(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 363 945 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89118923.5**

(51) Int. Cl.[5]: **F23D 14/42**

(22) Date of filing: **12.10.89**

(30) Priority: **12.10.88 ZA 887611**

(43) Date of publication of application:
18.04.90 Bulletin 90/16

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

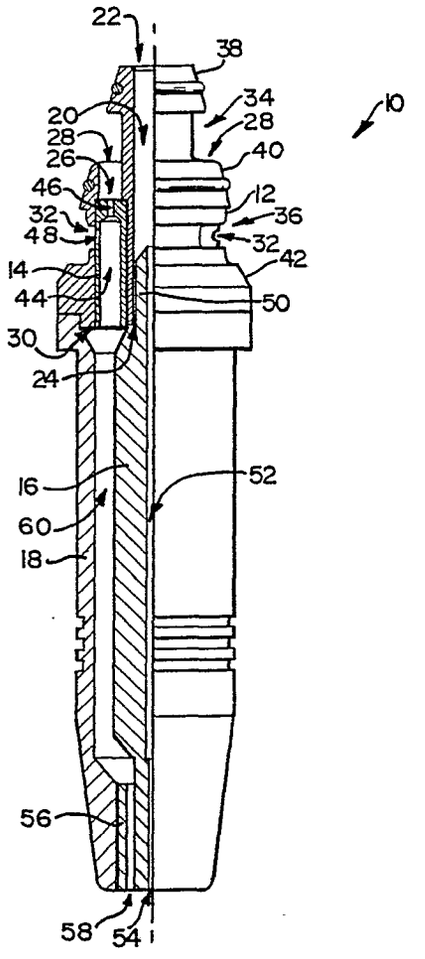
(71) Applicant: **AFRICAN OXYGEN LIMITED**
Afrox House 23 Webber Street
Johannesburg(ZA)

(72) Inventor: **Kruger Marthinus,J.S.**
12-5th Avenue, Marlands, Germiston
Transvaal Province(ZA)

(74) Representative: **Busse & Busse Patentanwälte**
Postfach 1226 Grosshandelsring 6
D-4500 Osnabrück(DE)

(54) A cutting nozzle.

(57) A cutting nozzle (10) has replaceable jet elements (14) which are receivable in chambers between an inlet (28) for pre-heat oxygen and an outlet, with each jet element (14) defining a venturi which communicates with an inlet (36) for fuel. The characteristics of the nozzle (10) are variable by using jet elements (14) with different orifice sizes. As the jet elements (14) provide a low pressure, the nozzle (10) may be used with a demand valve in the fuel line.



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THIS INVENTION relates to a cutting nozzle for use with gas cutting equipment.

According to the invention there is provided a cutting nozzle which includes

an attaching component for attachment to supply pipes for supplying fuel gas, pre-heat oxygen and cutting oxygen, which has

a first inlet connectable to the cutting oxygen supply pipe;

a second inlet connectable to the pre-heat oxygen supply pipe and;

a third inlet connectable to the fuel supply pipe;

and which has

a first outlet in communication with the first inlet,

a second outlet and;

a chamber which communicates with both the second and third inlets and the second outlet;

a jet element in the chamber, the jet element being hollow and having a first opening in communication with the second inlet, a second opening in communication with the third inlet, and a third opening in communication with the second outlet;

a stem that has a passage therethrough and has one end seated in the first outlet, such that an inner end of the passage communicates with the first inlet and the outer end comprises a first delivery vent;

a second delivery vent defining means for defining a second delivery vent adjacent the first delivery vent; and

a path defining means for defining a path from the second outlet of the attaching component to the second delivery vent defining means.

The path defining means may include a cover which defines an annular passageway between itself and the stem.

The second delivery vent may be defined by the stem, the cover or by the stem and the cover. Thus, the second delivery vent may be an annular gap between the stem and the cover, grooves in an end portion of the stem and/or cover, or bores in an end portion of the stem or the cover.

There may be a number of chambers with a jet element in each chamber.

The cutting nozzle may particularly be for use with a demand valve arrangement. Thus, the/or each jet element may have a venturi arrangement for providing a decreased pressure at the second opening of the element, that is below ambient pressure, so that the pressure at the third inlet is also below ambient pressure, thereby to provide suction to open the demand valve.

The attaching component may have a central bore with one end thereof defining the first inlet and the other end the first outlet. The end of the attaching component where the first inlet is, may be frusto-conical, with two spaced perimetral grooves. One groove may then constitute the second inlet and the other the third inlet, with adjacent parts of the frusto-conical surface being sealing surfaces. It will be appreciated that the attaching component thus may define a spigot-like end portion that is receivable in a socket of a coupling unit that is connected to the supply pipes. The chambers may then be defined by auxiliary bores which are parallel to and adjacent the central bore, these auxiliary bores opening out in the groove constituting the second inlet, with transverse passages connecting the other groove with the auxiliary bores.

It will be appreciated, that with a cutting nozzle in accordance with the invention the characteristics thereof can be easily changed by using different jet elements which have openings of different sizes.

