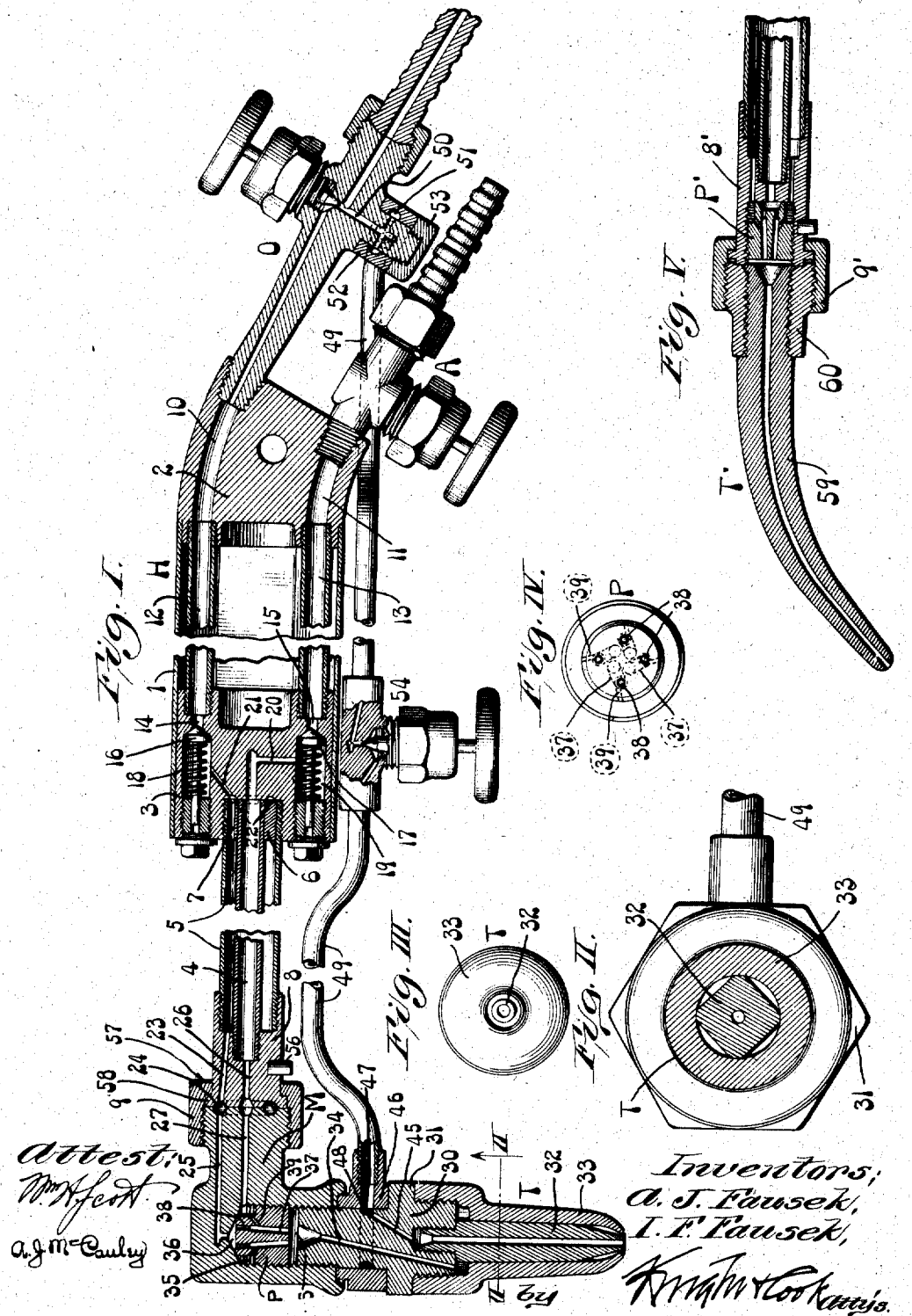
A. J. & I. F. FAUSEK.

