Sept. 20, 1938. W. J. JACOBSSON 2,130,344

BLOWPIPE

Filed Aug. 8, 1934

Fig 1

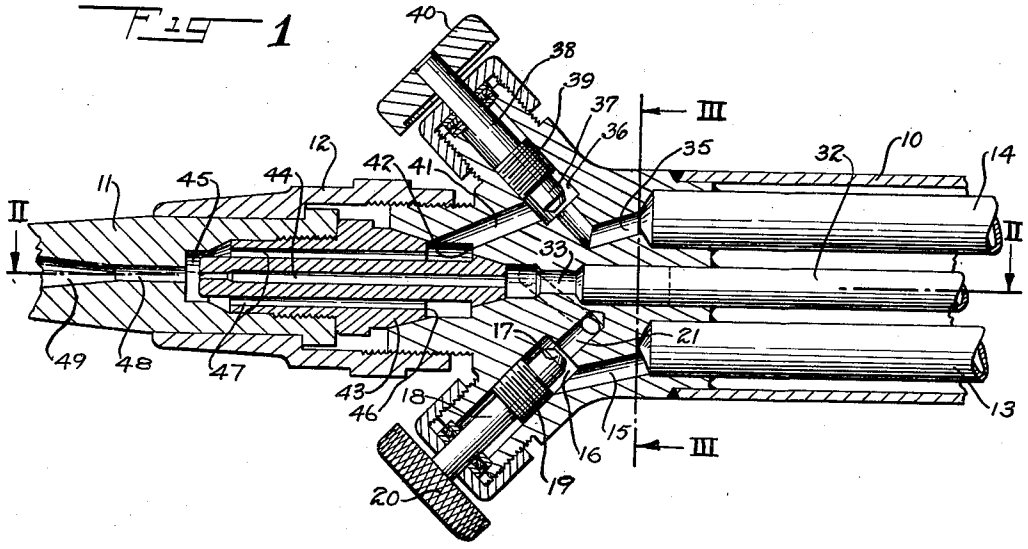
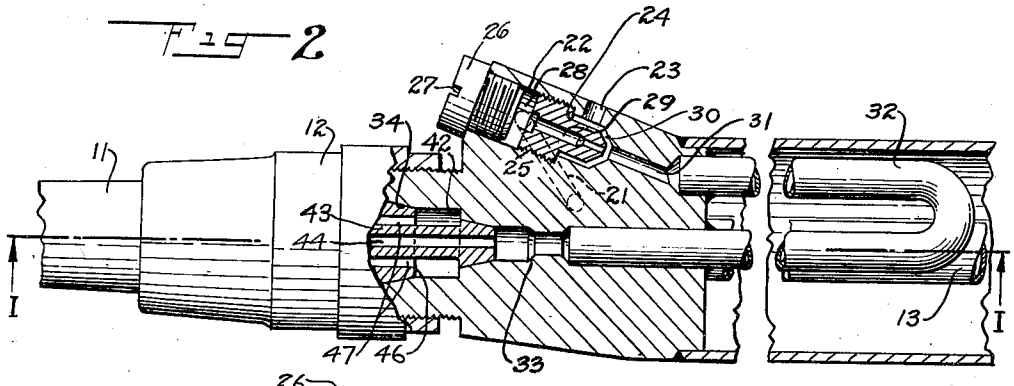


Fig 2



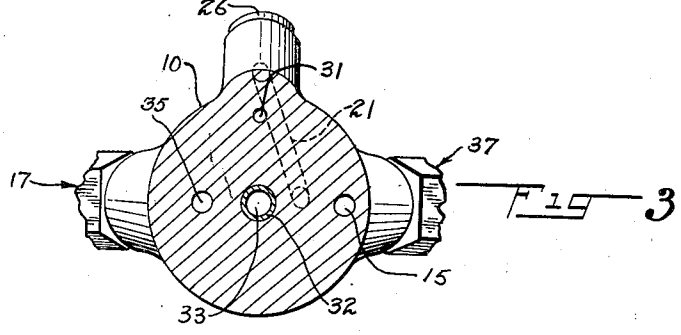


Fig 3

INVENTOR
WILGOT J. JACOBSSON
BY
ATTORNEY

Patented Sept. 20, 1938 2,130,344

UNITED STATES PATENT OFFICE

2,130,344

BLOWPIPE

Wilgot J. Jacobsson, Elizabeth, N. J., assignor, by mesne assignments, to Union Carbide and Carbon Corporation, a corporation of New York

Application August 8, 1934, Serial No. 738,923

11 Claims. (Cl. 158—27.4)

This invention relates to blowpipes and more particularly blowpipes in which fuel gas and a combustion supporting gas are mixed. The invention relates especially to such blowpipes in which a diluting gas is mixed with one of the other gases before the final mixing.

