

[54] BURNER CONSTRUCTION

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Related U.S. Application Data

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3,647,146.

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[51] Int. Cl. B05b 1/14

[58] Field of Search 239/568, 559, 560

[56] References Cited

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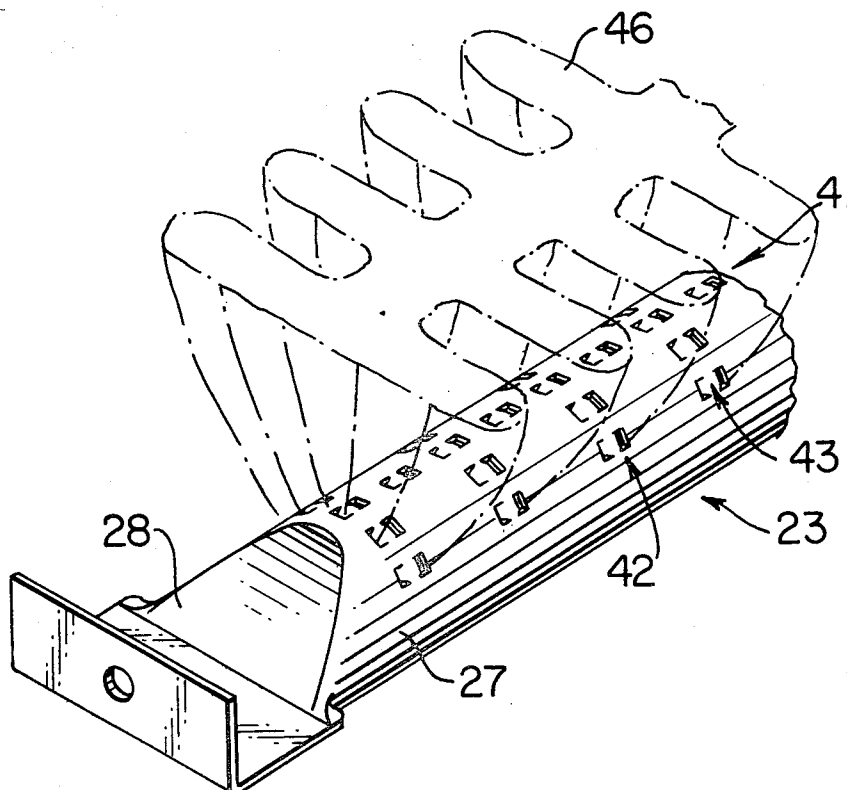