The invention is now described, by way of an example, with reference to the accompanying drawing which shows a partly sectioned view of a cutting nozzle in accordance with the invention.

Referring to the drawing, a cutting nozzle in accordance with the invention is designated generally by reference numeral 10. The nozzle 10 has an attaching component 12, two jet elements 14 of which one is shown, a stem 16 and a cover 18.

The attaching component 12 has a central bore 20 which defines a first inlet 22 at one end and a first outlet 24 at its other end. The attaching component 12 also has two further bores 26 of which one is shown. These bores 26 are parallel to the bore 20 and are adjacent thereto. The bores 26 have mouths 28 at their ends adjacent the inlet 22 of the bore 20 and second outlets 30 at their other ends. It will be appreciated that the bores 20 and 26 extend longitudinally. Two passages 32 are provided which communicate with the bores 26 in a transverse manner. It will be noted that the mouths 28 open into a circumferential groove 34 which defines a second inlet and the passages 32 open into a further circumferential groove 36 which defines a third inlet. Between the groove 34 and the adjacent end of the attaching component 12 there is a frusto-conical sealing face 38, between the grooves 34 and 36 there is a frusto-conical sealing surface 40 and on the other side of the groove 36 there is a further frusto-conical sealing surface 42. The attaching component 12 mates with a coupling unit (not shown) which has suitable spigots or other coupling formations, for coupling to supply pipes, such that a pipe connected to a supply of cutting oxygen is in communication with the groove 34 and a further pipe connected to a supply of fuel gas is in communication with the groove 36.

The jet elements 14 are located in the bores 26. Each jet element 14 is hollow having a bore 44 therein which extends from an outer end of the element 14 to close to its other inner end, there being a jet orifice 46 between the bore 44 and the inner end of the element 14. Each element 14 also

has a transverse opening 48 which is aligned with its associated passage 32 so that there is communication between the groove 36 and the bore 44. It will be appreciated that the jet orifice 46 and the bore 44 constitute a venturi arrangement with the result that when gas passes through the jet orifice 46 into the bore 44 a region of low pressure is created. Further, the ratio of oxygen to fuel gas will be controlled (to a certain extent) by the relative sizes of the jet orifice 46 and the opening 48. Thus, a nozzle 10 with a desired characteristic can be supplied by merely utilising jet elements 14 having the apropriate jet orifice 46 and opening 48.

The stem 16 has a spigot 50 at its inner end which is seated in the bore 20, at the first outlet 24. The stem 16 is hollow having a stepped passage 52 therethrough. The passage 52 is narrow at the outer end of the stem 16, to define a first delivery vent 54. The stem 16 further has a head portion 56 at its outer end which has a number of bores 58 that define a set of second delivery vents.

The cover 18 is fast with the attaching component 12 at its inner end in a gas tight manner, and at its outer end forms a relatively good seal with the head portion 56. Intermediate its ends, the cover 18 has sufficient clearance between it and the stem 16 to define an annular passageway 60 by means of which the third outlets 30 and the interior of the jet elements 14 communicate with the bores 58.

It will be appreciated that, in use, if there is a supply and flow of pre-heat oxygen through the jet orifice 46 and through the jet element 14 into the passageway 60 and out through the bores 58, then a low pressure will exist in the passages 32 and in the groove 36 which will be below ambient pressure and sufficient to operate a demand supply valve so that fuel gas is also supplied and utilised.

In accordance with the invention, a cutting nozzle is provided that is relatively cheap and simple to manufacture, which is interchangeable with existing equipment, which can be used with demand supply valves and the characteristics thereof can be varied by means of small replaceable and interchangeable parts.

Claims

1. A cutting nozzle which includes
an attaching component for attachment to supply pipes for supplying fuel gas, pre-heat oxygen and cutting oxygen, which has
a first inlet connectable to the cutting oxygen supply pipe;
a second inlet connectable to the pre-heat oxygen supply pipe and;
a third inlet connectable to the fuel supply pipe;
and which has
a first outlet in communication with the first inlet,
a second outlet and;
a chamber which communicates with both the second and third inlets and the second outlet;
a jet element in the chamber, the jet element being hollow and having a first opening in communication with the second inlet, a second opening in communication with the third inlet, and a third opening in communication with the second outlet;
a stem that has a passage therethrough and has one end seated in the first outlet, such that an inner end of the passage communicates with the first inlet and the outer end comprises a first delivery vent;
a second delivery vent defining means for defining a second delivery vent adjacent the first delivery vent; and
a path defining means for defining a path from the second outlet of the attaching component to the second delivery vent defining means.

2. A nozzle as defined in Claim 1, in which the path defining means includes a cover which defines an annular passageway between itself and the stem.

3. A nozzle as claimed in Claim 2, in which the second delivery vent is defined by the stem.

4. A nozzle as claimed in any one of the preceding claims, in which the attaching component has a plurality of chambers, each of which communicates with the second and third inlets and the second outlet, and there is a jet element in each chamber, each jet element being hollow and having a first opening in communication with the second inlet of its chamber, a second opening in communication with the third inlet of its chamber and a third opening in communication with the second outlet of its chamber.

