

[54] **BURNER STRUCTURE**

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[58] Field of Search **239/425.5, 425, 424.5, 239/424, 568, 553, 556, 561, 560, 601; 431/354**

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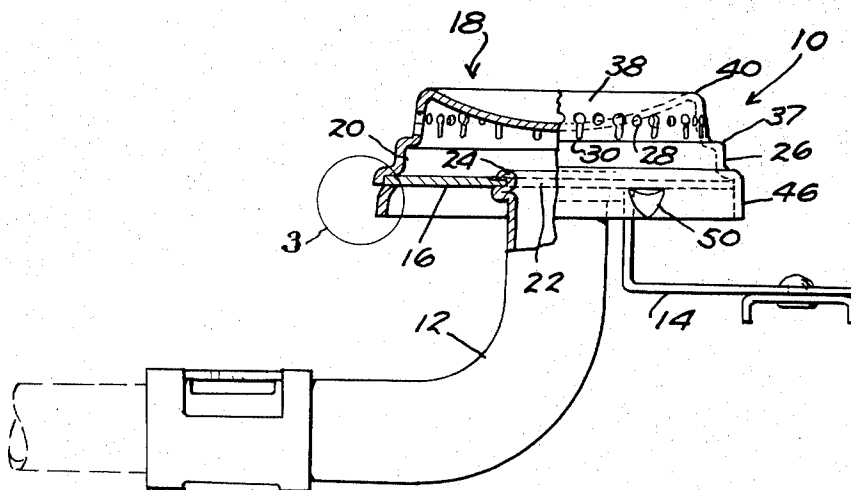
Primary Examiner—Lloyd L. King

