line 7—7 of Fig. 3.

Similar reference characters indicate corresponding parts throughout the several figures of the drawing.

Referring more particularly to the drawing, I have shown a blow-pipe adapted to utilize a fuel-gas as acetylene and a combustion-supporting gas as oxygen, the fuel-gas being hereinafter referred to simply as fuel-gas and the combustion-supporting gas being referred to as oxygen. However, it is understood that any suitable gases may be used. The burner is provided with a pipe 10 forming a channel for the fuel-gas and a pipe 11 forming a channel for the oxygen-gas, the flow of gases through said pipes being controlled by the cock 12, which comprises a tapering portion 13 through which said channels pass transversely, as shown. A spigot 14 having a handle 15 is rotatably received by said tapering portion 13 and is provided with a pair of parallel bores 16 and 17 passing therethrough and adapted, when said valve is turned to open position, to be placed in alinement with the channels of said pipes 10 and 11. It will be noticed that the bore 17 and its corresponding channel are of a considerably smaller diameter than the bore 16, as also the diameter of the spigot is of considerably larger diameter where the bore 16 passes through it, than at the place where the bore 17 passes through it. Notwithstanding that the plug is tapering in shape, and smaller at the oxygen-bore than at the fuel-bore, the difference in angular movement at the two portions of the plug is so small that the small movement necessary to close the bore 17 is insufficient to close the bore 16. This arrangement permits the closing or partial closing of the bore 17 without noticeably closing the bore 16. This accomplishes the regulation of the amount of oxygen passing through the pipe 11 without affecting materially the amount of fuel-gas passing through the pipe 10. Thus the amount of oxygen may be regulated without greatly diminishing the amount of fuel-gas. The main point of the invention resides in the varied exposure

of the inlet and the outlet ends of the bores to the pipes 16 and 17; that is by the turning of the spigot 14, the bore 17 is first cut off from the inlet of pipe 11 and then by further turning, the bore 16 is cut off from the inlet of pipe 10. Pipes 18 and 19 conduct the oxygen and fuel-gas respectively to the stationary head 20 carrying the movable nozzle 21. The head 20 is provided with a central oxygen-channel 22 communicating with the pipe 18. A connecting chamber 23 is provided near one end of the head 20 which surrounds the channel 22 and which communicates with the pipe 19. In the end-face of the head 20 an annular valve-chamber 24′ is provided having a plurality of orifices 25 communicating with the chamber 23. The oxygen-channel 22 is provided at its outer end with a circular valve-chamber 26 concentric with the annular valve-chamber 24′, and forming therewith an annular wall 27 which is both internally and externally threaded for purposes which will hereinafter appear.

Within the annular valve-chamber 24′ is provided a movable annular valve 28 having an inner flat face and a peripheral flange 30 adapted to snugly cover the orifices 25 when said valve is pressed rearwardly. In order to limit the movement of the valve 28 and to adjust said limit of movement a nut 29 is placed by means of its central opening upon the outside of the annular wall 27, and by adjusting said nut the amount of space left at the forward-edge of the flange 30 of the valve 28 may be determined, the fuel-gas passing around the edges of the valve and between it and the wall 27, sufficient clearance being allowed for this purpose. A circular valve 31 having a peripheral flange $31^1$ is placed within the chamber 26 and has its movement limited by the nut 32, but is provided with a plurality of orifices 33 to permit the flow of oxygen when said valve is pressed against the nut 32, but sufficiently small as not to impair the quick response and return motion of the valve to its seat under the influence of the increased pressure of gases of a back-flash. The object of the peripheral flanges of the valves is to guide the same so as to assume a uniform movement of the same. The movable nozzle 21 is provided with a smooth flat face $21^1$ which fits against the end-face of the head 20. This nozzle is also provided at said face with a shouldered flange 34 adapted to receive the shouldered flange of a collar 35 screwed to the head 20, whereby said movable nozzle may be adjustably and interchangeably secured to the head 20. The movable nozzle 21 is provided with a channel 36 for the gas mixture. The inner end of said channel is co-axial with the oxygen-channel 22 and the chamber $36^a$ and is provided with an adjustable tip-nozzle 37 screwed thereinto. The tip-nozzle communicates with the chamber 26, as shown. These tip-nozzles are interchangeable and enable the nozzle to be used for different sized blow-pipes. The tip-nozzle 37 is provided with a plurality of channels 39 communicating with the mixing chamber $24^1$ and adapted to conduct the fuel-gas and oxygen from the chamber $24^1$ to the channel 36. It will be seen that by adjusting the tip-nozzle the channels 39 may be partially or wholly closed from connection with the chamber 26 by the contraction or enlargement which is thereby produced of the space between the tapering inner end of the tip-nozzle and the wall 27, as indicated in Fig. 3. As is well known the flow of oxygen causes an injector action on the fuel and both enter channel 36 in their mixed condition.

