United States Patent

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[73] Assignee **By mesne assignments, to Olin Corporation, Stamford, Connecticut, a corporation of Virginia**

[54] **CAMP STOVE AND BURNER CONSTRUCTION THEREFOR**
13 Claims, 8 Drawing Figs.

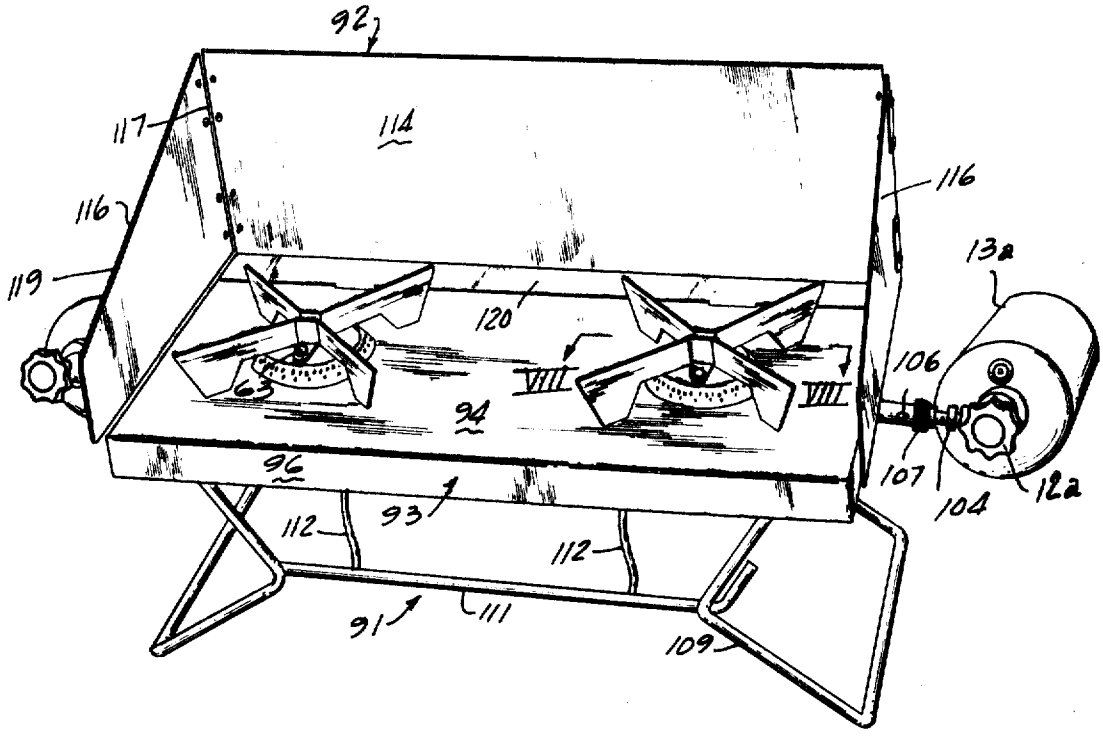
[52] U.S. Cl. **126/38,** 126/39, 126/214, 431/344
[51] **Int. Cl.** **F24c 5/20,** F24c 15/10
[50] **Field of Search** 126/38, 29, 39H, 39I, 214, 214C; 431/203, 344, 346

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ABSTRACT: A burner assembly constructed to be a self-contained, unitary structure made of simple economically produced elements and having wide utility in different forms of camp stoves. The burner assembly includes a base member forming a coupling connector, a reflector attached to the base member and having an inlet passageway for connection with a fuel source, and an inverted dish shaped, apertured burner engaging said reflector for cooperating therewith to form a chamber for receiving the fuel from the supply source. The burner grill is formed by two simple strip form members shaped to provide a support for cooking utensils above the flame area. The reflector may be eliminated in favor of a flat supporting surface in a multiple burner stove arrangement