TORCH.

APPLICATION FILED DEC. 4, 1914.

1,246,573.

Patented Nov. 13, 1917.



UNITED STATES PATENT OFFICE.

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TORCH.

1,246,573. Specification of Letters Patent. Patented Nov. 13, 1917.

Application filed December 4, 1914. Serial No. 875,478.

To all whom it may concern:

Be it known that we, ARTHUR J. FAUSEK and IRWING F. FAUSEK, citizens of the United States of America, residents of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Torches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Our invention relates to a torch or blowpipe adapted for use in welding or cutting metals, one of the objects being to produce a torch of this kind having an improved mixing device wherein different gases are thoroughly mixed and thereafter delivered to a tip or nozzle. The invention also includes an improved tip or nozzle, an attachment for conducting an auxiliary supply of gas to the tip or nozzle, and other details of construction which will be hereinafter described.

Figure I is a longitudinal section, partly in elevation, of a torch embodying the features of our invention.

Fig. II is an enlarged transverse section taken approximately on the line II—II, Fig. I.

Fig. III is an enlarged inverted plan view of the double tip shown in Fig. I.

Fig. IV is an enlarged top or plan view of the mixing device shown in Fig. I.

Fig. V is a longitudinal section illustrating a tip and a mixing device associated therewith.

H designates a handle connected to a mixing head M, and T designates a double tip or nozzle secured to said mixing head. The handle comprises a tubular member 1, an inlet head 2 at one end of said tubular member 1 and a valve housing 3 at the other end of said member 1.

4 designates an acetylene tube surrounded by an oxygen tube 5, said tubes being connected to each other by means of an annular distance piece 6 having a passageway 7 which communicates with the oxygen tube 5. A coupling head 8 secured to the tubes 4 and 5 is coupled to the mixing head M, preferably by means of an annular union coupling 9.

The inlet head 2, at one end of the handle, is provided with an oxygen passageway 10 and an acetylene passageway 11. O designates a valve through which oxygen is conducted to the oxygen passageway 10, and A designates a valve through which acetylene gas is conducted to the acetylene passageway 11. 12 and 13, respectively, designate tubes arranged in the handle H and leading from the passageways 10 and 11 to the valve housing 3, the latter being provided with ports 14 and 15 which communicate with said tubes. Check valves 16 and 17 arranged in valve chambers 18 and 19 are adapted to open and close the ports 14 and 15. An angular passageway 20 leads from the valve chamber 19 to the acetylene tube 4, and a passageway 21 leads from the valve chamber 18 to an annular passageway 22 formed at the end of the distance piece 6, said annular passageway being in communication with the passageway 7 leading to the oxygen tube 5.

The oxygen forced into the inlet passageway 10, at the right hand end of Fig. I, passes through the tube 12, into the port 14, through the valve chamber 18 then through the passageways 21 and 7, into the oxygen tube 5, through a passageway 23, and into an annular passageway 24 formed between the coupling head 8 and the mixing head M. The mixing head M is provided with an oxygen duct 25 communicating with the annular passageway 24. The acetylene gas passing through the housing of the valve A, at the right hand end of Fig. I, is forced into the passageway 11, and it flows through the tube 13, port 15, valve chamber 19, angular passageway 20, tube 4, passageway 26, and then into an acetylene duct 27 formed in the mixing head M.

The mixing head M is provided with a screw threaded opening for the reception of a coupling member 30 which connects the double tip T to the mixing head. The coupling member 30 is preferably formed with screw threaded end portions and with an enlarged non-circular intermediate portion 31. The double tip T comprises an inner tube 32 and an outer tube 33 surrounding said inner tube, the inner tube being screwed into the coupling member 30 and the outer tube being screwed onto said coupling member. 34 designates a passageway formed in the coupling member 30 for the purpose of conducting the mixed gases from the mixing head M to the discharge passageways between the inner tube 32 and outer tube 33. It will be noted that portions of the

inner tube are separated from the outer tube as shown in Figs. II and III to produce the discharge passageways just referred to.

