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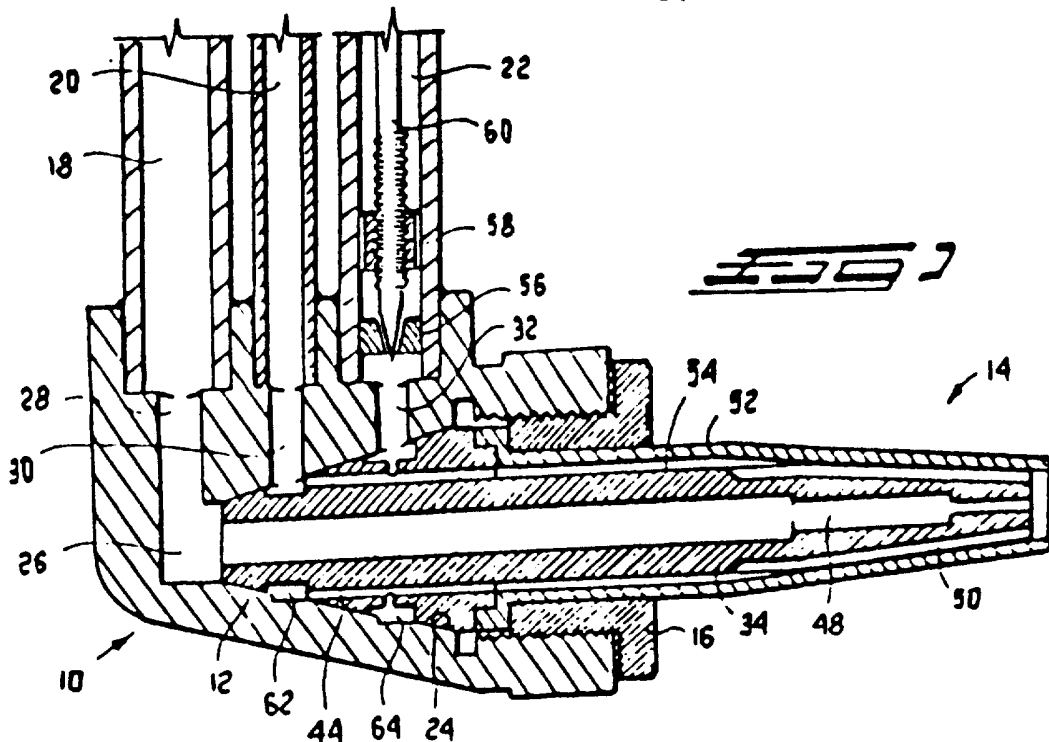
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(30) Priority Data:	
(33) Country: ZA	
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(32) Date: 14.06.89	
(84) Designated States: BW GM KE MW SD SZ UG LS ZM ZW	

(51) International Patent Classification Int. Cl.⁵ B23K 7/10

(54) Title: CUTTING TORCH

(57) Abstract: A CUTTING TORCH WITH FLAME NOZZLE, PARTICULARLY FOR USE WITH A PETROL/OXYGEN MIXTURE OF FUEL, WHEREIN TUBES SUPPLY PETROL AND OXYGEN THROUGH A MIXER IN THE HEAD.



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(56) Documents cited: DE-GM 8 912 142 EP 0 148 405 B1 DE-GM 8 300 552 US 3 042 106

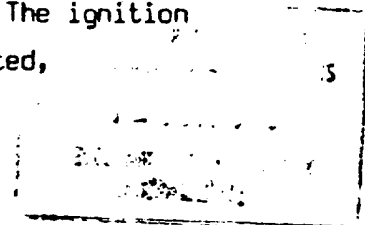
FIELD OF THE INVENTION:

5 This invention relates to a flame cutting torch and more particularly to a such a cutting torch for use with a petrol/oxygen fuel mixture.

10 BACKGROUND TO THE INVENTION

15 With conventional petrol/oxygen cutting torches the petrol is fed under pressure from a source to a fabric wick which surrounds the mixing cone in the cutting head of the torch. Petrol vapour is drawn from the wick by oxygen flow through the cutting head, through passages in the cone, to a mixing chamber between the cone and torch nozzle in the head. A major irritation if not a problem to users of
20 these torches is that when the supply of petrol or oxygen to the cutting head of the torch is interrupted or anything else happens to extinguish the flame, the petrol in the cutting head downstream of the wick is caused by the heated nozzle and cutting head to vapourise at a rapid
25 rate making re-ignition of the torch a difficult and time consuming process.