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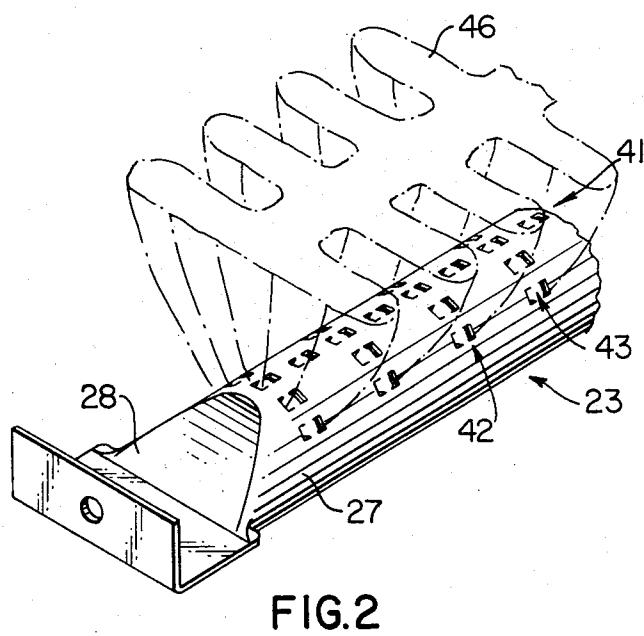
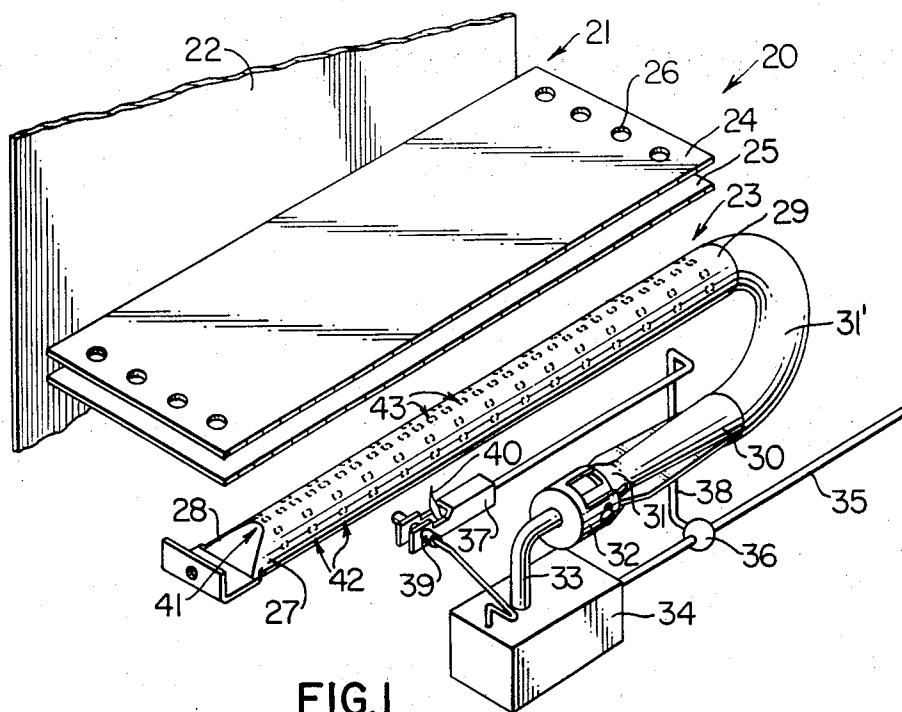
Primary Examiner—Lloyd L. King
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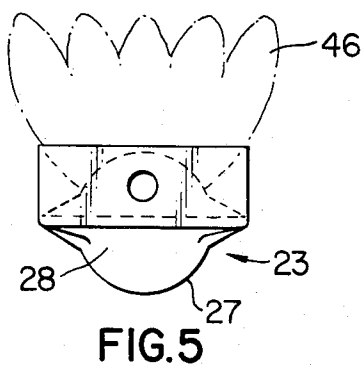
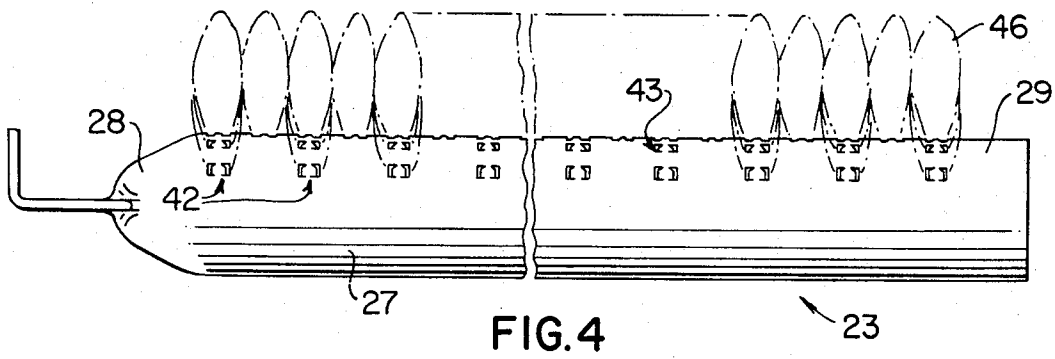
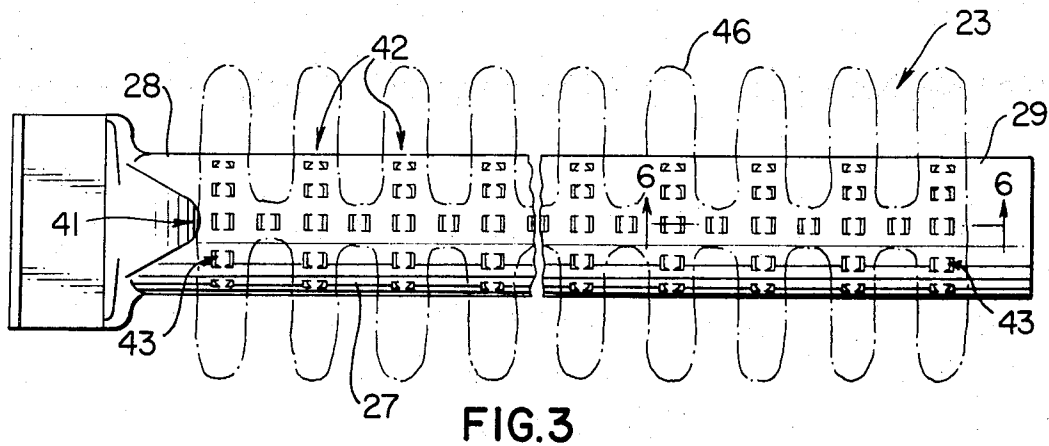
[57] ABSTRACT

