Sept. 30, 1947. J. H. FLYNN ET AL 2,428,274

NEEDLE FLAME DUAL CONTROL BURNER

Filed March 1, 1944

Fig.1.

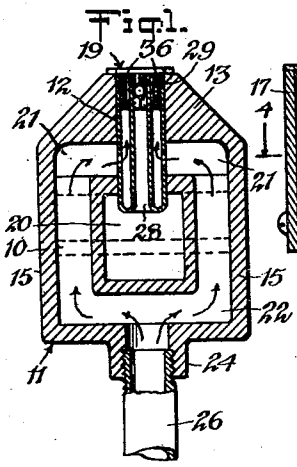


Fig.2.

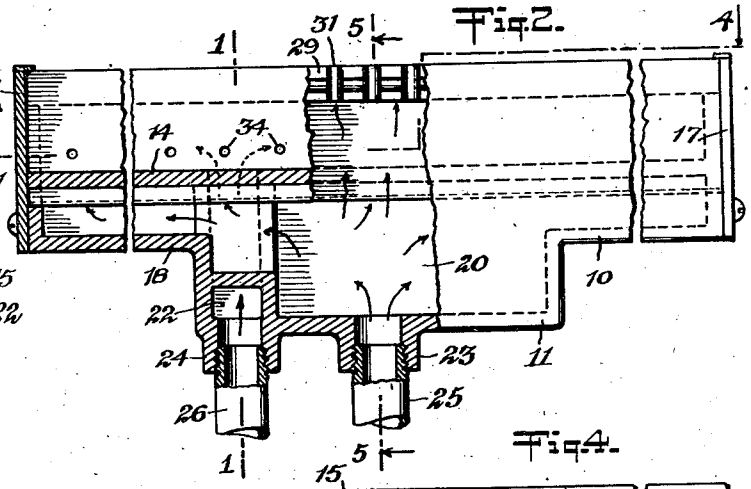


Fig.3.

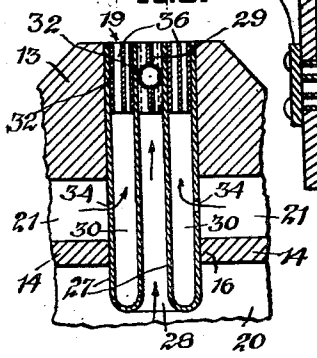


Fig.4.

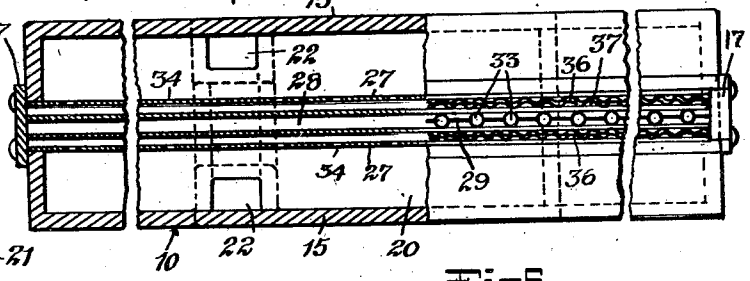


Fig.5.

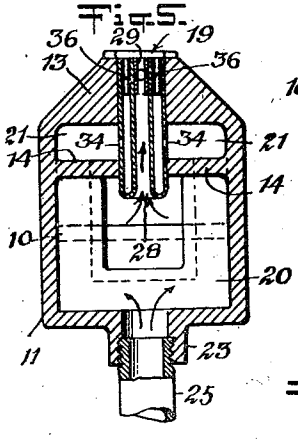


Fig.6.

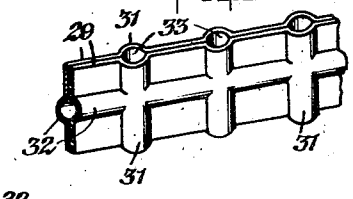


Fig.8.

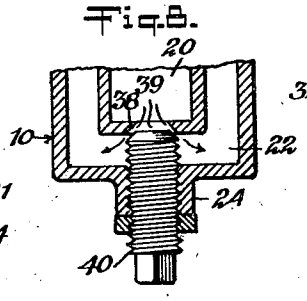


Fig.7.

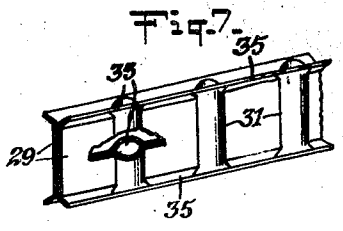
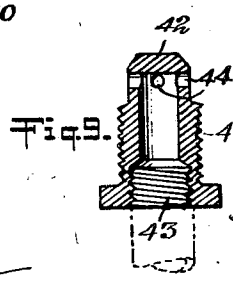


Fig.9.



