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(54) **Flame cutting torch.**

(57) A petrol cutting torch has a fuel mixer (12) located in a complimentary shaped recess (24) of the cutting head (10) and includes a recessed land (36) which is scored and partially defines an annular petrol chamber; an oxygen passage (44) passes through the mixer from an oxygen chamber upstream of the petrol chamber in the head to the nozzle (14), and a petrol passage (46) is provided between the land and the oxygen passage (44).

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FLAME CUTTING TORCH

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.

BACKGROUND TO THE INVENTION

With conventional petrol/oxygen cutting torches the petrol is fed under pressure from a source to a fabric wick which surounds 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 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 rate making re-ignition of the torch a difficult and time consuming process.

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

OBJECT OF THE INVENTION

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

SUMMARY OF THE INVENTION

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 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 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.

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

Preferably the oxygen passages are no greater than one millimetre in diameter with the width of the petrol 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 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 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 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 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 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.

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:

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

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.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

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 18, two oxygen supply tubes 18 and 20 and a petrol supply tube 22.

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

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 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 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.

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 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 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 brazing. Although the petrol supply tube 22 is also shown brazed 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.

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 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 60 is connected to a rotatable nob on the handle for rotating the rod and so varying the gap between the needle and seat 56.

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 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 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 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 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.

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 60 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 is conventional, operates the handle trigger to cause oxygen to flow under pressure through the tube 18, the head passage 28, chamber 26 and the bore 48 in the mixer and nozzle to provide a cutting flame of high intensity.

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 leaned due to petrol evaporation in the cutting head of the torch.

Claims

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 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 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.

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 being an annular slot in the scored land which intersects each of the oxygen passages.

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.

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 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.

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.

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 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 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 fixed to the tube adjacent the valve seat.

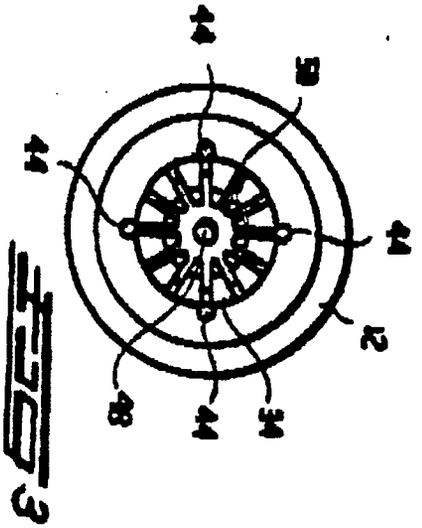

Fig 3

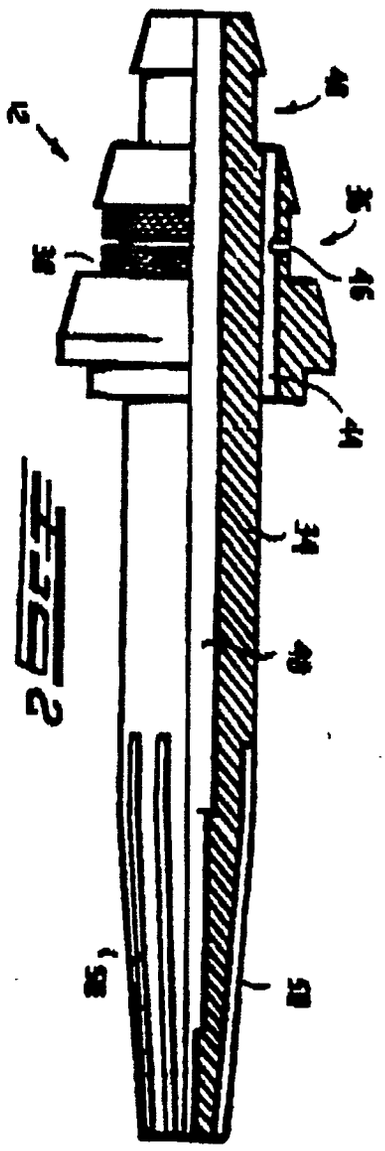

Fig 2

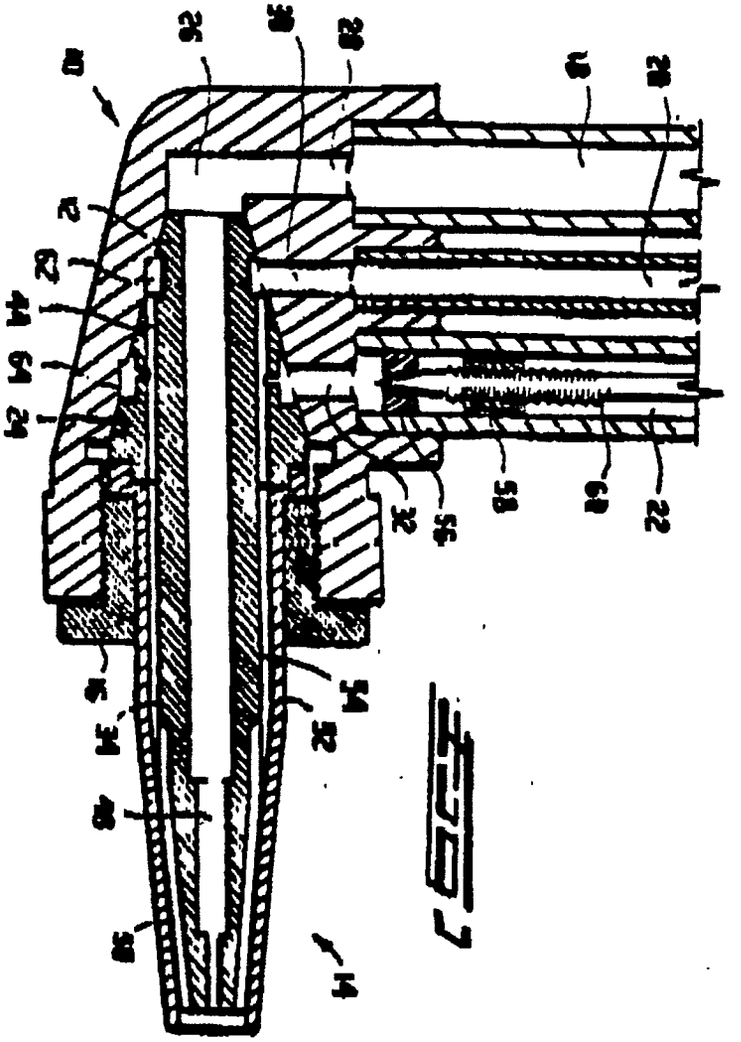

Fig 7