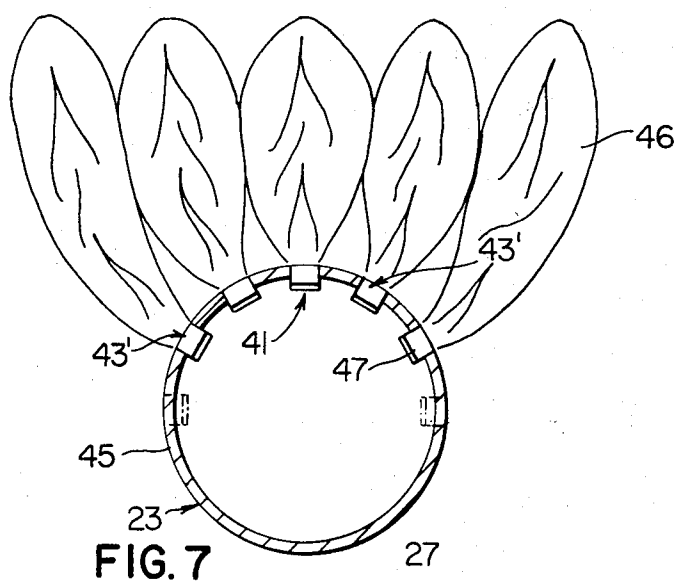
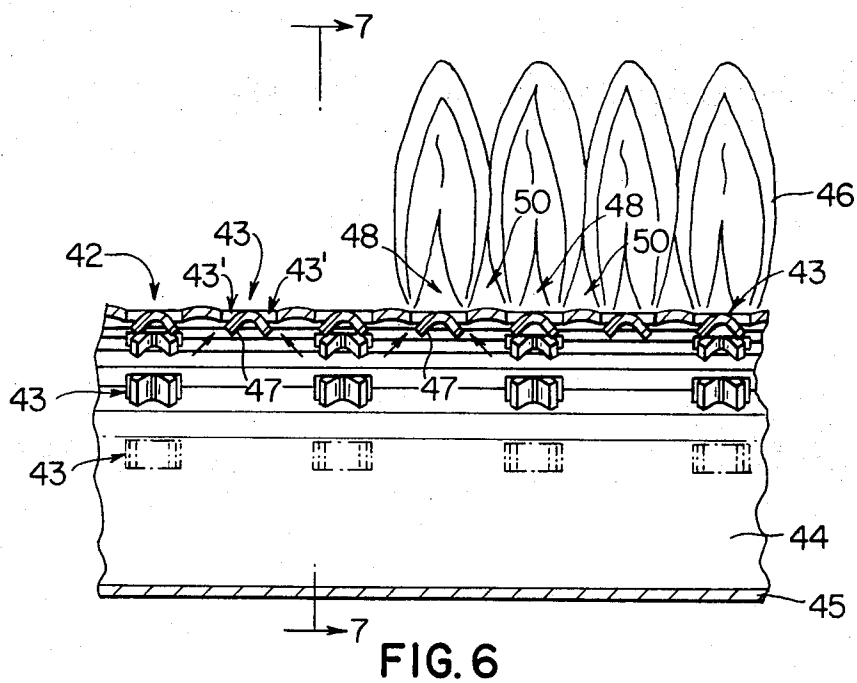
A burner construction having wall means defining a chamber for receiving fuel from a source thereof, the wall means having a plurality of port means passing therethrough and interconnecting the exterior of the wall means with the chamber whereby fuel will issue from the chamber out through the port means. The port means are arranged in a pattern through the wall means to define a first row of aligned spaced port means and a plurality of second rows of aligned spaced port means transverse and adjacent to the first row in spaced parallel relation to each other with the spacing between adjacent second rows being greater than the spacing between adjacent port means in the first row so that secondary air will be provided in a sufficient amount for all of the port means of the burner construction for proper fuel combustion.