5. A nozzle as claimed in any one of the preceding claims, in which the or each jet element has a venturi restriction between its first opening and its third opening, such that, in use, gas flow through the or each jet element provides a decreased pressure at the second opening of the element.

6. A nozzle as claimed in any one of the preceding claims, in which the second inlet is a perimetral groove, with a sealing surface on either side thereof.

7. A nozzle as claimed in any one of the preceding claims, in which the third inlet is a perimetral groove, with a sealing surface on either side thereof.

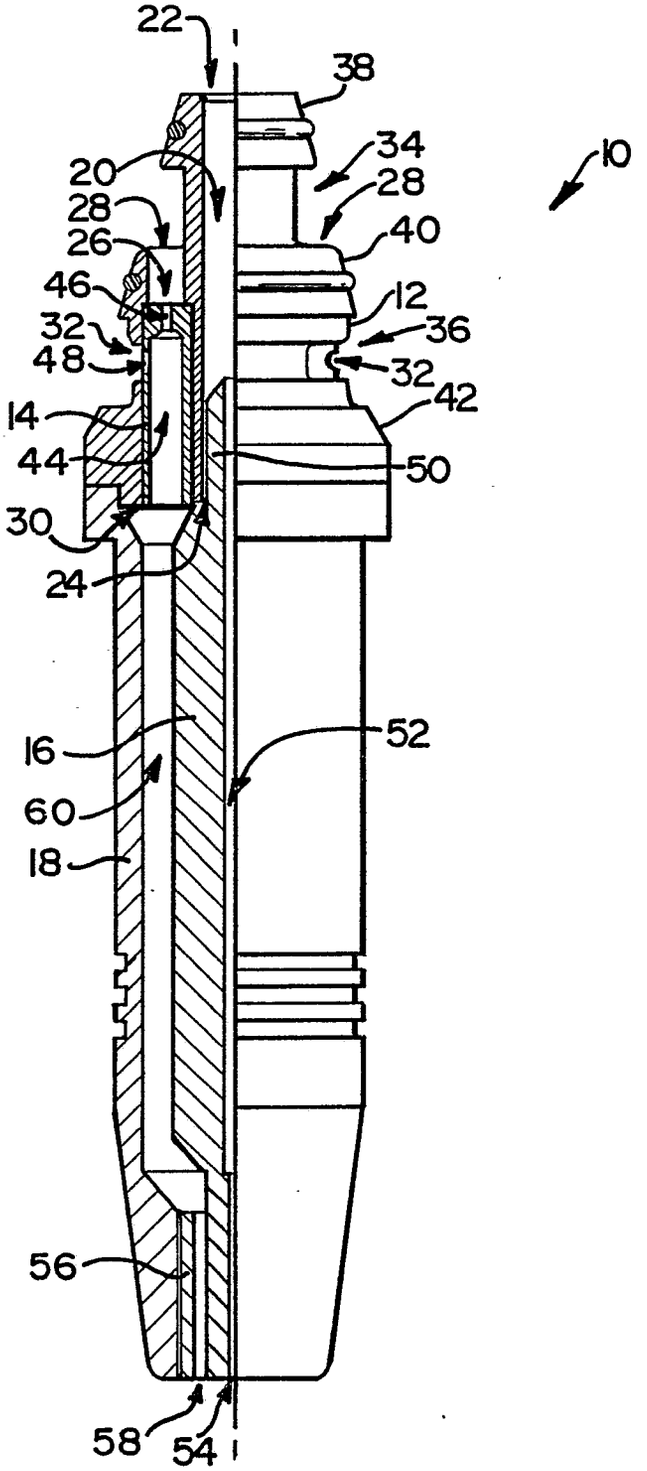
8. A nozzle as claimed in any one of the preceding claims, in which the attaching component has a central bore, with a first end thereof defining the first inlet and the other second end the first outlet.

9. A nozzle as claimed in Claim 8, in which the attaching component has at least one auxiliary bore, parallel to and adjacent to the central bore, the or each auxiliary bore defining a chamber.

10. A nozzle as claimed in Claim 9, in which the or each auxiliary bore is internally stepped to define a sealing shoulder against which the jet element in that bore seats, the or each auxiliary bore being wider at its second end than at its first end.

11. A nozzle as claimed in Claim 9 or 10, in which the or each auxiliary bore has a transverse passage which defines the second opening.

12. A cutting nozzle substantially as described in the specification with reference to the accompanying drawing.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EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 89118923.5

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.~~4~~5)
A	US - A - 2 993 531 (SPIES JR. et al.) * Totality * --	1-8,12	F 23 D 14/42
A	US - A - 3 042 106 (WERNER) * Totality * --	1-8,12	
A	US - A - 2 392 593 (JENKINS) * Totality * --	1-8,12	
A	EP - A2 - 0 191 741 (AGA) * Fig. 1 * ----	1-8,12	

TECHNICAL FIELDS SEARCHED (Int. Cl.~~4~~5)

F 23 D 14/00
B 23 K 7/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	18-01-1990	TSCHÖLLITSCH

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