One object of the invention is economy in the quantity of gas used. Another object is the provision of a construction to reduce the amount of popping or back flashing and which will insure safety to the operator should such popping occur. A further object is the provision of a simple rugged and inexpensive construction which will be capable of attaining the desired results. Other objects will be apparent upon consideration of the present specification.

The invention is shown by way of illustration in the accompanying drawing in which:

Fig. 1 is a broken mid-section through a blowpipe constructed in accordance with the invention;

Fig. 2 is a longitudinal mid-section taken on line II—II of Fig. 1; and

Fig. 3 is a cross-section taken on line III—III of Fig. 1.

In the operation of blowpipes, economy of gas consumption frequently becomes an important factor. At times, therefore, the fuel gas, or the combustion supporting gas, or both, have been diluted with another gas, for instance, atmospheric air. Under such conditions, however, the danger of popping or flash backs is increased because the addition of air makes possible the existence of a combustible mixture in the tubes and passages of the pipe to an extent which is not possible where such tubes and passengers are full of a more concentrated gas which is mixed, adjacent the stem or even the tip of the blowpipe, with the other gas necessary for combustion. This is so because of the dilution of the combustion-supporting gas with the nitrogen in the air. Such dilution causes the receding burning gas mixture, before burning out, to burn more slowly and hence to travel farther into the blowpipe passages than would be the case with a more concentrated supply of oxygen. Greater concentration of oxygen would obviously cause quicker burning out of the flame by effecting more rapid combustion of the fuel gas. Specially designed constructions are therefore desirable where such dilution takes place.

A further consideration is the question of employing blowpipes under different service conditions and the desirability of changing the mixture of fuel gas, combustion supporting gas and diluting gas to fit the service requirement.

Referring now more particularly to the drawing there is shown a blowpipe comprising a handle 10, a stem 11 and a coupling 12 joining the handle to the stem. An oxygen-supply conduit 13 extends longitudinally of the handle 10, and an acetylene-supply conduit 14 is disposed in similar position within the handle parallel to the oxygen supply conduit. A duct 15 connects the oxygen-supply conduit with a chamber 16 in which an oxygen regulating valve 17 operates. The oxygen regulating valve is operated by a valve stem 18 having a threaded portion 19 turning in a corresponding threaded portion of the chamber 16 and controlled by a knurled head 20 at the outer end of the stem. A duct 21 connects the chamber 16 with the inlet side of an oxygen-air injector, which will now be described.

The forward part of the handle 10 has a cavity 22 therein, and an air port 23 opens into the cavity 22 near its inner end. An oxygen-air injector is formed by the cavity 22 and a nozzle 24 cooperating therewith. The nozzle 24 has a threaded section 25 thereon and is adapted to be screwed into corresponding threads in the cavity 22. A plug 26, provided with a kerf 27 is adapted to be screwed into the end of the cavity 22, clearing the end of the plug by a considerable distance and thereby forming an oxygen inlet chamber 28 in which the duct 21 terminates. A central bore 29 in the nozzle 24, communicating with the chamber 28, provides means for passage of the oxygen entering the chamber into an aspirating chamber 30, formed between the threaded portion of the injector and the inner end of the cavity 22, into which the end of the nozzle 24 extends. The position of the air port 23 is such that atmospheric air may freely enter the aspirating chamber 30. A passage 31 coaxial with a bore 29 through the oxygen-air injector 24 extends from the aspirating chamber 30 through the handle to one end of a return bend conduit 32 which extends substantially the entire length of the handle. The other end of the return bend conduit terminates in a chamber 33 at the base of a concave conical opening 34 in the forward part of the handle to which it delivers the oxygen-air mixture which is projected into it from the passage 31.

A duct 35 extends from the forward end of the acetylene conduit 14 to a chamber 36, the entrance to which is controlled by an acetylene regulating valve 37. The acetylene regulating

valve is carried by a stem 38 having a threaded section 39 thereon co-acting with threads in the chamber 36 and operated by a knurled head 40 at the end of the stem outside of the chamber. A duct 41 extends from the acetylene regulating chamber 36 to an annular groove 42 in the wall of the concave conical opening in the forward part of the handle 10. Thus, by turning the knurled head 40 in one direction the duct 35 is closed and no acetylene may enter the chamber 36 from the acetylene conduit 14, whereas by turning the knurled head 40 in the other direction the end of the duct 35 is opened and acetylene may flow into the chamber 36 and out through the duct 41 and into the annular groove 42 in the handle end.