5 Claims, 7 Drawing Figures









BURNER CONSTRUCTION

This is a division of application Ser. No. 37,654, filed May 15, 1970, now U.S. No. 3,647,146.

This invention relates to an improved fuel burner construction as well as to an improved method for making such a burner construction or the like.

It is well known from the U.S. patent to Branson, No. 3,386,431, that a burner tube construction can be provided with port means passing therethrough in two longitudinal rows on opposite sides of the burner construction for creating flame patterns that readily provide for sufficient secondary air to be drawn into the issuing fuel for proper fuel flame characteristics.

In particular, it was found that such prior burner construction was not only relatively simple and inexpensive to manufacture, but also was adapted to permit a minimum flame characteristic so that the oven could be maintained at a relatively low warming and non-cooking temperature without subjecting the burner construction to adverse flashback conditions or adverse flame sweep off conditions as in prior known burner constructions.

One of the features of this invention is to provide an improved port means pattern for such a burner construction or the like wherein a high BTU rating per lineal inch of the burner construction can be provided and still permit the burner construction to provide the small or low flame pattern for low temperature characteristics, as desired.

In particular, one embodiment of this invention provides a burner construction having wall means defining a chamber means for receiving the fuel from a source thereof, the wall means having a plurality of ports passing therethrough and interconnecting the exterior of the wall means with the chamber whereby fuel will issue from the chamber out through the port means. The port means are arranged in a pattern through the wall means to define a first row of aligned spaced port means along the top of the burner construction and a plurality of second rows of aligned spaced port means transverse and crossing the first row with the second rows being in spaced parallel relation to each other and with the spacing between adjacent second rows being greater than the spacing between adjacent port means in the first row so that sufficient secondary air can be drawn to all of the port means for proper fuel burning characteristics.

Accordingly, it is an object of this invention to provide an improved burner construction having one or more of the novel features set forth above or hereinafter shown or described.

Another object of this invention is to provide an improved cooking apparatus utilizing such a burner construction or the like.

Another object of this invention is to provide an improved method for making such a burner construction or the like, the method of this invention having one or more of the novel features set forth above or hereinafter shown or described.

Other objects, uses and advantages of this invention are apparent from a reading of this description which proceeds with reference to the accompanying drawings forming a part thereof and wherein:

FIG. 1 is a fragmentary, top perspective and schematic view illustrating an improved apparatus of this invention.

FIG. 2 is an enlarged fragmentary, top perspective view of an end portion of the burner construction of FIG. 1 with the flame pattern produced thereby being illustrated in cross section by phantom lines.

FIG. 3 is a top view of the burner construction.

FIG. 4 is a side view of the burner construction.

FIG. 5 is an end view of the burner construction.

FIG. 6 is an enlarged fragmentary cross-sectional view taken on line 6—6 of FIG. 3.

FIG. 7 is a transverse cross-sectional view taken on line 7—7 of FIG. 6.

While the various features of this invention are herein described and illustrated as being particularly adapted for providing a gaseous fuel burning burner construction for a cooking apparatus or the like, it is to be understood that the various features of this invention can be utilized singly or in any combination thereof to provide burner means for other types of fuel burning apparatus as desired.

Therefore, this invention is not to be limited to only the embodiment illustrated in the drawings, because the drawings are merely utilized to illustrate one of the wide variety of uses of this invention.

Referring now to FIG. 1, an improved cooking apparatus of this invention is generally indicated by the reference numeral 20 and includes a cooking oven chamber means 21 defined by conventional wall means 22 of the cooking apparatus 20. The cooking chamber 21 is separated from the improved burner construction 23 of this invention by conventional baffle plates 24 and 25 extending between the wall means 22, but being spaced therefrom and having apertures 26 passing therethrough in a conventional manner so that the heated air produced by the burner construction 23 of this invention can readily circulate into the cooking chamber 21 in a conventional manner.