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Fig. 1

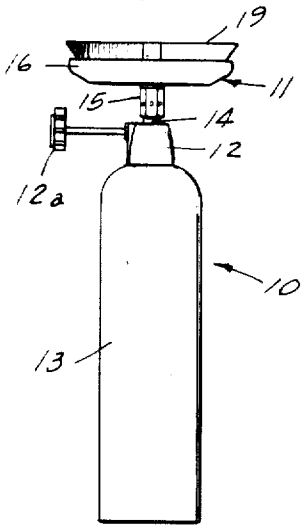
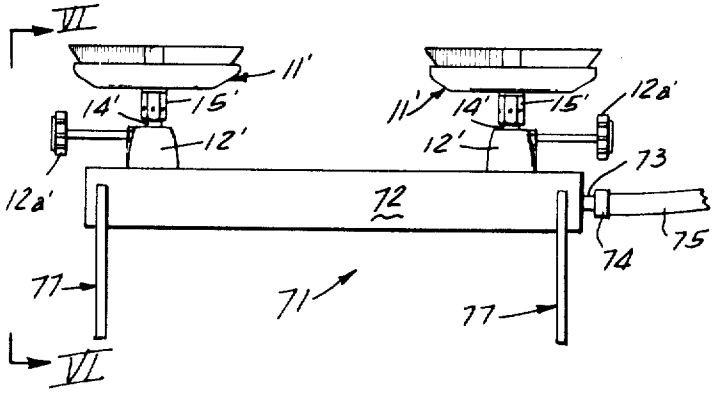