30 The petrol supply to the wick of these torches, through the handle tube to the cutting head, is controlled by a needle and seat valve arrangement in the petrol supply tube to the head. The needle of the valve arrangement is located at the end of a rod which extends axially through the supply tube from the torch handle to the seat which is located in the tube adjacent the cutting torch head and is
35 adjustable in length to vary the needle and seat aperture by a screw thread arrangement in the handle. The ignition problem with these torches is further aggravated,



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particularly at or just after initial ignition of a cool
torch, by expansion and contraction of the needle rod
5 between its adjustment arrangement at the handle and the
needle seat to cause variations in the set needle and seat
gap.

10 OBJECT OF THE INVENTION

It is the object of this invention to provide a petrol
cutting torch which will at least minimise the above
15 ignition problems with known torches.

SUMMARY OF THE INVENTION

20 A petrol cutting torch according to the invention includes
a cutting head, petrol and oxygen supply tubes to the
head, a fuel mixer in the head and a flame nozzle which
extends from the head characterised in that the fuel mixer
25 is located in a complementally shaped recess in the
cutting head and includes a recessed land which is scored
and which defines between it and the mixer recess wall an
annular petrol chamber in the head, at least one oxygen
30 passage which passes through the mixer from an oxygen
chamber upstream of the petrol chamber in the head to the
nozzle and at least one petrol passage between the scored
mixer land and the oxygen passage.

35 Further according to the invention the oxygen chamber is
defined between a second land on the mixer and a wall of
the head recess in which the mixer is located and the
mixer includes a plurality of oxygen passages which are
spaced around an axis which includes the axes of the mixer

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and nozzle with the petrol passage being an annular slot
in the scored land which intersects each of the oxygen
5 passages.

Preferably the oxygen passages are no greater than one
millimetre in diameter with the width of the petrol
10 passage slot being less than one millimetre.

Still further according to the invention the nozzle
includes an inner element which is fixed in axial
alignment to the mixer and a shroud which is engaged with
and surrounds the inner element of the nozzle to define
15 between it and the inner nozzle element an annular fuel
passage which is aligned with and open to the oxygen
passages in the mixer and extends between the mixer and
fuel discharge flutes in the forward end of the inner
nozzle element.

Still further according to the invention the cutting head
includes a second oxygen chamber which is located at the
rear of the mixer and a cutting oxygen passage which
25 passes axially through the mixer and nozzle to emerge from
the forward end of the nozzle.

Conveniently, the torch includes a handle having petrol
and oxygen supply connections, an oxygen supply tube
extending from the handle to a valve between the handle
30 and cutting head, two tubes from the valve to the cutting
head with one tube connected to an oxygen supply passage
in the head to the first oxygen chamber and the second to
a supply passage in the head to the second oxygen chamber,
a trigger mechanism for supplying oxygen from the valve to
35 the tube to the second oxygen chamber, a petrol supply
tube extending between the handle and a passage in the
head to the petrol chamber and a needle and seat valve in
the petrol tube with the seat fixed in the tube in or

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5 adjacent the cutting head and the needle on the end of a
rod which is rotatable from the handle and screw engaged
in a sleeve which is fixed to the tube adjacent the valve
seat.

10 BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention is now described by way of
example only with reference to the drawings in which:

15 FIGURE 1 is a sectioned side elevation of the cutting head
of the cutting torch of the invention,

20 FIGURE 2 is an enlarged half sectioned side elevation of
the mixer and inner nozzle element of the Figure 1 torch,
and

FIGURE 3 is an end elevation of the Figure 2 component as
seen from the right in the drawing.

25 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

30 The cutting torch of the invention is shown in the
drawings to include a cutting head 10, a fuel mixer 12, a
flame nozzle 14, a gland nut 16, two oxygen supply tubes
18 and 20 and a petrol supply tube 22.

35 The cutting head 10 is recessed to receive the fuel supply
tubes 18, 20 and 22 and includes a frusto conical recess
24 in which the mixer 12 is located, an oxygen cutting
chamber 26 at the rear of the recess 24, oxygen passages
28 and 30, a petrol passage 32 and a screw threaded bore

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for the nut 16 which is co-axial with the recess 24.