Generally, the burner construction 23 of this invention includes a burner tube 27 having a closed end 28 for being supported to suitable burner supporting structure on the wall means 22 of the apparatus 20 and another end 29 adapted to be disposed in a sealing and telescoping relation with a venturi or fuel mixing member 30 by a U pipe or conduit 31'.

The venturi tube member 30 has an end 31 telescopically carrying a primary air adjustment member 32 in the manner fully disclosed in the aforementioned U.S. Pat. No. 3,386,431, the end 31 of the venturi tube member 30 being in fluid communication with the outlet orifice means 33 of a conventional fuel control valve means 34 adapted to have its inlet interconnected to a source 35 of gaseous fuel or the like. The source 35 is adapted to be interconnected to the valve means 34 by conventional selector means 36 manually operated by the housewife or the like, the selector valve means 36 also being adapted to interconnect the source of fuel 35 to a pilot burner means 37 through a conduit means 38. The valve means 34 is so constructed and arranged that the valve means 34 will only interconnect the source of fuel 35 to the venturi tube 30 when a flame sensing bulb 39 senses a flame 40 at the pilot burner 37 so that fuel subsequently issuing from the burner construction 23 will be ignited by the pilot flame 40 in a manner well known in the art.

As illustrated in the drawings, the tubular member 27 of the burner construction 23 has the majority of the length thereof provided by a cylindrical portion having a uniform circular cross section and being provided

with a single longitudinally disposed top row 41 and a plurality of transverse rows 42 of port means 43 arranged in a pattern hereinafter described to permit fuel to issue from the internal chamber 44 of the wall means 45 of the burner construction 23 to the exterior thereof and produce the heating flames 46 in the unique pattern illustrated throughout the drawings in a manner hereinafter set forth.

As illustrated in FIG. 6, each port means 43 of the rows 41 and 42 of the burner construction 23 of this invention comprises a pair of cooperating ports 43' in such a manner that the flow of fuel to the chamber 44 of burner construction 23 flows out of each pair of cooperating ports 43' in two streams in the manner illustrated by arrows in FIG. 6 to impinge against each other outboard of the wall 45 of the tubular member 27 and form a common stream substantially perpendicular to the vertical wall 45 of the burner construction 23 to produce the flame pattern 46 as illustrated schematically in FIG. 6.

Each port 43' is formed in the manner fully disclosed and claimed in the aforementioned U.S. Pat. No. 3,386,431 and interrupts the cylindrical wall means 45 of the burner construction 23 so as to include a carved and inwardly bent tab means 47 angularly disposed relative to the longitudinal axis of the burner construction 23 in such a manner that the tab means 47 not only causes the angular flow of fuel through the respective port 43' in the manner illustrated by the arrows in FIG. 6, but also the tab means 47 effectively increases the cross-sectional thickness of the wall means 45 of the burner construction 23 at the respective port 43' in such a manner that a relatively small flame can be produced at the port 43' and be effectively held therein so that an upward draft or flow of air will not wipe such flame from the respective port 43' and will not cause the small flame at the port means 43' to create an adverse flashback condition in the burner construction 23. Conversely, the tab means 47 are so constructed and arranged that substantially no blow-off of the flames 46 can be created, even for a low flame setting of the burner construction 23.

Because each port 43' of each pair thereof causes an angular flow of fuel in the manner previously described, it can be seen that a substantially flame or fuel free triangular area 48 is defined between the cooperating ports 43' of each pair thereof to draw secondary air therebetween for good secondary air entrainment with the fuel flowing from the ports 43'. In addition, a substantially flame or fuel free triangular area 50 is created between adjacent pairs of ports 43' in the manner illustrated in FIG. 6 so as to also cause secondary air flow entrainment so that by the time the flames 46 substantially merge together, improved secondary air entrainment has been provided for effective fuel burning characteristics.

The tab means 47 for each port means 43' has a substantially rectangular configuration and is cut on two sides thereof, each tab means 47 when bent inwardly out of the plane of the wall 45 defining its particular port 43'.

