Dec. 8, 1970 J. MENERET ET AL 3,545,906

FLAME SPRAYING GUNS

Filed April 14, 1969 2 Sheets-Sheet 1

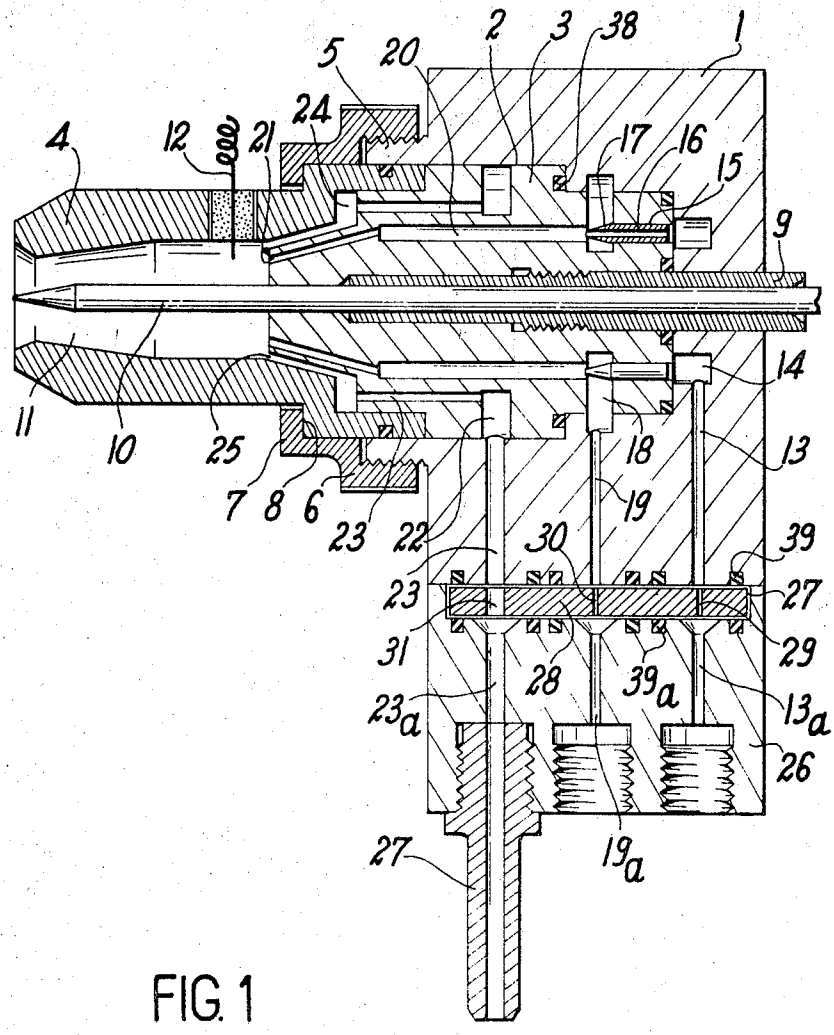

FIG. 1

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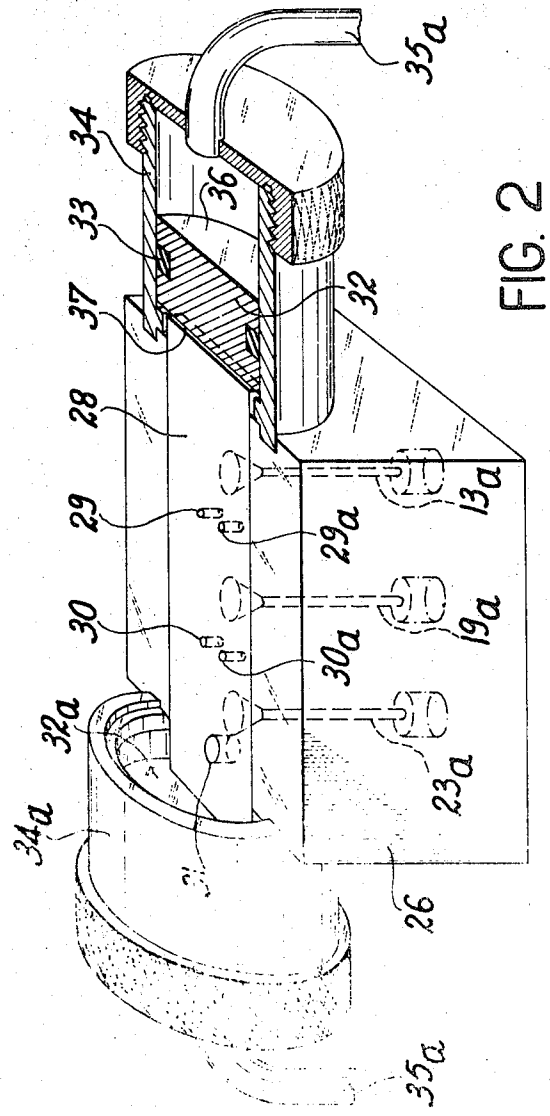