Between the handle 10 and the stem 11 a mixer 43 is disposed. As here shown the mixer 43 is threaded into the rear end of the stem 11 and a convex conical end mates with the concave conical opening in the forward end of the handle. The mixer 43 has an axial passage 44 therethrough extending from the chamber 33 at the base of the concave conical opening 34 in the forward end of the handle to an aspirating chamber 45 formed between the forward mixer end and the interior walls of the stem 11. The convex conical end of the mixer 43 has an annular groove 46 therein which registers with the annular groove 42 in the concave conical end of the handle, thus forming an annular chamber into which the acetylene duct 41 extends. One or more longitudinal passages 47 extend from the groove 46 through the mixer 43 substantially parallel to the axial passage 44 therein and terminate in the aspirating chamber 45. An axial mixing throat 48 in the stem 11 extends from the aspirating chamber 45 to an expansion chamber 49 whence the mixture of gases passes through the stem to the tip of the blowpipe.

From the description already given the operation of the blowpipe will be obvious. When the knurled head 20 is turned so as to open the oxygen regulating valve 17, oxygen under greater pressure than the acetylene flows into the receiving end of the oxygen-air injector. As the oxygen rushes through the bore 29 in the injector and into the aspirating chamber it reduces the pressure in the aspirating chamber thereby drawing air through the air port 23. Passing into the passage 31 the oxygen draws air from the aspirating chamber with it and mixes with the air in the passage 31 before entering the return bend conduit 32. From the return bend conduit 32 the oxygen-air mixture still under considerable pressure, enters the chamber 33 at the base of the concave conical opening in the forward end of the handle whence it passes through the axial passage 44 in the mixer 43. The acetylene control valve 37 is opened by turning the knurled head 40 and acetylene under lower pressure than the oxygen passes into the annular chamber 46 at the rear end of the mixer 44 whence it may flow through the longitudinal passages 47 into the aspirating chamber 45. The oxygen-air mixture passing out of the end of the mixer 43 at high pressure tends to produce a vacuum in the aspirating chamber 45 and thereby assists the passage of acetylene to this chamber. Entering the mixing throat 48 with considerable velocity the oxygen-air mixture draws with it acetylene from the aspirating chamber and mixes with the acetylene in the mixing throat before passing into the expansion chamber 49.

It will be noted that because the oxygen-air mixture is at all times at a higher pressure than the acetylene there will be no back-flow of acetylene into the return bend conduit. Even if there should be such back-flow and a tendency for combustion, the popping will be extinguished in the long passage provided by the return bend conduit. Furthermore, there will be no tendency for the oxygen-air mixture to flow backward toward the acetylene conduit through the passages 47 because the shape of the mixer 43 insures that the travel of the oxygen-air mixture will be in the opposite direction.

In order to meet different requirements a series of substitute oxygen-air injecting nozzles may be used, the nozzles being adapted to mix different ratios of oxygen and air by having different sizes of passages therein and different nozzle diameters and lengths so as to increase or decrease the size of the aspirating chamber 30. A substitute series of oxygen-air fuel gas mixers may also be provided, the mixer passages having different diameters, or a different number of passages being provided in the mixer, so that different relative quantities of oxygen-air mixture and fuel gas may be passed through the mixer.

The example here described and shown in the drawing is presented merely to indicate how the invention may be applied. Other forms of the invention differing in detail but not in principle from that here described will, of course, suggest themselves to those skilled in this art.

I claim:

1. In a blowpipe, a handle; a stem extending from the forward end of said handle to the discharge end of the blowpipe; an oxygen-air injector in the forward part of said handle; means for supplying oxygen to said injector; and a return bend conduit connecting the discharge end of said oxygen-air injector with said stem, said conduit extending substantially the entire length of said handle, said handle having a port therein for admitting air to said injector.

2. In a blowpipe, a handle; an oxygen-air-fuel gas mixer seated in the forward part of said handle; an oxygen-air injector in the forward part of said handle; means for supplying oxygen under pressure to said injector; means for admitting air to said injector; and a return bend conduit between the discharge end of said injector and said mixer, said conduit extending substantially the entire length of said handle.

3. A blowpipe comprising a handle; an oxygen supply conduit and an acetylene supply conduit in said handle; an oxygen regulating valve, an acetylene regulating valve, and an oxygen-air injector all in the forward part of said handle; means for mixing and projecting gases at the forward part of said handle, and a return bend conduit extending from the discharge end of said oxygen-air injector to the intake side of said mixing and projecting means; said handle having therein a duct connecting said oxygen supply conduit with said oxygen regulating valve, a duct connecting said oxygen regulating valve with the oxygen inlet side of said oxygen-air injector, a duct connecting said acetylene supply conduit with said acetylene regulating valve, and a duct connecting said acetylene regulating valve with said mixing and projecting means.