The different gases passing from the ducts 25 and 27 in the mixing head M, flow through a primary mixing device P from which they are discharged into a secondary mixing chamber S (Fig. I) communicating with the passageway 34. The primary mixing device is screwed into the mixing head M and its reduced inner end engages the mixing head as shown in Fig. I. An annular acetylene chamber 35 is formed around the reduced inner end portion of the primary mixing device P and an oxygen chamber 36 is formed at the discharge end of the oxygen duct 25. The primary mixing device P is bored to form a plurality of restricted mixing chambers 37 and a plurality of restricted inlet ports 38 and 39. The restricted inlet ports 38, communicating with the oxygen chamber 36, are substantially equal in diameter to the restricted inlet ports 39 which communicate with the acetylene chamber 35, and these different inlet ports 38 and 39 are smaller in diameter than the primary mixing chambers 37.

One of the objects in forming a plurality of primary mixing chambers in the primary mixing device is to prevent a backfire or "whistling" of the combustible gases, and this object is attained by making the primary mixing chambers so small that the flame will not travel backwardly through the restricted passageways formed by these mixing chambers. Since the primary mixing chambers are very small in diameter it is necessary, or desirable, to provide a plurality of such chambers, so that the desired volume of gases may be forced through the mixing head under the ordinary degree of pressure. If only one restricted primary mixing chamber was formed in the mixing device, it would be necessary to maintain the gases under an extremely high degree of pressure to secure the required volume or rate of flow of gases at the tip.

Another advantage, gained by forcing the different gases through a plurality of primary mixing chambers, is that a thorough mixture is insured by mixing the gases in the different restricted chambers where the fine streams of gases are mingled with each other, and thereafter discharging the gases into a secondary mixing chamber S (Fig. I) where the different streams of gases are mixed with each other. A further advantage is obtained by forming the inlet ports 39 tangentially with respect to primary mixing chambers 37 (Fig. IV) so that the acetylene gas, discharged from said tangential inlet ports, will whirl around in the primary mixing chambers, thereby insuring a thorough mixture of the different gases. Another desirable feature of the mixing device is that the different streams of gases passing from the primary mixing chambers, are thoroughly mixed in the secondary mixing chamber S. In this connection, it will be noted that the primary mixing chambers 37 are formed at an angle to each other and at an angle to the axis of the mixing device P, said mixing chambers being separated from each other a greater distance at their inlet ends than at their discharge ends, see Figs. I and IV. By arranging the mixing chambers 37 in this manner, the stream of gases passing from each of them is discharged into a stream of gases passing from another of said mixing chambers, and furthermore the different gases discharged at an angle to the axis of the mixing device P, are whirled around the conical bottom wall of the primary mixing chamber S.

The double tip T is constructed to receive an additional supply of oxygen gas which passes through an auxiliary passageway 45 in the coupling member 30 and which is discharged through the inner tip member 32. A ring 46, surrounding the coupling member 30, at the inlet end of passageway 45, is provided with an inlet port 47 which communicates with an annular passageway 48 formed around the coupling member 30. The ring 46 lies between the enlarged portion 31 of coupling member 30 and the bottom face of the mixing head M, said ring being detachably secured to the mixing head by means of the coupling 30. 49 designates an auxiliary oxygen supply pipe secured to the ring 46 and leading from the inlet port 47 in said ring to the oxygen valve O. The valve O is provided with a passageway 50 through which oxygen is conducted to an annular passageway 51 formed in a ring 52 which surrounds the discharge end of passageway 50. 53 designates a nut for securing the ring 52 to the valve O. The pipe 49 is secured to the ring 52 so as to receive the oxygen gas passing from the annular passageway 51. 54 designates a needle valve for controlling the flow of oxygen from the pipe 49.