FIG. 2

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FLAME SPRAYING GUNS

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U.S. Cl. 431—158 5 Claims

ABSTRACT OF THE DISCLOSURE

A gun for use in a flame-spray process in which a recessed body accommodates a nozzle for mixing fuel gas and oxidant and a spray nozzle forming a combustion chamber into which said mixture is delivered with spray fluid and which is fitted with ignition means, said mixing nozzle and spray nozzle being maintained in concentric relation by means of a clamping member. Respective annular ducts for the fluids which pass through the nozzles are connected to fluid supply ducts provided within the gun body. The flow outlets of the supply ducts are selectively controlled by distribution means constituted by a slide valve mounted within the gun.

The present invention is concerned with improvements to flame spraying guns.

The gas torches or spray-guns which are employed especially for the purpose of spraying ceramic materials usually comprise means for circulating fuel gas, oxidant and spray fluid towards a combustion chamber in which is placed a rod or cord of material to be sprayed, said chamber being provided with ignition means.

The aim of this invention is to provide improvements in this type of gas torch which is made up of a body on which the different nozzles for discharging and mixing gases are mounted by means of an interassembly of components so as to obtain a gun which is preset at the time of construction and which is consequently not liable to get out of order during operation.

In accordance with an important property of the invention, and injector is provided between the oxidant duct and the duct for pre-mixing fuel gas and oxidant in order to produce a combining-tube effect on the fuel gas.

This arrangement makes it possible to have a lower fuel gas pressure and thus to prevent any backflash, decomposition of acetylene and carbon deposits within the ducts, thereby achieving greater reliability of operation.

The outlets of the ducts for the supply of oxidant, fuel gas and spray fluid are controlled by a self-lubricated slide-valve which ensures rapid and reproducible supply of the different fluids with a very small dead space.

Finally, the device in accordance with the invention makes it possible to obtain a gun unit of an industrial type which has small overall size and provides convenient operation.

In accordance with the present invention, the gun comprises a body having a recess in which a nozzle for discharging and mixing fluids and a spray nozzle are maintained in concentric relation by means of a clamping member, provision being made for the fluids which flow through said nozzles for respective annular ducts connected to fluid supply ducts formed within said body, the flow outlets of said supply ducts being selectively controlled by a distribution means constituted by a slide-valve mounted within said torch body.

Further properties and advantages of the present invention will become apparent from the following description

of one embodiment which is given solely by way of example and not in any limiting sense, reference being had to the accompanying drawings, in which:

FIG. 1 is a longitudinal sectional view of a flame spray-gun of improved design in accordance with the invention;

FIG. 2 is a view in perspective and in partial cross-section showing the slide-valve of the gun.

The improved gun in accordance with the invention as illustrated in FIG. 1 comprises a body **1** having a recess **2** in which are mounted with interposition of seals **38** a nozzle **3** for delivering and mixing fluids and a spray nozzle **4**, said body **1** being provided with a threaded collar **5** on which is screwed a nut **6** having an annular flange **7** applied against an annular shoulder **8** of the nozzle **4** and adapted to maintain the nozzles **3** and **4** clamped within the recess **2**.

The gun body **1** and the nozzles **3** and **4** are provided with an axial bore for the insertion of a rod **10** of material to be sprayed, the extremity of which extends into the interior of a combustion chamber **11** of the spray nozzle **4**. This nozzle is guided by a sleeve **9** which is screwed into the nozzle **3** and extends through the torch body **1**.

There is disposed within the combustion chamber **11** an electrode **12** which is intended to cause ignition of the mixture of fuel gas and oxidant.

A duct **13** for the admission of oxidant is formed within the torch body **1** and terminates in an annular chamber **14** which has its outlet in the bottom of the recess **2** in oppositely-facing relation to an annular duct **15** formed in the nozzle **3**, there being mounted in said annular duct an injector **16** having a calibrated passageway. The thinned extremity **17** of the injector **16** which extends through an annular chamber **18** which is formed in the nozzle **3** and connected to a duct **19** for the admission of fuel gas has its opening at the inlet of an annular pre-mixing duct **20** which communicates with the fuel-gas chamber **18**.