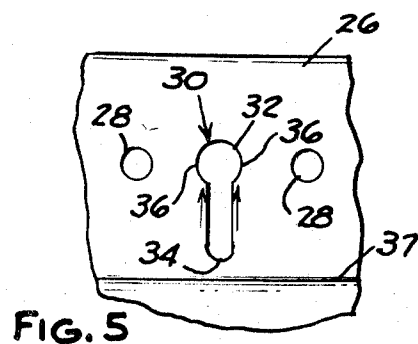
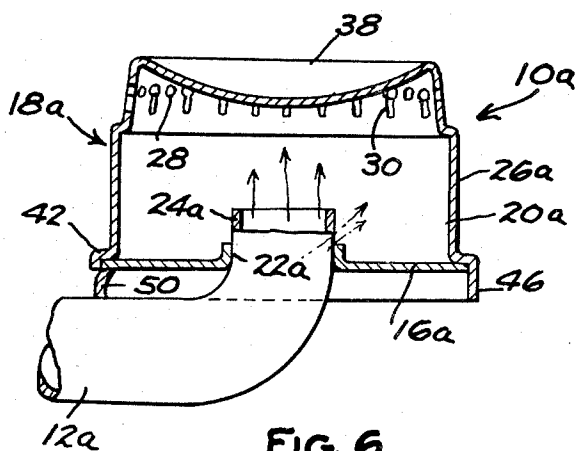
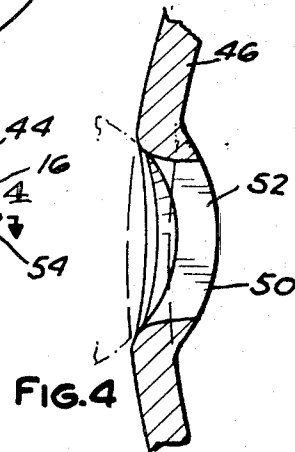
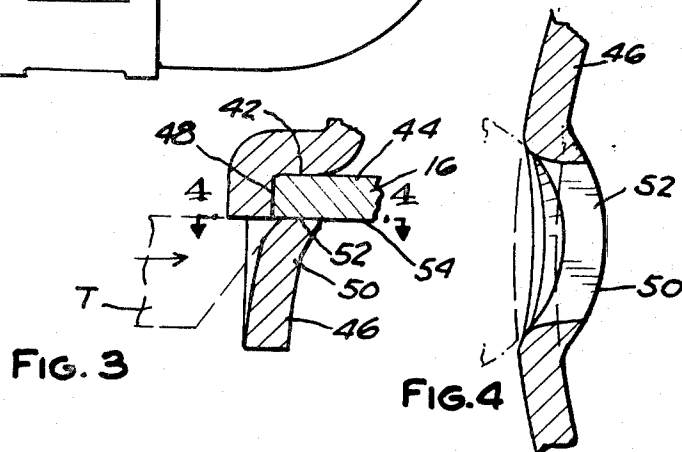
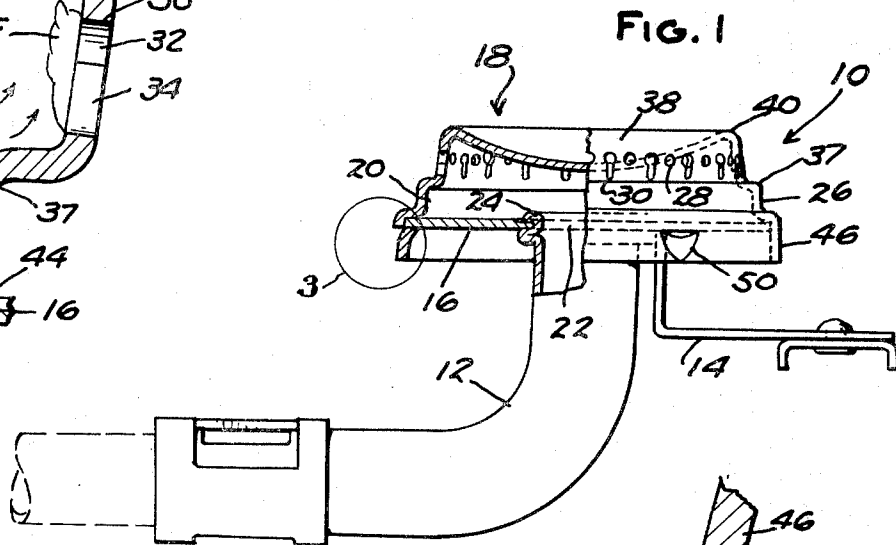
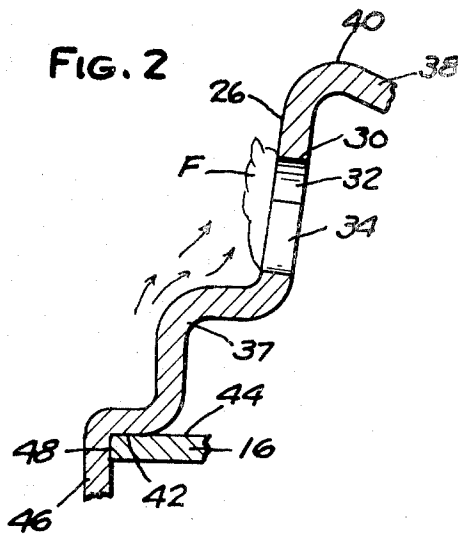
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[57] **ABSTRACT**

Burner for domestic gas ranges has alternate small burner ports and larger key-hole shaped burner ports; has inverted cup shape with downwardly dished top wall for cooling purposes; the rim of the cup being anchored to a base plate by lanced and struck-in portions of a flange.

12 Claims, 6 Drawing Figures





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BURNER STRUCTURE

This invention relates generally to a burner for use in domestic gas ranges and the like and more particularly relates to a burner which, if desired, can be made small enough for use in relatively small ranges such as are found in travel trailers and camp trailers.

A problem of long standing has been how to provide such relatively small diameter burners with sufficient burner port area to result in a satisfactory heat output. Another problem has been how to provide such a burner with a durable, attractive appearance. Steel rusts. A black oxide finish on a steel burner doesn't last and the burner soon appears rusty. Nickel and the so-called stainless steel darken or stain. Aluminum maintains its bright appearance but its low melting point makes it unsuitable in conventional burners of the type under consideration.

The object of the present invention is to provide a relatively simple, inexpensive burner structure improved to provide increased burner port area yet which remains cool enough during use so that it can be made of a material such as aluminum which maintains its attractive, bright appearance.

Generally, the invention contemplates the use of a cup-shaped member inverted over a base plate having a central inlet for fuel gas. The upper, closed end of the cup is configured to provide a relatively large area for cooling by radiation and is positioned to be cooled by impingement thereon of fuel gas entering the burner. The cup is tightly anchored to the base plate by lanced and struck-in portions of a flange adjacent the bottom edge of the cup which promotes cooling thereof by conduction. The burner ports comprise a series of alternately arranged small ports and larger key-hole shaped ports which provide a relatively large total port area.

