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(54) IMPROVEMENTS IN OR RELATING TO GAS BURNER NOZZLES

(71) We, MANSEI KOGYO KABUSHIKI KAISHA of 3035, 1-chome Kamiaoki-cho, Kawaguchi-shi, Saitama-ken, Japan, a Japanese Company do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to gas burner nozzles.

Gas burner nozzles are employed for gas burning appliances in which the emitted fuel is ignited by a spark produced by a high voltage generating device. It is already known that the most efficient ignition is obtained with a nozzle which has a main gas outlet and a subsidiary gas outlet in the gas burning appliance. Many such nozzles have been fabricated but they were not suitable for use with gas burning appliances which are small sized devices, such as cigarette lighters. Also, a number of the above-mentioned gas burner nozzles employ two cylindrical bodies in their construction and are not economical for use as the gas burner nozzle in smaller sized gas burner appliances such as cigarette lighters.

The present invention consists in a gas burner nozzle comprising a hollow cylindrical body and a cylindrical spiral member which is secured to the body, generally coaxially thereof and is at least partly located within the body, the spiral member having an outer end portion in which an internal space is defined by an inner periphery of the member and in which a spiral space is formed between adjacent turns of the member, the internal space of the spiral member communicating, in use, with a fuel reservoir device and forming a main gas outlet passage and the spiral space communicating with said main gas outlet passage to provide a subsidiary flow of gas.

A gas burner nozzle according to the

invention may be economical to manufacture and easy to assemble.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a longitudinal section of a first gas burner nozzle according to the present invention;

Figure 2 is a longitudinal section of a second gas burner nozzle according to the present invention; and

Figure 2a is a longitudinal section of a modification of the nozzle of Figure 2.

Each of the gas burner nozzles shown in the drawings includes a hollow cylindrical body and a cylindrical spiral member. The spiral member is so arranged that a portion thereof extends beyond one end of the cylindrical body, the space between successive turns of the member serving as a subsidiary gas outlet and a main gas outlet being defined in the inner space thereof.

Referring to Figure 1, reference numeral 1 denotes a cylindrical body of a heat resistant material formed with a passage which communicates with a fuel reservoir (not shown). A screw thread 3 is formed intermediate the ends of the passage 11.

Reference numeral 2 denotes a cylindrical spiral member of a heat resistant material, in this embodiment a metallic wire. The spiral member 2 is arranged coaxially of and partly within the cylindrical body 1 and is secured thereto by engagement with the screw thread 3 in the body 1.

The inner periphery of the spiral member 2 defines a main gas outlet passage 12 and an outer portion 5 of this passage serves as a main gas outlet opening, namely, a burner opening 5. The spiral space 4 between adjacent turns of the member 2 serves as a subsidiary gas outlet passage through which gas flows into a space 7 of annular section which is formed between an enlarged section of the passage 11 and the exterior of member 90

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2. An outer end of the space 7 serves as a subsidiary gas outlet opening 6.

Reference numeral 9 designates a high voltage generating device which employs a piezoelectric element or the like. An electrode 10 is connected in series with the high voltage generating device 9 and forms a spark gap with the spiral member 2, which is electrically connected with the high voltage generating device 9 through the cylindrical body 1, which is metallic in this embodiment. It will be appreciated that the member 2 must be directly connected to the high voltage generating device 9 when the cylindrical body 1 is made of an electrically insulating material, such as steatite. It is also possible to provide a separate electrode instead of using the spiral member 2 as the second electrode.

Operation of the burner nozzle of Figure 1 is as follows: Gaseous fuel emitted from the fuel reservoir reaches the burner opening 5 through the passage 11 in the cylindrical body 1 and the main gas outlet passage 12 formed by the spiral member 2. A certain quantity of the gaseous fuel passing through the main passage 12 of the spiral member 2 passes through the lower part of the spiral space 4 in the member 2 and the annular space 7 to the subsidiary outlet opening 6.

The gaseous fuel which emerges from the subsidiary outlet opening 6 is first ignited by an electric spark which bridges the gap between the electrode 10 and the spiral member 2 as a result of the high voltage generated by the high voltage generating device 9. The flame so produced ignites the gaseous fuel emerging from the burner opening 5.