Witnesses
Geo. W. Naylor
Chris Feinle.

INVENTORS
John H. Flynn
and William B. Ensign
BY
Munn, Liddy & Glascum
Attorneys

Patented Sept. 30, 1947

2,428,274

# UNITED STATES PATENT OFFICE

2,428,274

## NEEDLE FLAME DUAL CONTROL BURNER

John Harold Flynn and William B. Ensign, New Rochelle, N. Y., assignors to Ensign Ribbon Burners, Inc., Mount Vernon, N. Y., a corporation of New York

Application March 1, 1944, Serial No. 524,580

2 Claims. (Cl. 158—99)

1

This invention relates to a burner adapted to burn gaseous fuel 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.

An object of the invention is the provision of a burner of the indicated character embodying improvements whereby the gaseous fuel may be delivered from a common source of supply to ports producing the knife-type needle main flame and to the ports producing the pilot ribbon flames, simultaneously, or to one set of the ports so that a regulated flow of fuel for the pilot flames may be provided, or to stop the flow to extinguish the pilot flames if desired. By providing a controlled feed for the pilot flames of the burner it is possible to use different kinds of gaseous fuel in different amounts so that the main flame will always have the desired volume and heating efficiency. Also, the characteristics of the main flame may affect the amount of fuel to the pilot flames and this may be remedied by the novel controlled feed of the burner.

A further object of the invention is the provision of novel form of gas port or jet grid structure for producing needle type main flames in a ribbon type burner.

With the foregoing, other objects of the invention will appear when the following specification is read in conjunction with the accompanying drawing, in which—

Fig. 1 is a cross-sectional view 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 with portions broken away.

Fig. 3 is an enlarged fragmentary cross-sectional view showing the port or jet grid structure of the burner.

Fig. 4 is a sectional plan view, the section being taken approximately on the line 4—4 of Fig. 2.

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 2.

Fig. 6 is a fragmentary perspective view of ribbons for producing needle type main flames.

Fig. 7 is a view similar to Fig. 6 showing modification of the ribbons.

Fig. 8 is a fragmentary cross-sectional view of modification for controlling the flow of fuel.

Fig. 9 is a sectional view of an adaptor for controlling the flow of fuel.

Referring now more particularly to the drawing, it will be seen the burner includes an elongated hollow body 10 which may be of any suitable length and shape. In the present instance the body 10 is substantially rectangular in longitudinal aspect and also rectangular in cross-section except that the body slopes at each side at the top. At the middle there is an extension 11 which enlarges the body for a portion of its length at the bottom side as shown in Fig. 2. The body 10 has a longitudinal slot 12 in the top wall 13 thereof. Horizontal flanges 14 project inwardly from the side walls 15 in spaced relation to the top wall. The flanges 14 are in the same plane and provide a longitudinal slot 16 equal in length and width to slot 12. The body 10 has removable end wall sections 17 and a stepped bottom wall 18. A separate ribbon grid gas port or jet structure 19 is designed and adapted to fit in and wholly occupy the slots 12 and 16. The walls and flanges of the body, together with the structure 19, form a main chamber 20 and branch passages 21 each extending the full length of the body. The end walls 17 close the opposite ends of the slots 12 and 16. A U-shape passage 22 is formed within the body 10 transversely thereof. The opposite ends of the passage 22 communicate with the passages 21 respectively at intermediate points above the extension 11. The bottom wall 18 at the extension has a tapped inlet 23 which communicates with the chamber 20, and a tapped inlet 24 which communicates with the passage 22. The gaseous fuel is fed to the inlets 23 and 24 by pipes 25 and 26 connected therewith respectively and connected with an external fuel supply source. Thus fuel or gas is fed to the main chamber 20 from the pipe 25 and an independent supply of fuel is fed to the passage 22 and passages 21 from the pipe 26.

The structure 19 provides means for producing low pressure or piloting flames at either side of a high velocity knife-type needle main flame. The structure 19 includes channels 27 fitting in the slots 12 and 16 and arranged side by side in spaced relation to each other in contact with the side walls of said slots throughout the length thereof and in contact with the sections 17. Thus, a space 28 is provided between the channels 27, and said space communicates with the main chamber 20. The top or open side of each channel 27 is disposed upwardly. Crimped or corrugated strip material, such as ribbons 29, of sheet steel are placed within the space 28 in frictional contact with the side walls of the channels 27. The ribbons may be diversely crimped or corrugated to provide a multiplicity

of ports or jets in spaced relation to each other and obstructing portions contacting the walls of the channels to prevent leakage between the channels and ribbons. In Fig. 6 there are shown portions of two strips or ribbons 29 which are similar in construction. Each strip is crimped to provide transverse corrugations 31 in spaced parallel relation to each other, and a longitudinal corrugation 32 merging into the corrugations 31. When two strips or ribbons are laid together side-by-side and are placed in the space 28 designed to receive them, a multiplicity of vertical ports or jets 33 will be provided. These ports or jets 33 will be spaced from each other a predetermined distance. Also, the corrugations 32 contacting the opposite walls of the channels will act as an obstructing means to prevent the escape of gas upwardly between the channels and strips and cause the gas to leave the ports or jets 33 to produce a series of needle flames of high velocity to serve as the main flame.