It has been found according to the teachings of this invention that in order to utilize such port means 43' with a tubular burner construction 23 of sensible diameter and in order to produce a high BTU per lineal inch for the burner construction, the port means 43 can be arranged in the unique pattern of this invention as pro-

vided by the longitudinal top row 41 and plurality of transverse secondary rows 42, each second row 42 being bisected by the top longitudinal row 41 and comprising two adjacent pairs of ports 43' on opposite sides of the longitudinal row 41 while utilizing one cooperating pair of ports 43' of the top row 41 therewith. The spacing between adjacent second rows 42 is equivalent to one of the pairs of cooperating ports 43' in the top row 41 thereof. Thus, it can be seen that the second rows 42 cooperate with every other pair of cooperating ports 43' of the top row 41.

If desired, each second row 42 can include more than the number of port means 43 disclosed and such additional port means 43 are indicated by dash dot lines in the drawings and are disposed on opposite sides of the centerline of the tube 27.

It has been found that when a burner construction 23 has the burner tube 27 thereof provided with approximately 7.985 inches in length, a diameter of approximately one inch and with the longitudinal row 41 of port means 43' being approximately six and one-half inches long with the second rows 42 of ports 43' being arranged with each first pair of ports 43' thereof being disposed 30° from the vertical axis, with the second pair of ports 43' thereof being disposed 60° from the vertical axis and with the last pair of ports 43' being disposed 20° from the vertical axis when viewing the transverse cross section of FIG. 7, with the wall thickness of the tube 27 being approximately 0.035 of an inch with each port 43' having a length of approximately 0.100 of an inch and a width of approximately 0.100 of an inch while being spaced at its far edge to the far edge of its cooperating port 43' approximately 0.200 of an inch and having its tab means 47 bent at an angle of approximately 35° relative to the radius of the tube 27, the difference between adjacent center lines of adjacent pairs of port means 43 in the top row 41 being approximately 0.325 of an inch, such a burner construction is adapted to produce approximately 4000 BTU per lineal inch with all of the ports 43' receiving sufficient secondary air through the unique flame pattern arrangement thereof.

Therefore, it can be seen that this invention not only provides an improved burner construction, but also the burner construction of this invention has many of the unique features fully disclosed and claimed in the aforementioned U.S. Pat. No. 3,386,431.

In addition, this invention provides an improved method of making such a burner construction or the like.

While the form of the invention now preferred has been disclosed as required by the statutes, other forms may be used, all coming within the scope of the claims which follow.

What is claimed is:

1. In an apparatus having a cooking chamber, a source of fuel and means for igniting said fuel, the improvement comprising a burner construction for heating said cooking chamber and having wall means defining chamber means for receiving fuel from said source thereof, said wall means having a plurality of port means passing therethrough and interconnecting the exterior of said wall means with said chamber means whereby fuel will issue from said chamber means out through said port means to be ignited by said means for igniting said fuel, said port means being arranged in a pattern through said wall means to define a straight line

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first row of aligned spaced port means and a plurality of straight line second rows of aligned spaced port means perpendicular to and crossing said first row and in spaced parallel relation to each other with the spacing between adjacent second rows being greater than the spacings between adjacent port means in said first row, the central port means of each second row providing one of the port means of said first row, the number of second rows being such that a plurality of straight line unported sections of said wall means respectively defined between adjacent pairs of said second rows lead perpendicularly to said first row to provide secondary air therefor.

2. In an apparatus as set forth in claim 1, said wall means defining a tubular structure having a substantially circular cross-sectional configuration, said first row of port means extending longitudinally along said tubular structure.

3. In an apparatus as set forth in claim 2, said first row extending along the top of said tubular structure.

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4. In an apparatus as set forth in claim 3, each port means comprising a pair of spaced and cooperating ports passing through said wall means, each port including a tab means having a free end projecting into said chamber means beyond the interior surface of said wall means and having another end attached to said wall means on the side of its respective port that is adjacent to the tab means attached side of the other port that forms said respective pair of ports, said tab means and said ports being so constructed and arranged that fuel is adapted to flow from said chamber means in two streams respectively out of each pair of cooperating ports and impinge against each other to form a substantially common stream that is angularly disposed relative to said wall means.

5. In an apparatus as set forth in claim 4, the spacing between adjacent second rows of port means being such that said second rows cross said first row at every other pair of cooperating ports of said first row.

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