The movable nozzle 21 comprises the base 40 having a screw-threaded reduced portion 41 at its outer end adapted to receive thereon the cylindrical shell 42. Within said shell 42, and forming therewith and with the reduced portion 41 a mixing chamber 43, is a plug 44, said plug extending to the outer end of the shell 42. This plug 44 is provided with a tapering axial opening 45 forming a central discharge-outlet from the chamber 43. The plug 44 is provided with a broad annular chamber 46 forming therewith and with said shell 42 a chamber communicating by means of a plurality of channels 47 with the opening 45 near the mixing chamber 43. The forward end of the plug 44 is provided with a plurality of spiral grooves 48 communicating with the chamber and forming discharge-orifices for the gas mixture. The gas mixture is expanded and well mixed in the chamber 43. From there it passes through the opening 45 and is compressed. Part of the gas is forced through the openings 47 into the chamber 46 where it expands, which chamber serves as a reservoir from which it discharges in a plurality of small flames emanating from the grooves 48. The grooves 48 being arranged in spiral, a good mixture is effected thereby, and furthermore the smaller flames are caused to ignite the large central flow in case the flame is extinguished, whereby the flame is prevented from blowing out due to high pressure in the central opening 45. The spiral arrangement also causes a vortex in the flame which causes an intimate mixing of the gases necessary to produce a good flame and is desirable when melting certain metal since it gives a whirling motion to the particular mass under treatment. For larger blow-pipes it is very often desirable and necessary to have multiple channels, and mixing chambers, and such an embodiment is shown in Fig. 1, in which an outer chamber 85 fed by channels 86 and outer orifices 87 are shown.

By having valves in both the oxygen-channel and the fuel-channel it is impossible for either of the gases to be forced back into the channel or reservoir of the other gas if the channel 36 should become stopped up. By adjusting the nuts 29 and 32 the amount of gas flowing from either the fuel-channel or the oxygen-channel may be regulated.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a blow-pipe, the combination of a stationary head provided with an annular valve-chamber, a circular valve-chamber concentric with said annular valve-chamber, a check-valve in said annular chamber, separate inlet-channels communicating with said chambers respectively, a nozzle, and an outlet-channel in said nozzle communicating with said chambers.

2. In a blow-pipe, the combination of a stationary head provided with an annular chamber and a circular chamber concentric with each other, the wall between said chambers being internally and externally screw-threaded, a circular valve within said circuit chamber, an annular valve within said annular chamber, and nuts one screwed on the outside and one on the inside of said annular wall.

3. In a blow-pipe having an oxygen-channel and a fuel-channel, a wall separating said channels, and a valve interposed in one of said channels and adapted to be closed by back-pressure therein, said valve having an opening, and being spaced at said opening away from said wall.

4. A blow-pipe having an oxygen-channel and a fuel-channel, a wall between said channels, a check-valve in one of said channels, said valve having an opening, and a nut on said wall adapted to close said opening.

5. A blow-pipe having a head, an oxygen-channel in said head, a fuel-channel in said head separate from the oxygen-channel, said channels having orifices in said head in close proximity to each other, a check-valve entirely within the fuel channel in close proximity to the orifices thereof and adapted to be closed by back-pressure in the fuel-channel caused by back-flashing, said valve having an opening, a check-valve in the oxygen-channel, and a wall separating said valves.

6. In a blow-pipe, the combination of a head provided with a pair of gas-chambers, one within the other, a nozzle provided with a channel communicating with said gas-chambers, an annular check-valve in the outer chamber, and a circular check-valve in the inner chamber.

7. In a blow-pipe, the combination of a head provided with a pair of gas-chambers, one surrounding the other, a nozzle provided with a channel communicating with said gas-chambers, a tip-nozzle carried by said nozzle in line with the inner chamber and adjustable in the nozzle toward and away from the head, and a mixing chamber between the tip-nozzle and the nozzle.

8. In a blow-pipe, the combination of a head provided with a pair of gas-chambers, one for the oxygen and one for the fuel, the fuel-chamber surrounding the oxygen-chamber, a nozzle provided with a channel communicating with said gas-chambers, a tip-nozzle in said channel in line with the oxygen chamber, and carried by said nozzle, and adjustable in the nozzle toward and away from the oxygen-chamber of the head, and a mixing chamber between the tip-nozzle and the nozzle.

9. In a blow-pipe, the combination of a nozzle comprising a base provided with a gas-conducting channel, a cylindrical shell secured to said base, and a plug provided with a central opening, an annular recess, openings connecting said recess and said central opening, and spiral grooves in the periphery of the plug between said recess and the outer end of the plug, said plug being placed within said cylindrical shell, and spaced from said base, whereby a chamber is formed between said plug and said base and an annular chamber is formed between said plug and said shell.

10. In a blow-pipe, a nozzle provided with a central opening open at its outer end, an annular series of spirally-arranged discharge-openings, and means adapted to conduct gas from the central opening to the spirally-arranged openings.

11. In a blow-pipe, a nozzle provided with an annular recess, a series of spirally-arranged discharge-openings communicating therewith, a central discharge-opening open at its outer end, and means adapted to conduct gas from said central opening to said annular recess.

12. In a blow-pipe, a nozzle provided with an annular series of spirally-arranged discharge-openings, a central discharge-opening concentric therewith, and an additional series of spirally-arranged openings concentric with and outside of the first series, and means adapted to conduct gas from the central opening to the first of said series and means for conducting gas from the central discharge-opening to said additional series.

13. In a blow-pipe, the combination of a stationary head provided with an annular valve chamber and a circular valve chamber concentric therewith, a circular check-valve in said circular valve-chamber, an annular check-valve in said annular valve-chamber, means for supplying gases to said chambers respectively, and means for regulating the flow of the gases to said chambers.

14. In a blow-pipe, the combination of a stationary head provided with an annular

valve-chamber and a circular valve-chamber concentric therewith, a circular check-valve in said circular valve-chamber, an annular check-valve in said annular valve-chamber, and means for supplying gases to said chambers.

15. In a blow-pipe, the combination of a fuel-channel, an oxygen-channel, a stationary head provided with a valve-chamber communicating with one of said channels, a closed check-valve in said valve-chamber controlling the passage of gas from said channel to said chamber, and means regulating the stroke of said check-valve to vary the flow of gas through the chamber.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

WILLIAM I. REICH.

Witnesses:
FANNIE FISK,
L. J. MURPHY.