4. A blowpipe comprising a handle; an oxygen supply conduit and an acetylene supply conduit in said handle; and an oxygen regulating valve, an acetylene regulating valve, and an oxygen-air injector all in the forward part of said handle; means for mixing and projecting gases at the

forward part of said handle, and a return bend conduit extending from the discharge end of said oxygen-air injector to the intake side of said mixing and projecting means; said handle having therein a duct connecting said oxygen supply conduit with said oxygen regulating valve, a duct connecting said oxygen regulating valve with the oxygen inlet side of said oxygen-air injector, an air port connecting the oxygen exit side of said oxygen-air injector with the atmosphere, a duct connecting said acetylene supply conduit with said acetylene regulating valve, and a duct connecting said acetylene regulating valve with said mixing and projecting means.

5. In a blowpipe, a handle; an oxygen-air injector in the forward part of said handle; an oxygen-air-acetylene mixer also in the forward part of said handle; means for supplying acetylene to said mixer; and means for supplying oxygen to the inlet side of said injector; said handle having in its forward part an air port connecting the oxygen exit side of said oxygen-air injector with the atmosphere and a duct into which said oxygen-air injector discharges, in combination with a return bend conduit connecting the duct into which said oxygen-air injector discharges with said mixer, said conduit extending substantially the entire length of said handle.

6. In a blowpipe, a handle; an oxygen supply conduit and an acetylene supply conduit in said handle; an oxygen regulating valve and an acetylene regulating valve in the forward part of said handle; an oxygen-air injector also in the forward part of said handle; said handle having therein an air port connecting the oxygen exit side of said oxygen-air injector with the atmosphere, a duct connecting said oxygen supply conduit with said regulating valve, a duct connecting said oxygen regulating valve with the oxygen inlet side of said air injector, and a duct connecting said acetylene supply conduit with said acetylene regulating valve; an oxygen-air-acetylene mixer adjacent the forward part of said handle; and a duct connecting said acetylene regulating valve with said mixer in combination with a return bend conduit connecting the duct into which said oxygen-air injector discharges with said mixer, said conduit extending substantially the entire length of said handle.

7. A blowpipe comprising a handle portion, a stem portion, and an oxygen-air-fuel gas mixer; said handle portion including an oxygen conduit, an acetylene conduit, an oxygen air conduit including at least one sharp bend therein, the length of said oxygen-air conduit being substantially in excess of the length of said handle portion, and an oxygen-air injector in said handle portion between said oxygen conduit and said oxygen-air conduit, said handle having a duct therein for admitting air to said injector.

8. In a blowpipe, means for supplying a combustion supporting gas to a mixer, said means comprising an oxygen-air injector adjacent the mixer, means for supplying oxygen under pressure to said injector, means for admitting air to said injector, and a return bend conduit extending from the discharge end of said injector to the intake end of said mixer.

9. In a blowpipe, a handle having a cavity in the forward part thereof and a unitary return bend conduit connecting the interior of said cavity with atmosphere, said conduit extending substantially the full length of said handle; a mixing device located in said cavity and communicating with said return bend conduit; means for supplying said mixing device with fuel gas, said device having passage and tip dimensions adapted to produce the properly proportioned mixture of fuel gas and air to meet the requirements of the blowpipe for a given piece of work; and means removably securing said device in said cavity.

10. In a blowpipe, the combination of a handle portion and a stem portion; said handle portion including an oxygen conduit, an oxygen-air conduit, a fuel gas conduit, and a chamber between said oxygen conduit and said oxygen-air conduit, said chamber being threaded to receive a removable injector nozzle, an injector nozzle within said chamber; said handle portion having a cavity at the forward end thereof adapted to receive a rear portion of a second removable injector nozzle; said stem portion having a threaded cavity at the rear end thereof adapted to receive a front portion of said second removable injector nozzle.

11. In a blowpipe, a handle of substantial length, a stem, an oxygen-air injector at one end of the handle, an oxygen-air-fuel gas injector at the same end of the handle, an oxygen conduit and a fuel gas conduit extending through said handle from the opposite end thereof and communicating respectively with said oxygen-air injector and said oxygen-air-fuel gas injector; and an oxygen-air conduit disposed intermediate said oxygen conduit and said fuel gas conduit, said oxygen-air conduit being substantially twice the length of said oxygen conduit and said fuel gas conduit and communicating at each end with one of said injectors.

WILGOT J. JACOBSSON.