In the accompanying drawings:

FIG. 1 is an elevational view of a burner according to the present invention with parts broken away and shown in section to illustrate structural details.

FIG. 2 is an enlarged fragmentary sectional view of a portion of the structure shown in FIG. 1.

FIG. 3 is an enlarged sectional view of the portion of the structure in circle 3 of FIG. 1.

FIG. 4 is a sectional view on line 4-4 of FIG. 3.

FIG. 5 is an enlarged fragmentary elevational view illustrating the relation of the burner ports.

FIG. 6 is a view partly in section and partly in elevation of a modified form of burner according to the present invention.

Shown in FIG. 1 is a burner 10 according to the present invention, a mixing tube 12 secured thereto, and mounting bracket 14 by which the assembly is mounted in a gas range or the like. Burner 10 has a base plate 16 and a cup-shaped member 18 inverted over the base plate so that the two define a closed chamber 20. Base plate 16 has a central opening 22 through which fuel gas enters chamber 20 from mixing tube 12. In the structure illustrated in FIG. 1 the downstream end portion 24 of the mixing tube is secured within opening 22 by crimping and the mixing tube terminates immediately adjacent inlet 22.

Cup 18 has a side wall 26 provided with a series of alternately arranged small burner ports 28 and larger key-hole shaped burner ports 30. Each port 30 has an upper portion 32 of larger diameter than ports 28 and

has downwardly extending slot-like portion 34 whose width is less than the diameter of upper portion 32 so that the sides 36 of the upper portion project horizontally beyond the sides of slot 34. In the structure illustrated, the diameter of ports 28 is larger than the width of slot portions 34, but smaller than the diameter of port portion 32 and the length or height of slot 34 is greater than the diameter of port portion 32. Side wall 26 has a shoulder 37 which projects outwardly beneath ports 28, 30.

Cup 18 has closed upper end 38 which adjoins side wall 26. The juncture 40 of the top and side wall defines a circumscribed area in the plane of the top edge of cup 18. Top 38 of the cup is provided with such a configuration that its area is greater than the area circumscribed by juncture 40. In the illustrated structure this is accomplished by dishing top 38 downwardly and the center of the dished area lies substantially on the central axis of inlet 22.

Cup 18 has an annular shoulder 42 which seats on the upper face 44 of base plate 16. An annular flange 46 depends from shoulder 42 and engages against the outer side edge 48 of base plate 16. Flange 46 is lanced through and deformed inwardly at a plurality of angularly spaced locations around its periphery. This can be accomplished by a suitable tool T such as that represented in dotted lines in FIG. 3. The inwardly deformed portions 50 have top edge faces 52 which engage firmly against the bottom face 54 of base plate 16 since the lancing is in the plane of face 54.

In use, fuel gas enters chamber 20 through inlet 22 from mixing tube 12 and issues from chamber 20 to burn at ports 28, 30. A flame F at a port 30 is represented in FIG. 2. A flame at slot 34 entrains secondary air and carries it upwardly as represented by the arrows in FIG. 5. The side portions 36 of the keyhole port are in the flow path of this secondary air which results in an improved supply of secondary air to upper portion 32 of the port.

The porting arrangement of this invention increases the total port area of the burner by about 10 per cent over the port area of prior structures such as the structure disclosed Kindl 3,236,451. The heat output of the burner is increasing commensurately.

The relatively large area of cup top 38 facilitates increased cooling thereof by radiation. The increased area could be accomplished by means other than or in addition to the dishing illustrated. For example, the cup top could be dimpled, scored, roughened, or corrugated. However, the dished configuration illustrated removes the major portion of top 38 from impingement by flames issuing from the burner ports.

Moreover, the central portion of the burner top is depressed toward inlet 22 so that the flow of gas there-through blows directly on the underside of top 38 before it becomes distributed through chamber 20, thereby cooling the burner top.

Inwardly lanced portions 50 of flange 46 hold shoulder 42 firmly against upper face 44 of base plate 16 which facilitates effective heat transfer from the shoulder to the base plate by conduction. The firm interengagement between the shoulder and base plate is maintained even though the entire burner assembly may heat to the order of about 1,000° repeatedly during use over the course of time. In contrast, the conventional folded or bent tab type of connection loosens upon being heated thereby eliminating or greatly reducing

heat conduction across the juncture between shoulder 42 and upper surface 44 of the base plate.