5 The fuel mixer 12, as is more clearly seen in Figure 2, is
made integral with an inner element 34 of the nozzle 14
with the outer surface of the mixer being complementally
shaped to the shape of the cutting head recess 24. The
10 mixer includes a first recess 36 the base surface 38 of
which has a scored or roughened surface which could
conveniently be provided by knurlling, a second recess 40,
four bores 44 which extend between a side wall of the
recess 40 and the front face of the mixer 12 and an
15 annular slot 46 which is centrally located on the base of
the recess 36 and intersects each of the bores 44. A
central bore 48 passes through the mixer and inner nozzle
element 34 to the forward end of the nozzle.

20 The forward portion of the nozzle element 34 carries, as
is conventional, fuel directing flutes 50. The nozzle 14
additionally includes, as is also conventional, a shroud
52 the forward end of which is frictionally engaged with
the outer surface of the inner nozzle element 34, as shown
25 in Figure 1, with its rear end carrying a step formation
which is sandwiched between the forward face of the mixer
12 and the nut 16. The rear portion of the shroud is
spaced from the inner nozzle element to provide an annular
fuel flow passage 54 which extends between the bores 44 in
30 the mixer and the flutes 50 on the inner nozzle element
34.

The oxygen supply tubes 18 and 20 have their ends located
in the recesses in the cutting head and are fixed in
position by braising. Although the petrol supply tube 22
35 is also shown braised to the cutting head it is, in
practise, preferably threadedly engaged with the cutting
head so that it may be easily removable from the head.

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5 The cutting torch includes the conventional handle and
oxygen and petrol connections with the oxygen supply tubes
18 and 20 being connected to a trigger operated valve for
supplying cutting oxygen to the tube 18 on demand. The
petrol tube 22 has fixed in its bore in the head a valve
seat 56 and directly adjacent it a threaded sleeve 58
10 which is also fixed to the inner wall of the bore of the
tube 22. The sleeve 58 has a plurality of grooves spaced
around its circumference for the passage of petrol through
the sleeve. A valve needle is formed on the free end of a
rod 60 which is co-axially held in the tube 22 by the
threaded sleeve 58. The remote end of the rod 66 is
15 connected to a rotatable nob on the handle for rotating
the rod and so varying the gap between the needle and seat
56.

20 In use, oxygen under pressure is fed through the tube 20,
oxygen passage 30 and into a chamber 62 defined between
the recess 40 in the mixer and the wall of the recess 24
to flow from the chamber 62 through the bores 44, through
the fuel flow passage 54 in the nozzle 14, and from the
flutes 50 at the forward end of the nozzle 14. Petrol
25 under pressure is then fed through the tube 22, the slots
in the sleeve 58, through the needle and seat valve into a
petrol chamber 64 in the head. The surface tension of the
petrol in the chamber 64 is reduced mechanically by the
scored surface 38 in the chamber to cause the petrol to
30 flow evenly over the surface 38 and into the slot 46
uniformly to enter and be entrained by the oxygen flowing
under pressure through the bores 44 in the mixer. This
even petrol distribution in the mixed fuel leaving the
bores 44 is further mixed in the nozzle fuel passage 54
35 and is evenly spread by the flutes around the nozzle to
provide a circumferentially consistent flame around the
central outlet from the nozzle bore 48 which would
otherwise not be the case if the surface of the recess 32

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5 had been smooth to cause the petrol in the chamber 64 to puddle under gravity in the chamber on one side or another in the chamber 64 in dependence on the direction in which the cutting head was being held by the operator during the cutting operation.

10 With the flame burning to the satisfaction of the cutting torch operator there is little possibility of the needle and seat gap varying due to expansion or contraction of the rod 63 as the needle is firmly held in its axial direction relatively to the seat by the threaded sleeve 58. To commence cutting with the torch the operator, as
15 is conventional, operates the handle trigger to cause oxygen to flow under pressure through the tube 18, the heat passage 25, chamber 26 and the bore 48 in the mixer and nozzle to provide a cutting flame of high intensity.

