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RIBBON BURNER

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Fig. 1.

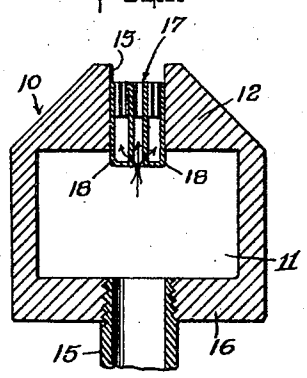


Fig. 2.

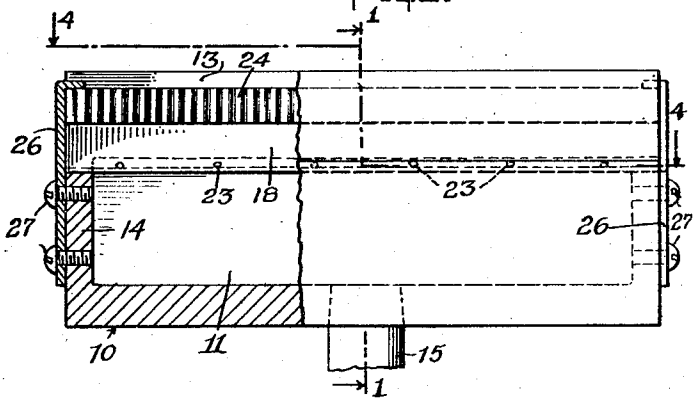


Fig. 3.

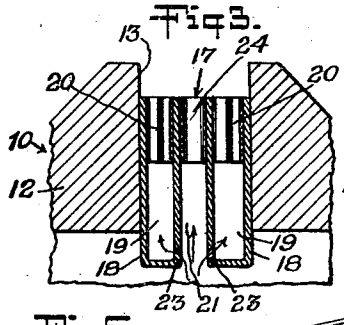


Fig. 4.

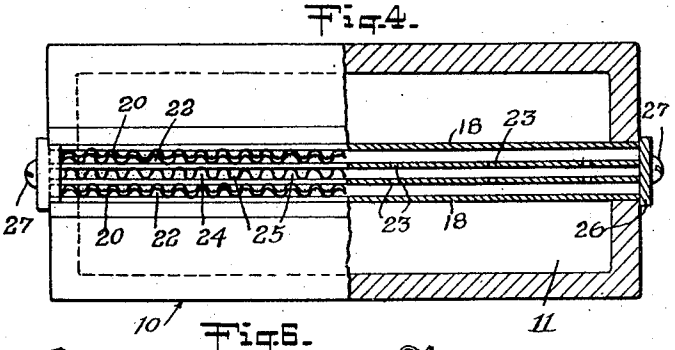


Fig. 5.

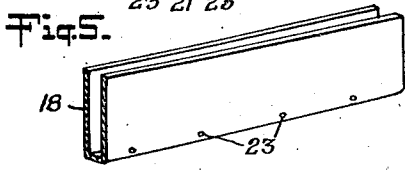


Fig. 6.

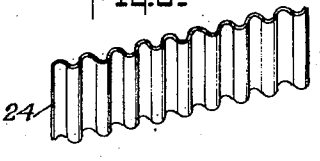


Fig. 7.



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UNITED STATES PATENT OFFICE

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RIBBON BURNER

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4 Claims. (Cl. 158—99)

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This invention relates to gas burners adapted to produce a combination of a main high velocity flame and low pressure piloting flames to assure a steady and even application of heat where wanted.

The principal object of the invention is the provision of an improved burner of the indicated character which overcomes the deficiencies of burners hitherto produced in the same class.

The burner of the present invention is a ribbon burner in that it uses crimped or corrugated gas jet forming strips or ribbons, as distinguished from gas jet drilled material. The strips or ribbons of metal, such as sheet steel, are crimped or corrugated transversely so that when laid together provide an elongated gas port or jet grid structure.

In accordance with the invention, the ribbons are so arranged and held in position that it is possible to obtain a continuous sheet of stiff flame of any required height and terminating in a sharp edge, thereby in fact constituting a true knife edge flame. The flame is maintained at an equal height from the jets or ports producing a concentrated heat line from one end of the flame space to the other and so giving even heat to the flame edge for the entire length of the flame space. This is due to the fact the gas jets are separated or limited in their spacing only by the thickness of the metal strips or ribbons forming said jets. Moreover, these ribbon formed jets will not oxidize or change in area from any combustion or heat condition as is true of jets formed by drilling holes in a piece of metal.

Also, the use of crimped ribbons to form gas ports provides for expansion and contraction of such ribbons without upsetting the port area as well as without injury to the ports. The distribution of the gas fuel is equalized the entire length of the flame space producing even or balanced continuous piloting flames and the main knife edge flame. The ribbon grid port or jet construction breaks up the stratification of the initial air-gas mixture so that the molecules of the air and gas become intimately united so that complete combustion results, there being no free carbon constituents of the gaseous fuel liberated by the flames to be condensed and form carbon at the point of flame contact.

A further object of the invention is the provision of improvements whereby ribbons are removable, replaceable and renewable to the end that the burner may be kept in its original operating condition, and also may be readily adapted for burning various kinds of combustible gas.

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The nature of the invention and its distinguishing features and advantages will appear when the following specification is read in conjunction with the accompanying drawing in which—

Fig. 1 is a cross-section of a burner constructed in accordance with the invention, the section being taken on the line 1—1 of Fig. 2.