The coupling head 8 (Fig. I) is provided with a smooth seat which engages the mixing head M, and the union coupling member 9 is utilized to protect this smooth seat from injury when the coupling head is detached from the mixing head. The screw threaded union coupling member 9 is slidably fitted to the coupling head 8 and the latter is provided with a stop member 56 for limiting the movement of said union coupling member. It will be noted that the inturned flange 57 of the union coupling lies between the stop member 56 and the outturned flange 58 of the coupling head 8, so that the union coupling cannot move to a point beyond the smooth seat on said coupling head.

In Fig. V we have shown the primary mixing device P′ applied directly to the coupling head 8′, and the tip T′ is coupled to the head 8′ by means of the union coupling 9′.

To prevent the tips from melting under the excessive heat of the oxy-acetylene flame, they are usually made of copper or other expensive material adapted to withstand such heat. The nozzle sections 32 and 33 shown in Fig. I as well as the nozzle section 59 shown in Fig. V are preferably made of copper, and to reduce the cost of the tips the nozzle sections are preferably provided with heads made of some other material. 60 designates a head section screwed onto the nozzle section 59, an end of said nozzle section being upset and sunk into the head section 60. The different sections 59 and 60 are thus permanently secured together to form an inexpensive tip having a nozzle section made of copper, and a head section made of comparatively inexpensive material.

We claim:—

1. A torch having a mixing head provided with ducts for different gases and also having inclined passageways forming primary mixing chambers into which the gases are discharged, said inclined passageways being formed at an angle to each other and being separated from each other a greater distance at their inlet ends than at their discharge ends, said mixing head also having a mixing chamber into which the gases are discharged from said inclined passageways, and the said inclined passageways being so formed that the mixing gases discharged from each of them is discharged into a stream of mixing gases passing from another of said inclined passageways, and a tip adapted to receive the mixture discharged from said mixing chamber.

2. A torch having a mixing head provided with ducts for different gases and also having primary mixing chambers which communicate with said ducts, said primary mixing chambers being formed at an angle to each other and being separated from each other a greater distance at their intake ends than at their discharge ends, said mixing head also having a secondary mixing chamber into which the mixed gases are discharged from said primary mixing chambers, and said primary mixing chambers being so arranged that the stream of mixed gases discharged from each of them is discharged into a stream of gases passing from another of said primary mixing chambers, and a tip adapted to receive the mixture discharged from said secondary mixing chamber.

3. A torch having a mixing head provided with ducts for different gases and having a screw threaded opening which communicates with said ducts, a mixing device screwed into said screw threaded opening, said mixing device having a plurality of primary mixing chambers which communicate with said ducts, said primary mixing chambers being inclined with respect to each other and inclined with respect to the axis of said mixing device so that the discharge ends of the primary mixing chambers are closer to each other than the intake ends of said primary mixing chambers, a secondary mixing chamber being formed at the discharge ends of said primary mixing chambers, and a tip adapted to receive the mixture discharged from said secondary mixing chamber.

4. A torch having a mixing head provided with ducts for different gases and having an opening which communicates with said ducts, a mixing device in said opening, said mixing device having a plurality of primary mixing chambers which communicate with said ducts, said primary mixing chambers being inclined with respect to each other and inclined with respect to the axis of said mixing device so that the discharge ends of the primary mixing chambers are closer to each other than the intake ends of said primary mixing chambers, a secondary mixing chamber being formed at the discharge ends of said primary mixing chambers, and a tip adapted to receive the mixture discharged from said secondary mixing chamber.

5. A torch having a mixing head provided with ducts for different gases, a mixing device in said head, said mixing device having a plurality of bores forming primary mixing chambers which communicate with one of said ducts and transverse bores leading to said primary mixing chambers and communicating with another of said ducts, said transverse bores being formed tangentially with respect to said primary mixing chambers, and the said primary mixing chambers being inclined with respect to each other and with respect to the axis of said mixing device so that the discharge ends of said primary mixing chambers are closer to each other than the intake ends of said mixing chambers, a secondary mixing chamber being formed at said discharge ends, and a tip adapted to receive the mixture discharged from said secondary mixing chamber.