20 Should the flame now accidentally or otherwise be extinguished, the torch may immediately be re-ignited as liquid petrol is immediately available to the ignition oxygen from the chamber 64 with no possibility of the heated cutting head causing the fuel mixture to be over
25 leaned due to petrol evaporation in the cutting head of the torch.

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CLAIMS

5 1. A petrol cutting torch including a cutting head,
petrol and oxygen supply tubes to the head, a fuel mixer
in the head and a flame nozzle which extends from the head
characterised in that the fuel mixer is located in a
10 complementally shaped recess in the cutting head and
includes a recessed land which is scored and which defines
between it and the mixer recess wall an annular petrol
chamber in the head, at least one oxygen passage which
passes through the mixer from an oxygen chamber upstream
15 of the petrol chamber in the head to the nozzle and at
least one petrol passage between the scored mixer land and
the oxygen passage.

20 2. A cutting torch as claimed in claim 1 in which the
oxygen chamber is defined between a second land on the
mixer and a wall of the head recess in which the mixer is
located with the mixer including a plurality of oxygen
passages which are spaced around an axis which includes
the axes of the mixer and nozzle with the petrol passage
25 being an annular slot in the scored land which intersects
each of the oxygen passages.

30 3. A cutting torch as claimed in claim 2 in which the
mixer includes four oxygen passages which are one
millimetre in diameter with the width of the petrol
passage slot being less than one millimetre.

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5 4. A cutting torch as claimed in claim 3 in which the
nozzle includes an inner element which is fixed in axial
alignment to the mixer and a shroud which is engaged with
and surrounds the inner element of the nozzle to define
between it and the inner nozzle element an annular fuel
10 passage which is aligned with and open to the oxygen
passages in the mixer and extends between the mixer and
fuel discharge flutes in the forward end of the inner
nozzle element.

15 5. A cutting torch as claimed in claim 4 in which the
cutting head includes a second oxygen chamber which is
located at the rear of the mixer and a cutting oxygen
passage which passes axially through the mixer and nozzle
to emerge from the forward end of the nozzle.

20 6. A cutting torch as claimed in claim 5 including a
handle having petrol and oxygen supply connections, an
oxygen supply tube extending from the handle to a valve
between the handle and cutting head, two tubes from the
valve to the cutting head with one tube connected to an
25 oxygen supply passage in the head to the first oxygen
chamber and the second to a supply passage in the head to
the second oxygen chamber, a trigger mechanism for
supplying oxygen from the valve through the second tube to
the second oxygen chamber, a petrol supply tube extending
30 between the handle and a passage in the head to the petrol
chamber and a needle and seat valve in the petrol tube
with the seat fixed in the tube in or adjacent the cutting
head and the needle on the end of a rod which is rotatable
from the handle and screw engaged in a sleeve which is
35 fixed to the tube adjacent the valve seat.

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7. A petrol cutting torch as herein described with
reference to and as illustrated in the drawings.

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8. A fuel mixer for use in a cutting torch as herein
described with reference to and as illustrated in the
drawings.