Fig. 2 is a view partly in side elevation and partly in longitudinal section of the burner shown in Fig. 1.

Fig. 3 is an enlarged fragmentary cross-section of the burner shown in Figs. 1 and 2.

Fig. 4 is a view partly in top plan and partly in section, the section being taken on the line 4—4 of Fig. 2.

Fig. 5 is a perspective view of a portion of one of the removable channels of the ribbon grid port structure.

Fig. 6 is a perspective view of a portion of one of the crimped or corrugated ribbons.

Fig. 7 is a top view showing portions of two ribbons in gas port or jet forming relation on an enlarged scale.

Referring now more particularly to Figs. 1 to 7 inclusive, it will be apparent the burner shown in accordance with the invention includes an elongated hollow body 10. This body may be of any suitable length and shape and in the present instance is substantially rectangular in longitudinal aspect and also in cross-section except it slopes at each side at the top. The body 10 being hollow, therefore, has a chamber 11 extending the entire length of the body. The top wall 12 has a longitudinal slot 13 therein opening through the opposite end walls 14 and communicating with the chamber 11. The combustible fuel or mixture of gas and air is fed into the chamber 11 by a feed pipe 15 at a central point through the bottom wall 16 for an even distribution of the gas.

A separate ribbon grid gas port or jet structure 17 is designed and adapted to fit in and wholly occupy the slot 13. This structure provides means for producing low pressure or piloting ribbon flames at either side of a high velocity knife edge ribbon flame. The structure 17 includes channels 18 arranged in the slot 13 side by side in spaced relation to each other in contact with the side walls of the slot throughout. The open side of each channel 18 is disposed upwardly. Crimped or corrugated strip material, such as ribbons 20 of sheet steel are placed within each of the channels 18. These ribbons are of less width than the depth of the channel to provide a gas expansion and distribution space 19. The space between the channels 18 is designated 21.

The ribbons 20 are of shallow depth crimp so that relatively small size ports are formed by a plurality of the ribbons laid side by side in the space between the side walls of the channel, as shown most clearly in Fig. 4. Two strips or ribbons 20 are arranged in each channel but any number may be used. These strips or ribbons 20 provide a multiplicity of ports or jets 22 to form a ribbon piloting flame. In the bottom of each channel 18 is a plurality of holes or orifices 23 for the passage of gas from the chamber 11 to the space 19. The orifices 23 restrict the flow of gas and together with the space 19 decrease the velocity of the bas so that the gas fuel is equalized the entire length of the flame space. As a result, there is produced an even or balanced low pressure or piloting flame.

In the space 21 crimped or corrugated strip material 24 is inserted in frictional contact with the side walls of the channels 18. Only one strip or ribbon 24 is shown, the same being of a deeper crimp than the ribbons 20. This ribbon 24 provides a multiplicity of ports or jets 25 designed to provide a static pressure and velocity of the gas from the chamber 11 to produce a solid continuous sheet of flame of the required height terminating in a knife edge to furnish maximum heat.

From the foregoing it will be understood the amount of gas to the ports 22 is controlled so that the velocity is reduced so that the flame will not leave the burner, thereby acting to produce a piloting flame at each side of the relatively high velocity main flame produced by the larger ports 25.

The structure 17 is held in place by end clips 26 attached to the end walls 14 respectively by screws 27. The structure 17 may be removed so that the ribbons may be renewed for the upkeep of the burner. Also, such ribbons may be replaced by others to suit the nature of the particular combustible fuel or gas used in case of necessity.

We claim:

1. A gas burner capable of producing a high velocity continuous knife edge flame and low pressure piloting flames, comprising an elongated hollow body adapted to receive gas, said body having a longitudinal slot communicating with the interior of the body, channels arranged in said slot side by side in spaced relation to each other in contact with the side walls respectively of said slot throughout, the open side of each channel being disposed upwardly, the space between said channels being for a high velocity flow of gas outwardly from the interior of said body, crimped strip material in said space to produce the continuous knife edge flame from the gas issuing through said space, crimped strip material in each of said channels to produce piloting flames at either side of said knife edge flame from the gas issuing from said channels, said channels having orifices for the passage of gas from the interior of said body into said channels.

2. A gas burner as set forth in claim 1, wherein said channels together with said crimped strip material may be removed and replaced for the purpose of adapting he burner for various kinds of gas.

3. In a gas burner, apertured channels arranged side by side in spaced relation, crimped ribbon material arranged in the space between said channels and therewith forming ports of a size causing a relatively high velocity flow of gas to produce a ribbon flame, crimped ribbon material arranged in each of said channels and therewith forming ports of a size causing a low velocity flow of gas to produce piloting flames at either side of said ribbon flame, means removably holding said channels in place, and means to feed gas through said channels and into the space between the channels.

4. In a gas burner, a hollow body adapted to receive gas, said body having a longitudinal slot communicating with the interior of the body, apertured channels arranged in said slot side by side in spaced relation in contact wtih the walls thereof, crimped ribbon material arranged in the space between said channels and therewith forming ports of a size causing a relatively high velocity flow of gas to produce a ribbon flame, and crimped ribbon material arranged in each of said channels and therewith forming ports of a size causing a relatively low velocity flow of gas to produce piloting flames at either side of said ribbon flame, the gas from within said body flowing into said channels and into the space between the channels.

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