Referring now to Figure 2, a second embodiment of the present invention is made of materials which are the same as those employed in the first embodiment. In this second embodiment a spiral member 102 is secured within a through bore 111 in a cylindrical body 101 by applying pressure to deform the body from the outside, material from the wall of the body being forced between adjacent turns of the member 102. The spiral member 102 is disposed in an abutting relationship with an internal wall 113 of the through bore 111 in the body 101 and there is no annular space between the member 102 and the body 101 corresponding to the space 7 in the embodiment of Figure 1. Indeed, the portion of the spiral member 102 which extends within the cylindrical body 101 serves only to support the member within the body 101. Accordingly, it will be noted from Figure 2a that the spiral member 102 does not necessarily have the same length as that of the passage 111 of the cylindrical body 101. The remaining construction of the second embodiment is similar to that of the first embodiment.

In the embodiment of Figure 2 the inner

periphery of the member 102 forms a main gas outlet passage and the spiral space 104 between adjacent turns of the part of member 102 which is outside the body 101 serves as a subsidiary gas outlet passage.

Figure 2a is a modification of the embodiment of Figure 2. Referring to Figure 2a, a spiral member 202 is mounted within an enlarged section 211 of a bore in a cylindrical body 201 and is secured thereto by deformation of the body wall to form an abutment 201a, as described above in connection with Figure 2. Section 211 communicates with a fuel reservoir (not shown) and also communicates with a burner opening 205 at an outer end of the spiral member 202 via a main outlet passage formed by the inner periphery of member 202. Numeral 206 is an upper spiral space in the spiral member 202 which serves as a subsidiary gas outlet passage. The remaining construction of this embodiment is similar to that of the above-mentioned embodiments.

The following description is given to explain the operation of the gas burner nozzle in this embodiment. The gaseous fuel from the reservoir passes through the section 211 of the bore in body 201 and the main gas spouting passage and then reaches the spiral space 206, from which it emerges slowly. It is this fuel gas from the spiral space 206 that is first ignited by the electric spark which bridges the gap between the electrode 210 and the spiral member 202 as a result of the high voltage produced by the operation of the high voltage generating device 209. After this the fuel gas emerging from the burner opening 205 catches fire from the already ignited gaseous fuel from space 206.

WHAT WE CLAIM IS:—

1. A gas burner nozzle comprising a hollow cylindrical body and a cylindrical spiral member which is secured to the body, generally coaxially thereof and is at least partly located within the body, the spiral member having an outer end portion in which an internal space is defined by an inner periphery of the member and in which a spiral space is formed between adjacent turns of the member, the internal space of the spiral member communicating, in use, with a fuel reservoir device and forming a main gas outlet passage and the spiral space communicating with said main gas outlet passage to provide a subsidiary flow of gas.

2. A gas burner nozzle as claimed in claim 1, wherein the said spiral member is formed of electrically conductive material for use as one of a pair of electrodes which form a spark gap of an igniter therebetween.

3. A gas burner nozzle as claimed in claim 1 or 2 wherein said spiral member is secured to the cylindrical body by engagement with a screw thread formed internally

2. An outer end of the space 7 serves as a subsidiary gas outlet opening 6.

Reference numeral 9 designates a high voltage generating device which employs a piezoelectric element or the like. An electrode 10 is connected in series with the high voltage generating device 9 and forms a spark gap with the spiral member 2, which is electrically connected with the high voltage generating device 9 through the cylindrical body 1, which is metallic in this embodiment. It will be appreciated that the member 2 must be directly connected to the high voltage generating device 9 when the cylindrical body 1 is made of an electrically insulating material, such as steatite. It is also possible to provide a separate electrode instead of using the spiral member 2 as the second electrode.

Operation of the burner nozzle of Figure 1 is as follows: Gaseous fuel emitted from the fuel reservoir reaches the burner opening 5 through the passage 11 in the cylindrical body 1 and the main gas outlet passage 12 formed by the spiral member 2. A certain quantity of the gaseous fuel passing through the main passage 12 of the spiral member 2 passes through the lower part of the spiral space 4 in the member 2 and the annular space 7 to the subsidiary outlet opening 6.