By reason of its diameter and profile, the injector **16** has a combining-tube effect on the fuel which is admitted into the chamber **18** through the duct **19** and which is impelled as a result of suction, with the result that an homogeneous mixture of fuel and oxidant is achieved within the duct **20**. Said mixture is directed through an annular duct **21** which forms an extension of the duct **20** into the combustion chamber **11** in which ignition of the mixture is caused by a spark produced by the electrode **12**.

Provision is made within the nozzle **3** for an annular chamber **22** into which opens a duct **23** for the supply of spray fluid under pressure, said chamber **22** being connected by means of an annular duct **23A** to a space **24** provided between the nozzles **3** and **4** and extending through an annular duct **25** into the combustion chamber **11** of the spray nozzle **4**.

The annular duct **25** has a diameter and an angle of slope which are variable according to the profile given to the rear portion of the nozzle **4** and according to the design criteria.

The ducts **13**, **19** and **23** for the supply of oxidant, fuel gas and spray fluid are bored in the torch body **1** and located in the line of extension of ducts **13***a*, **19***a*, **23***a* formed in a block **26** which is added to the torch body **1** and attached to this latter by any known means (FIGS. 1 and 2).

The ducts **13***a*, **19***a*, **23***a* are connected to the different fluid sources especially by means of screwed couplings such as the coupling **27**.

The block **26** comprises a guide **27A** within which is slidably mounted with interposition of seals **39**, **39***a* a rigid plate **28** which is pierced by apertures **29**, **30**, **31** and thus constitutes a slide-valve which is capable of putting into communication or isolating the ducts **13**, **19**, **23** and the ducts **13***a*, **19***a*, **23***a*.

Said slide-valve ensures the distribution of fluids according to a predetermined sequence with a minimum dead volume and maximum speed.

The plate **28** which is formed of self-lubricating material can be provided in respect of each fluid duct with a plurality of apertures of small size or ports **29**, **29***a* and **30**, **30***a* which can ensure a progressive supply of fluid with a predetermined lag between ports.

Said plate **28** is actuated without being subjected to stress by two pistons **32**, **32***a* which act respectively on each end of said plate. Said pistons which are fitted with packing rings **33** are mounted in free sliding motion within cylinders **34**, **34***a* which are supplied with compressed air via ducts **35**, **35***a*.

In this manner, the pistons **32**, **32***a* are subjected alternately on their faces **36** to the action of the compressed fluid so as to carry out the sliding motion of the plate **28** and to bring this latter selectively into a position of opening or closing of the fluid intake ports.

The pistons **32**, **32***a* are provided in one face with a groove **37** which serves to lock the slide-valve rotationally.

What we claim is:

1. A flame spraying gun comprising a body having a recess in which are maintained in concentric relation by means of a clamping member a spray nozzle defining a combustion chamber which is provided with ignition means and a nozzle for mixing an oxidant and a fuel gas and delivering said mixture and a spray fluid to said combustion chamber, provision being made for the fluids which flow through said nozzles for respective annular ducts connected to fluid supply ducts formed within said body, the flow outlets of said supply ducts being selectively controlled by a distribution means constituted by a slide valve mounted within said torch body.

2. A flame spraying gun in accordance with claim **1** comprising an injector disposed between the annular oxidant-duct and the fuel gas duct for pre-mixing fuel gas and oxidant, said injector being adapted to open into the inlet of a pre-mixing duct which is in turn connected to the annular fuel gas duct for the admission of fuel gas so as to produce a combining-tube effect on the fuel gas.

3. A flame spraying gun in accordance with claim **2**, wherein the slide-valve is constituted by a plate which is slidably mounted at right angles to the fluid supply ducts within a slideway provided within the torch body, said plate being provided with at least one port for each duct in order that a communication may be established between two elements of each supply duct.

4. A flame spraying gun in accordance with claim **3**, wherein the sliding plate is provided with a number of relatively-displaced ports for the oxidant and fuel gas fluid supply ducts.

5. A flame spraying gun in accordance with claim **3**, wherein the sliding plate is subjected at both ends to the action of two pistons which are mounted to slide freely within two cylinders, said pistons being subjected on one face to the action of a driving fluid.

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