Crimped or corrugated material 36 is placed within each of the channels 27. Only one strip is shown, but it is to be understood any number of strips may be used and each strip may be of any construction to provide a multiplicity of ports or jets 37 designed to produce a static pressure and velocity of the gas from the passages 21 through the holes 34 to provide a continuous sheet of flame to produce the piloting flames. The ribbon 36 is of less width than the depth of the channel 27, which provides the gas expansion and distribution space 30 the entire length of the channel. The parts of the structure 19 may be held together by any suitable means, such as pins, extending transversely through the channels 27 and strips 29 and 36. In one of the side walls of each channel 27 there are a plurality of holes or orifices 34 for the inflow of gas from the related passage 21 to a space 30. The holes 34 restrict the flow of gas and together with the space 30 decrease the velocity of the gas so that the fuel supply is equalized the entire length of the flame space.

In Fig. 7 modifications of the strips or ribbons 29 are shown. The difference is in the provision of angularly bent edge portions 35 in lieu of the corrugation 32, said portions 35 serving the same purpose as the corrugation 32. The portions 35 may be along one or both longitudinal edges of each strip.

The burner shown in Figs. 1 to 5 inclusive, produces low pressure ribbon type piloting flame at either side of a high velocity main knife-type needle flame to prevent extinguishment of the latter. The gas is supplied from an external source to port areas of the main flame in a separate path from the paths to the port areas of the piloting flames. This enables control of the gas to the main flame independently of the piloting flames to meet thermal conditions.

In accordance with the invention, the flow of gas to the pilots may be controlled by means of a regulating valve structure shown in Fig. 8. There is provided a beveled seat 38 surrounding a port 39 in a wall of the passage 22. A screw valve member 40 is inserted in the inlet 24 which cooperates with the seat 38. It is understood the pipe 26 is removed since it is not necessary. Gas may be diverted to flow from the chamber 20 through the port 39 into the passage 22, passages 21, holes 34, space 30 to the pilots, when the member 40 is off of the seat 38, as shown in Fig. 8. At the same time gas may flow from the main chamber 20 up through the space 28 to the main flame ports 37. By engaging the valve member 40 with the seat 38, gas to the pilots may be shut off if desired. Also, by adjusting the valve member 40 regulated amounts of gas may be supplied to the pilots.



Further results may be accomplished by using a hollow valve member 41 in lieu of the member 40. The member 41 is closed at one end as at 42, and the other end is open and tapped as at 43 to receive a gas supply pipe indicated in dotted lines. The member 41 has ports 44 therein. When the valve member 41 is engaged with the seat 38, gas to the main flame port area will flow from the chamber 20 to the main flame port area. Also, gas flows from the external source through the ports 44 of the valve member 41 to the passage 22, passages 21, through holes 34 to the spaces 30, and finally to the pilot port areas. Thus, both the pilot and main flames are kept burning independently of each other to meet conditions.

It is to be understood the invention is not restricted to the precise showing in the drawing but that details of construction may be modified and rearranged in accordance with spirit of the invention as defined in the claims.

We claim:

1. For use in a gas burner to produce a multiplicity of gas jets in conjunction with the walls of a slot of the burner, an element consisting of a strip of material bent to provide transverse corrugations extending entirely across the element in spaced parallel relation to each other and a longitudinal corrugation extending continuously throughout the strip adapted to serve as a gas obstructor to prevent gas leakage.

2. A gas burner comprising an elongated body having a chamber therein to receive a supply of gas and a continuous slot extending longitudinally of the body and communicating with said chamber, and strips in said slot, each of said strips having transverse corrugations extending entirely across the strip in spaced relation to each other and longitudinally disposed portions joining said corrugations throughout the strip, the corrugations of one strip being opposite those of the other strip providing the ports to receive gas from said chamber to produce flames, and said longitudinally disposed portions contacting the walls of said slot to prevent gas leakage.

JOHN HAROLD FLYNN.
WILLIAM B. ENSIGN.


REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,704,359 | Eisler | Mar. 5, 1929 |
| 2,294,748 | Hanson | Sept. 1, 1942 |
| 2,348,011 | Koppel | May 2, 1944 |
| 1,105,031 | Hagemeyer | July 28, 1914 |
| 1,642,154 | Kemp | Sept. 13, 1927 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 526,378 | Germany | June 5, 1931 |
| 595,514 | Germany | Apr. 13, 1934 |