The gaseous fuel which emerges from the subsidiary outlet opening 6 is first ignited by an electric spark which bridges the gap between the electrode 10 and the spiral member 2 as a result of the high voltage generated by the high voltage generating device 9. The flame so produced ignites the gaseous fuel emerging from the burner opening 5.

Referring now to Figure 2, a second embodiment of the present invention is made of materials which are the same as those employed in the first embodiment. In this second embodiment a spiral member 102 is secured within a through bore 111 in a cylindrical body 101 by applying pressure to deform the body from the outside, material from the wall of the body being forced between adjacent turns of the member 102. The spiral member 102 is disposed in abutting relationship with an internal wall 113 of the through bore 111 in the body 101 and there is no annular space between the member 102 and the body 101 corresponding to the space 7 in the embodiment of Figure 1. Indeed, the portion of the spiral member 102 which extends within the cylindrical body 101 serves only to support the member within the body 101. Accordingly, it will be noted from Figure 2a that the spiral member 102 does not necessarily have the same length as that of the passage 111 of the cylindrical body 101. The remaining construction of the second embodiment is similar to that of the first embodiment.

In the embodiment of Figure 2 the inner

periphery of the member 102 forms a main gas outlet passage and the spiral space 104 between adjacent turns of the part of member 102 which is outside the body 101 serves as a subsidiary gas outlet passage.

Figure 2a is a modification of the embodiment of Figure 2. Referring to Figure 2a, a spiral member 202 is mounted within an enlarged section 211 of a bore in a cylindrical body 201 and is secured thereto by deformation of the body wall to form an abutment 201a, as described above in connection with Figure 2. Section 211 communicates with a fuel reservoir (not shown) and also communicates with a burner opening 205 at an outer end of the spiral member 202 via a main outlet passage formed by the inner periphery of member 202. Numeral 206 is an upper spiral space in the spiral member 202 which serves as a subsidiary gas outlet passage. The remaining construction of this embodiment is similar to that of the above-mentioned embodiments.

The following description is given to explain the operation of the gas burner nozzle in this embodiment. The gaseous fuel from the reservoir passes through the section 211 of the bore in body 201 and the main gas spouting passage and then reaches the spiral space 206, from which it emerges slowly. It is this fuel gas from the spiral space 206 that is first ignited by the electric spark which bridges the gap between the electrode 210 and the spiral member 202 as a result of the high voltage produced by the operation of the high voltage generating device 209. After this the fuel gas emerging from the burner opening 205 catches fire from the already ignited gaseous fuel from space 206.

WHAT WE CLAIM IS:—

1. A gas burner nozzle comprising a hollow cylindrical body and a cylindrical spiral member which is secured to the body, generally coaxially thereof and is at least partly located within the body, the spiral member having an outer end portion in which an internal space is defined by an inner periphery of the member and in which a spiral space is formed between adjacent turns of the member, the internal space of the spiral member communicating, in use, with a fuel reservoir device and forming a main gas outlet passage and the spiral space communicating with said main gas outlet passage to provide a subsidiary flow of gas.

2. A gas burner nozzle as claimed in claim 1, wherein the said spiral member is formed of electrically conductive material for use as one of a pair of electrodes which form a spark gap of an igniter therebetween.

3. A gas burner nozzle as claimed in claim 1 or 2 wherein said spiral member is secured to the cylindrical body by engagement with a screw thread formed internally



of the body.

4. A gas burner nozzle as claimed in claim 1 or 2, wherein the spiral member is secured to the body by applying pressure to
5 deform the body from outside, material from the body wall being forced between adjacent turns of the member.

5. A gas burner as claimed in any one of the preceding claims, wherein an outer end
10 section of the cylindrical body through which the spiral member extends has an internal diameter greater than the external diameter of the member, whereby a space of generally annular section is defined between
15 part of the length of the said spiral members

and the interior surface of the outer end section of the body.

6. A gas burner nozzle constructed, arranged and adapted to operate substantially as hereinbefore described with reference to, 20 and as illustrated in, the accompanying drawings.

MATHYS & SQUIRE,
Chartered Patent Agents,

10 Fleet Street,
London, E.C.4.

Agents for the Applicants.

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