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BLOW TORCH AND POT

Filed Aug. 1, 1924

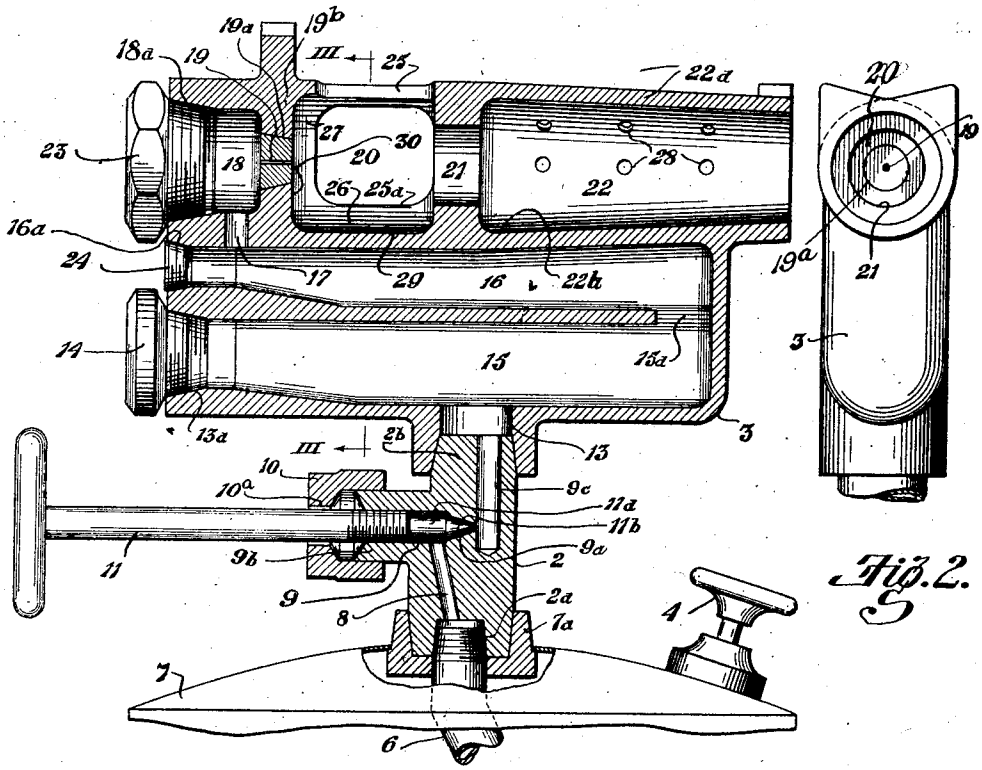


Fig. 2.

Fig. 1.

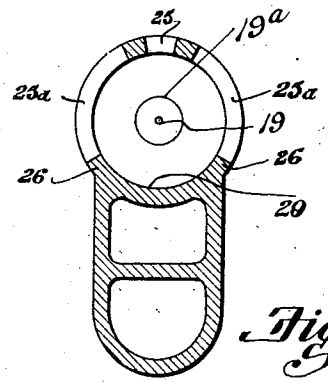


Fig. 3.

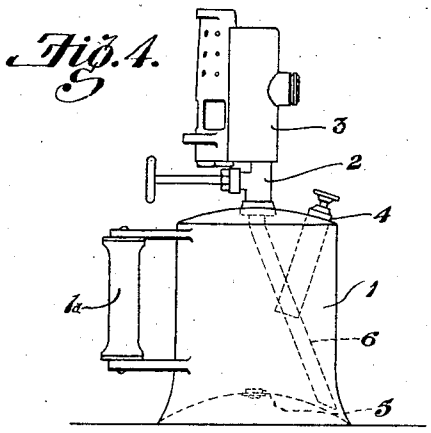


Fig. 4.

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BLOWTORCH AND POT.