A burner according to the present invention remains 50°F to 100° F. cooler than a conventional burner despite the increased burner port area and higher heat output. Cup 18 can comprise a simple, inexpensive stamping and because of its cool operating characteristics it can be made of a relatively low-melting point metal such as aluminum. Aluminum does not stain or darken in the course of use but retains its bright, attractive appearance indefinitely.

The modified form of burner 10a, shown in FIG. 6, is in general similar to burner 10 except that its side wall 26a is higher so that the downstream end 24a of mixing tube 12a can be extended a substantial distance above inlet 22a. This construction insures that fuel gas issuing into the burner will follow the path of the vertical arrows to blow directly against the underside of the top 38a of cup 18a.

Such a construction is desirable for example where mixing tube 12a closely underlies base plate 16a and is curved upwardly immediately before entering inlet 22a. Were it not for the extended downstream end 24a some of the gas would follow the path indicated in the sloped arrows which would diminish the cooling effect on top 38a and would result in an uneven distribution of gas in chamber 20a in turn tending to cause unequal flame sizes at different sides of the burner.

We claim:

1. Burner structure comprising, means forming a chamber having a bottom, a side wall, and a top, said bottom having an inlet through which gas issues into said chamber, said side wall having burner ports through which gas issues from said chamber, said top having edge portions adjoining upper portions of said side wall, said adjoining portions defining a circumscribed area, said top having a region within said adjoining portions configured so that the area of said region exceeds said circumscribed area, said region being spaced from said bottom in the direction of flow of gas through said inlet and being aligned with said inlet so that gas entering said chamber impinges directly on said region, said top, adjacent said adjoining portions, being displaced downwardly of said adjoining portions away from impingement by flames issuing from said burner ports.
2. The structure defined in claim 1 wherein said region and downward displacement are defined by a dished configuration the central portion of which is closer to said bottom than said edge portions.
3. The structure defined in claim 2 wherein said central portion is substantially aligned in said direction with the center of said inlet.
4. The structure defined in claim 3 wherein said dished configuration comprises a substantially spherically shaped concavity.
5. In combination with the structure defined in claim 1 a mixing tube secured to said bottom at said inlet with the central axis of the downstream end of said tube

passing through substantially the center of said region.

6. The structure defined in claim 5 wherein said tube projects into said chamber so that said downstream end is spaced a substantial distance away from said bottom toward said region.

7. The structure defined in claim 1 wherein said bottom has an upper face, a lower face, and a side edge, said side wall having a shoulder which seats on said upper face and having flange means engaged against said side edge, said flange means having a slit defining an upwardly disposed edge, said flange means being deformed so that said upwardly disposed edge is in engagement against said bottom face whereby to secure said side wall to said bottom.

8. The structure defined in claim 1 wherein said ports comprise a series of small ports and larger ports in alternate arrangement, said larger ports having keyhole shape with an upper portion having cross dimension greater than that of said small ports and a lower slot-like portion having a width less than said cross dimension.

9. The structure defined in claim 7 wherein said ports comprise a series of small ports and larger ports in alternate arrangement, said larger ports having keyhole shape with an upper portion having cross dimension greater than that of said small ports and a lower slot-like portion having width less than said cross dimension.

10. In a burner having a series of small burner ports and larger burner ports in alternate arrangement through which fuel gas issues for combustion, improved structure which comprises,

said larger ports having key-hole shape with an upper circular portion and a lower slot-like portion which intersects said circular portion, said upper portion having a diameter greater than the cross dimension of said small ports, said lower portion having a width less than said diameter and a height at least as great as said diameter, said upper circular portion having oppositely disposed segments which project horizontally beyond opposite sides of said lower portion.

11. The structure defined in claim 10 wherein the height of said slot-like portion is greater than said diameter.

12. Burner structure which comprises a base plate having an upper face, a lower face, and a side edge, a closed-center cup inverted over said base plate and having a shoulder which seats on said upper face so that said plate and cup define a chamber, said chamber having an inlet for fuel gas and having burner ports, said cup having flange means adjacent said shoulder engaged against said side edge, said flange means having a slit defining an upwardly disposed edge, said flange means being deformed so that said upwardly disposed edge is in engagement against said bottom face whereby to secure said cup to said base plate.

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