6. A torch having a mixing head provided with ducts for different gases, a mixing device in said head, said mixing device having a plurality of restricted primary mixing chambers communicating with said ducts, and the torch being provided with a secondary mixing chamber adapted to receive the mixture discharged from said plurality of restricted primary mixing chambers.

7. A torch having a mixing head provided with ducts for different gases, a mixing device in said head, said mixing device having a plurality of restricted primary mixing

chambers communicating with said ducts, and the torch being provided with a secondary mixing chamber having a conical wall adapted to receive the mixture discharged from said plurality of restricted primary mixing chambers.

8. A torch having a tip provided with an inner passageway and an outer passageway surrounding said inner passageway, a mixing head, a coupling member connecting said tip to said mixing head, said coupling member having a passageway for conducting mixed gases from said mixing head to the outer passageway in said tip, and said coupling member also having an auxiliary passageway for conducting gas to said inner passageway, and means at the exterior of said coupling member for conducting gas to said auxiliary passageway, said means including a ring surrounding said coupling member at the inlet end of said auxiliary passageway and a pipe for conducting gas into said ring.

9. A torch comprising a mixing head, a double tip having two discharge passageways, a coupling member connecting said double tip to said mixing head, said coupling member having a passageway for conducting mixed gases from said mixing head to one of said discharge passageways and also having an auxiliary passageway for conducting gas to the other discharge passageway, and a ring surrounding the inlet end of said auxiliary passageway, said ring being clamped between a portion of said coupling member and the mixing head.

10. A torch having a gas conductor, a tip, a coupling member securing said tip to said gas conductor, said coupling member having a passageway for conducting gas from said gas conductor to said tip, said coupling member also having an auxiliary passageway for conducting gas to said tip, and means for conducting gas to said auxiliary passageway, said means including a ring surrounding said coupling member at the inlet end of said auxiliary passageway, and a pipe for conducting gas to said ring.

11. An oxy-acetylene torch having a burner, conductors for conducting different gases to said burner, one of said conductors including a valve housing having an intake passageway and a discharge passageway, a valve for opening and closing communication between said passageways, said valve housing also having an auxiliary passageway which communicates with said intake passageway, a threaded stem extending from said valve housing, a ring surrounding said threaded stem and communicating with said auxiliary passageway, a threaded member fitted to said stem to secure said ring to said valve housing, and means for conducting gas from said ring to said burner.

12. A torch having a burner, conductors for conducting gases to said burner, one of said conductors being provided with an inlet passageway, a main discharge passageway and a stem having an auxiliary passageway, a valve for controlling the flow of gas from said main discharge passageway to the burner, said auxiliary passageway being adapted to permit the escape of gas through said stem at a point between said valve and the gas supply, a detachable ring surrounding said stem and communicating with said auxiliary passageway, and means for conducting gas from said ring to the burner.

13. A torch having a burner, conductors for conducting gases to said burner, one of said conductors being provided with an inlet passageway, a main discharge passageway and a stem having an auxiliary passageway, a valve for controlling the flow of gas from said main discharge passageway to the burner, said auxiliary passageway being adapted to permit the escape of gas through said stem at a point between said valve and the gas supply, a ring surrounding said stem and communicating with said auxiliary passageway, a member screwed onto said stem to secure said ring in position, a conductor leading from said ring to said burner, and a valve for controlling the flow of gas through the last mentioned conductor.

14. A torch having an inner tip, an outer tip, a coupling member to which said tips are secured, said coupling member having a main passageway which communicates with one of said tips and an auxiliary passageway which leads from the exterior of the coupling and communicates with the other tip, a ring surrounding said coupling at the location of said auxiliary passageway, means for conducting gas to said ring, and means for conducting mixed gases to said main passageway.

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In the presence of—
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