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The invention relates to blow torches and pots in which a liquid hydrocarbon fuel is volatilized and the gas thus formed mixed with air and burned in a nozzle to provide either a horizontal or vertical flame for use in soldering, brazing, melting, and the like; and the object of the improvement is to provide a blow torch and pot having a nozzle so constructed as to provide an easily started horizontal or vertical high temperature flame under conditions of efficient combustion.

The requirements for a high temperature flame under efficient combustion conditions are proper feed control of the liquid hydrocarbon fuel, proper volatilization of the fuel to form a gas, and proper mixing of the gas with air before combustion occurs.

When screw valve means are used to control the flow of gas, the temperature of the nozzle when the torch is in operation is so high that the valve seat and stem expand, and consequently warp upon cooling so that the valve becomes imperfect in operation.

Again, the burner of a torch must be heated to start the torch; and torches having an auxiliary bowl beneath the nozzle burner in which a quantity of the liquid fuel is placed and lighted in order to heat the burner to combustion temperature, are inconvenient in use because the liquid fuel for filling the auxiliary bowl must be obtained either from the torch tank or elsewhere.

Also a torch adapted to deliver a horizontal flame is not always adapted to deliver conveniently a vertical flame.

These difficulties are overcome and a torch is provided, which burns efficiently any desired hydrocarbon fuel such as hydrocarbon oil, gasolene, or benzenes, by the present invention, in which a starting bowl is incorporated in the nozzle; and in which the nozzle may be used by proper adjustment to direct either a horizontal or vertical flame; and in which the volatilization chamber, and air mixing chamber are properly placed and proportioned, and are combined with other elements in a compact nozzle formed from a unitary casting; and in which the fuel feed is controlled by a valve acting upon the liquid fuel and not on the subsequently volatilized gas, the valve being located away from the hotter portions of the nozzle.

A preferred form of the invention is illustrated in the accompanying drawings forming part hereof, in which—

Figure 1 is a fragmentary side elevation of the device set up for use as a blow torch to deliver a horizontal flame, the nozzle and fuel control valve being shown in section;

Fig. 2, a fragmentary front end elevation of the same;

Fig. 3, a cross section of the nozzle on line III—III, Fig. 1; and

Fig. 4, a side elevation of the device set for use as a blow pot to deliver a vertical flame.

Similar numerals refer to similar parts throughout the drawings.

The blow torch and pot includes the fuel pressure tank 1, the fuel control valve 2, and the nozzle 3. A hand air pump 4 is provided to create the necessary pressure in the tank, and a removable screw plug 5 in the bottom of the tank permits the filling thereof with liquid hydrocarbon fuel. From the fuel control valve 2, an angle fuel delivery pipe 6 depends to the bottom part of the tank. A suitable handle 1^a is attached to the tank for carrying the torch.

In the upper spherical wall 7 of the tank is located a bushing 7^a, into which the fuel control valve is threaded, the fuel delivery pipe 6 being threaded into the lower end 2^a of the valve as shown. In the valve a delivery passage 8 leads from the delivery pipe to the control chamber 9 having a conical outlet and valve seat 9^a leading to fuel reservoir 9^c in the upper end 2^b of the valve.

The control chamber 9 is located in an outwardly extending neck 9^b of the valve, and a packing cap 10 having a central aperture 10^a is threaded thereon. Through the central aperture 10^a the valve pin 11 passes and is threaded in the control chamber 9. The valve pin has an end portion 11^a of smaller diameter than the pin, and which carries a cone 11^b seating in the outlet 9^a, and adjustable therein by the turning of the threaded valve pin.

The nozzle 3 is provided with two inlets 13 and 13^a, either one of which may be alternately screwed upon the upper end 2^b of the fuel control valve 2. A screw plug 14 is provided to close the inlet when not screwed upon the valve. Both inlets lead to the same primary volatilizing chamber 15 in the nozzle 3.