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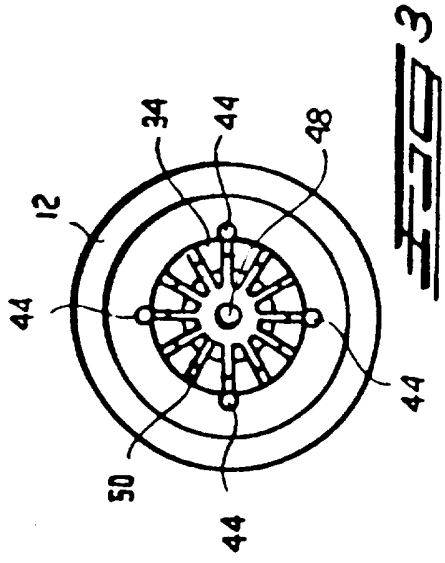
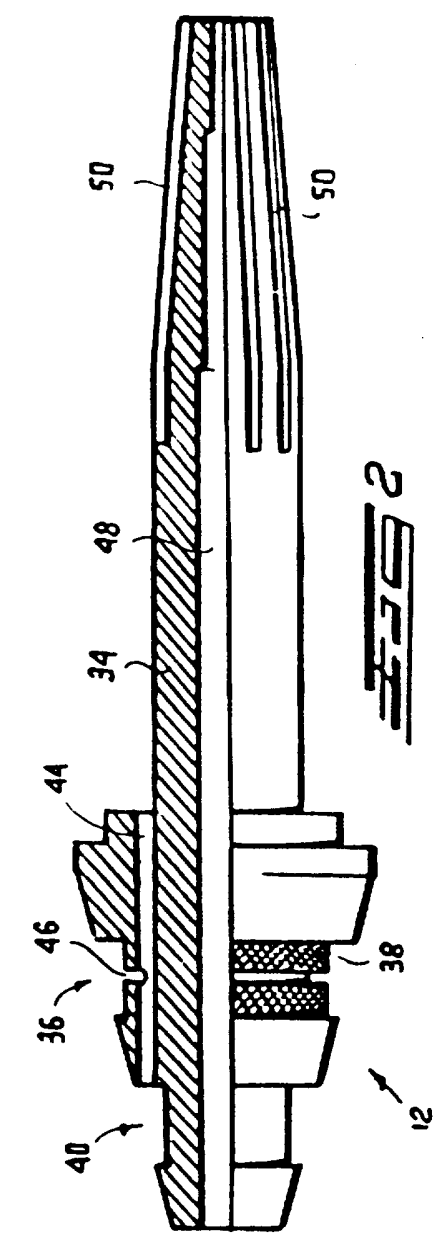
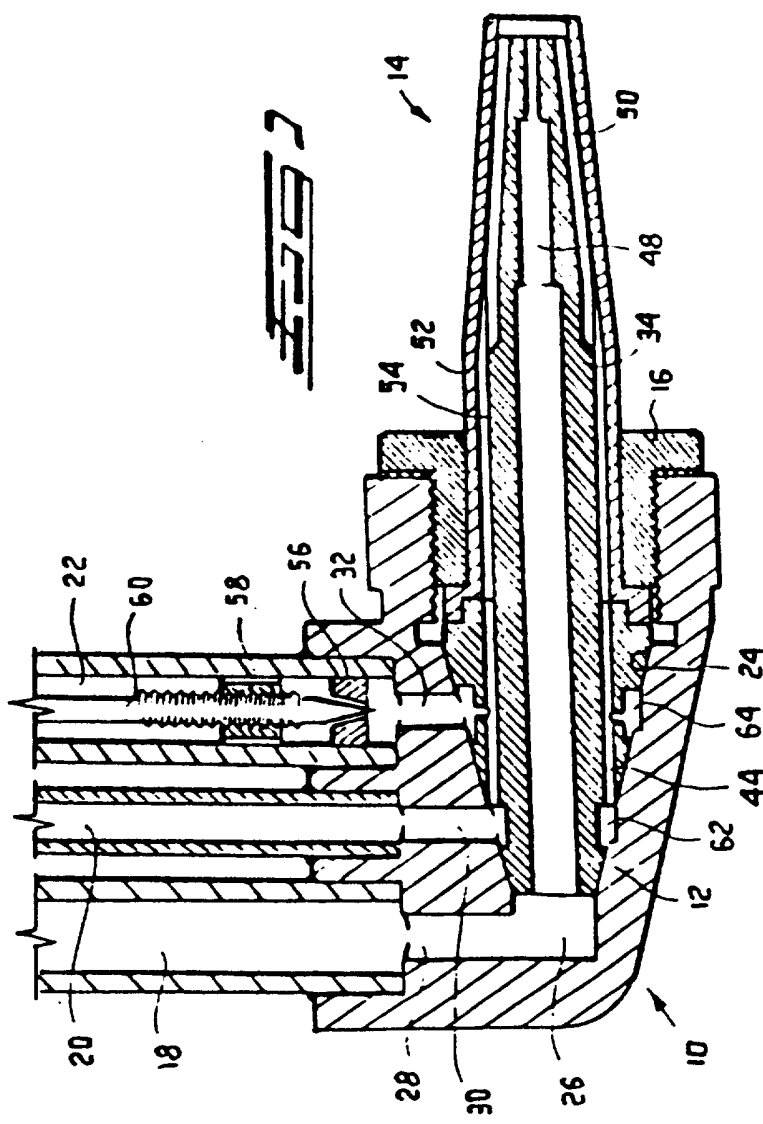
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