As set up in Fig. 1, the inlet 13 is threaded

upon the control valve, and the plug 14 closes inlet 13ª. Nozzle 3 is a cored casting, and the primary volatilizing chamber 15 opens through end passage 15ª into the secondary volatilizing chamber 16, which is connected by port 17 located at the end opposite the passage 15ª to gas reservoir 18. Gas delivery orifice 19, having a fixed aperture area, and being removably threaded in aperture 19ª of partition wall 19ᵇ, leads from the gas reservoir 18 to the gas mixing chamber 20, and a mixture passage 21 opens therefrom into the burner tip 22.

The nozzle being a cored casting, screw plugs 23 and 24 are provided to close the ends of the openings 18ª and 16ª respectively, of reservoir 18 and chamber 16.

Air is admitted to the mixing chamber 20 through ports 25 and 25ª, the ports 25ª being so placed that bowl walls 26 and 27 are formed in the mixing chamber. Breather ports 28 are provided in the outside wall 22ª of the burner tip 22.

The operation of the torch as set up in Fig. 1, may now be described. A liquid hydrocarbon having been placed in the tank 1, valve pin 11 is set so as to permit fuel passage through outlet 9ª, and pressure is set up in the tank by means of the air pump which forces liquid fuel up through the delivery pipe 6, the delivery passage 8, the control chamber 9, the outlet 9ª, the reservoir 9ᵉ, the primary volatilizing chamber 15, the the end passage 15ª, the secondary volatilizing chamber 16, the port 17, the gas reservoir 18, and the gas delivery orifice, into the bowl 29 formed by the bowl walls 26 of the mixing chamber 20, and through the mixture passage 21 to the burner bowl 22ᵇ. Liquid fuel now fills all the chambers of the nozzle up to the level reached in the bowls, and the valve pin is set to maintain this level.

The liquid fuel thus maintained in the mixing and burner bowls is then lighted, and generates heat which gradually raises the temperature of the nozzle parts to a degree sufficient to volatilize the liquid fuel in the volatilizing chambers 15 and 16; and this volatilized fuel will burn for some time, as its own generated pressure forces it through the gas orifice 19. It is to be understood that in accordance with usual practice, the volatilizing chambers 15 and 16 are filled with fine brass or copper gauze not shown for facilitating the breaking up of the liquid fuel and the formation of the gas.

In torches having an auxiliary preheating bowl separate from and below the burner tip, the liquid fuel placed in the auxiliary bowl and lighted to heat the burner tip to proper combustion temperature often burns out before the torch operator opens the fuel valve to admit fuel gas.

In the device of the present invention as aforesaid, the fuel in the integral preheating bowls, and the nozzle chambers below sustain a nozzle preheating flame for a comparatively long time, until the operator is ready to open the fuel valve; and, by maintaining the pressure in the tank, cause gas to be delivered through the gas delivery orifice 19, by the above described volatilizing action of the nozzle.

The fuel valve being sufficiently opened, gas thus delivered through the orifice 19, mixes with air admitted through ports 25 and 25ª in mixing chamber 20, and the mixture passes through passage 21 to the burner tip 22, where it is efficiently burned in a horizontal blow flame.

The action of the device set up as a blow pot, as in Fig. 4, is substantially the same, excepting that, in this case, the walls 27 of the mixing chamber form a starting bowl 30.

When valve screw fuel control means are employed to control the gas passage through the gas delivery tube 19, it has been found that expansion and contraction soon renders the operation of the valve imperfect. In operation, the liquid controlling valve 2 of the present invention is always cooler than the nozzle, and the cone end 11ᵇ of the valve pin 11 is always immersed in the liquid fuel which is maintained in liquid form beyond the cone end and in the reservoir 9ᵉ, volatilization taking place in the chambers 15 and 16. Thus the valve fuel control means of the present invention is constantly cooled by the passage of the liquid fuel, and is capable of operating perfectly for a longer time than a valve controlling the fuel flow after the fuel has become volatilized.

I claim:

1. A blow torch for burning liquid hydrocarbon fuel and the like, including in communication with each other a tank for the fuel and a fuel control valve, and a burner nozzle having a plurality of apertures for selective communicating connection with the fuel control valve and the tank.

2. A blow torch for burning liquid hydrocarbon fuel and the like, including in communication with each other a tank for the fuel and a fuel control valve, and a burner nozzle having a plurality of apertures for selective communicating connection with the fuel control valve and the tank, the nozzle having integral walls forming bowls for receiving liquid fuel to start the torch in the several positions of the burner nozzle.

3. A blow torch for volatilizing, mixing with air, and burning liquid hydrocarbon fuel and the like, including in communication with each other and a tank for the fuel, a fuel control valve, and a unitary volatilizing, mixing and burner nozzle, having a plurality of apertures for selective communicating connection with the fuel control valve and the tank.

4. A blow torch for volatilizing and

burning liquid hydrocarbon fuel and the like, including in communication with each other a tank for the liquid fuel, a fuel control valve acting upon the liquid fuel, and a nozzle, the nozzle including in communication with each other a volatilizing chamber, a removable gas delivery orifice, and a burner tip, and the nozzle having a plurality of apertures for selective communicating connection with the fuel control valve and the tank.

5. A blow torch for volatilizing, mixing with air, and burning liquid hydrocarbon fuel and the like including in communication with each other, a tank for the liquid fuel, a fuel control valve acting upon the liquid fuel, and a nozzle, the nozzle including in communication with each other, a volatilizing chamber, a removable gas delivery orifice, a mixing chamber, and a burner tip, and the nozzle having a plurality of apertures for selective communicating connection with the fuel control valve and the tank.

6. A blow torch for volatilizing, mixing with air, and burning liquid hydrocarbon fuel and the like, including in communication with each other a tank for the liquid fuel, a fuel control valve acting upon the liquid fuel, and a nozzle, the nozzle including in communication with each other a volatilizing chamber, a gas reservoir, a removable gas delivery orifice, a mixing chamber, and a burner tip, and the nozzle having a plurality of apertures for selective communicating connection with the fuel control valve and the tank.

7. A nozzle for a blow torch, including a volatilizing chamber, a mixing chamber, and a burner tip in communication with each other, the volatilizing chamber having a plurality of apertures for selective communicating connection with a fuel control valve and a fuel tank.

8. A nozzle for a blow torch including a mixing chamber having walls forming a starting bowl for receiving liquid fuel to start the torch, and in communication therewith a plurality of apertures for interchangeable communicating connection with a fuel control valve and a fuel tank.

9. A nozzle for a blow torch including a burner tip having walls forming a starting bowl for receiving liquid fuel to start the torch, and in communication therewith a plurality of apertures for interchangeable communicating connection with a fuel control valve and a fuel tank.

10. A nozzle for a blow torch including a mixing chamber and a burner tip in communication with each other, the walls of the chamber and tip forming starting bowls for receiving liquid fuel to start the torch, and in communication therewith a plurality of apertures for interchangeable communicating connection with a fuel control valve and a fuel tank.

11. A nozzle for a blow torch including in a unitary structure, a primary volatilizing chamber, a secondary volatilizing chamber, a mixing chamber and a burner tip in communication with each other, and with a plurality of apertures for interchangeable communicating connection with a fuel control valve and a fuel tank.

12. A nozzle for a blow torch including in a unitary structure, a volatilizing chamber, a gas delivery orifice having a fixed aperture area, and a burner tip in communiction with each other, and with a plurality of apertures for interchangeable communicating connection with a fuel control valve and a fuel tank.

13. A nozzle for a blow torch including in a unitary structure, a volatilizing chamber, a gas delivery orifice having a fixed aperture area, a mixing chamber, and a burner tip in communication with each other, and with a plurality of apertures for interchangeable communicating connection with a fuel control valve and a fuel tank.

14. A nozzle for a blow torch including in a unitary structure, a volatilizing chamber, a gas reservoir, a gas delivery orifice having a fixed aperture area, a mixing chamber, and a burner tip in communication with each other, and with a plurality of apertures for interchangeable communicating connection with a fuel control valve and a fuel tank.

In testimony that I claim the above, I have hereunto subscribed my name.

JAMES D. KELVIE, JR.