Fig. 5



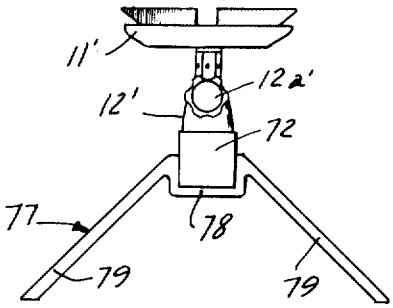


Fig. 2

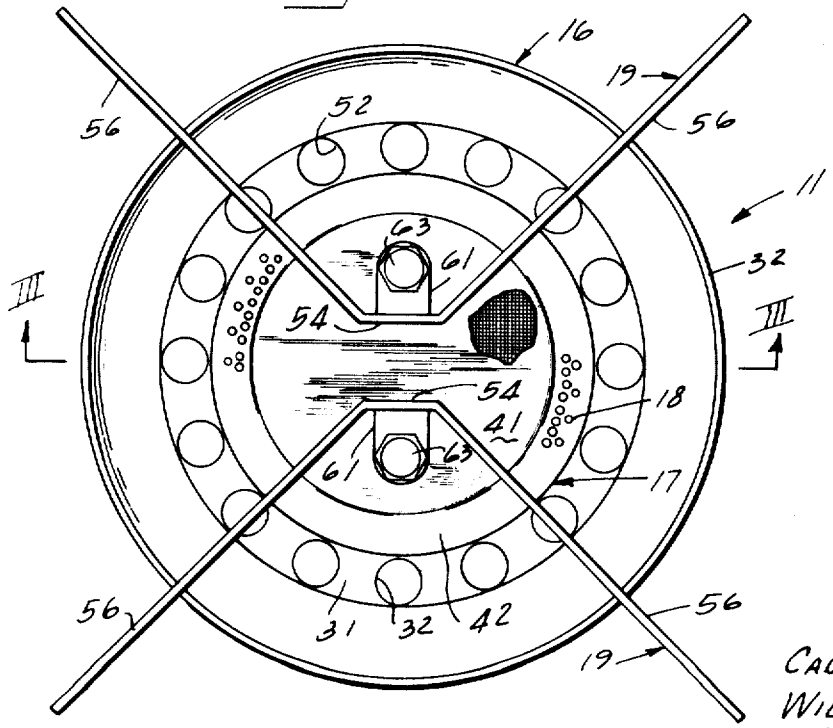


Fig. 6

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Fig. 3

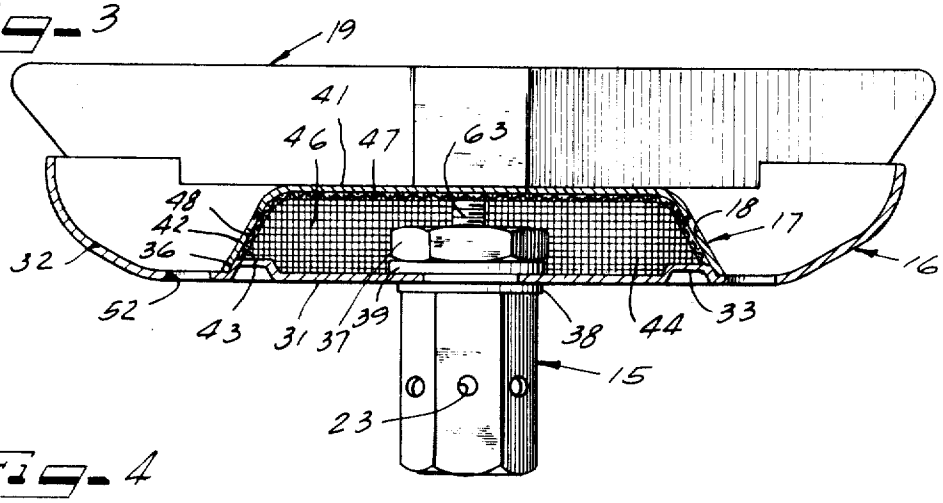
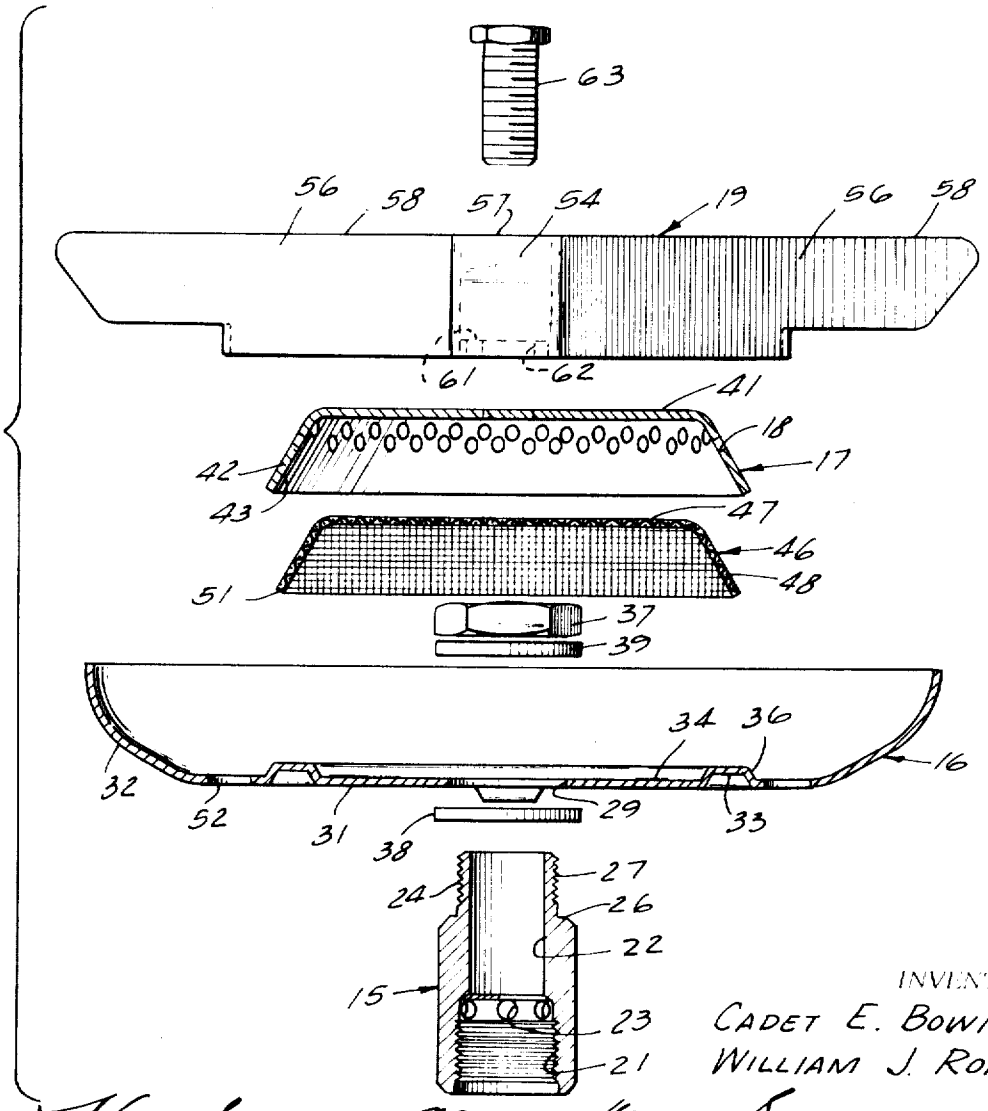


Fig. 4



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Fig. 7

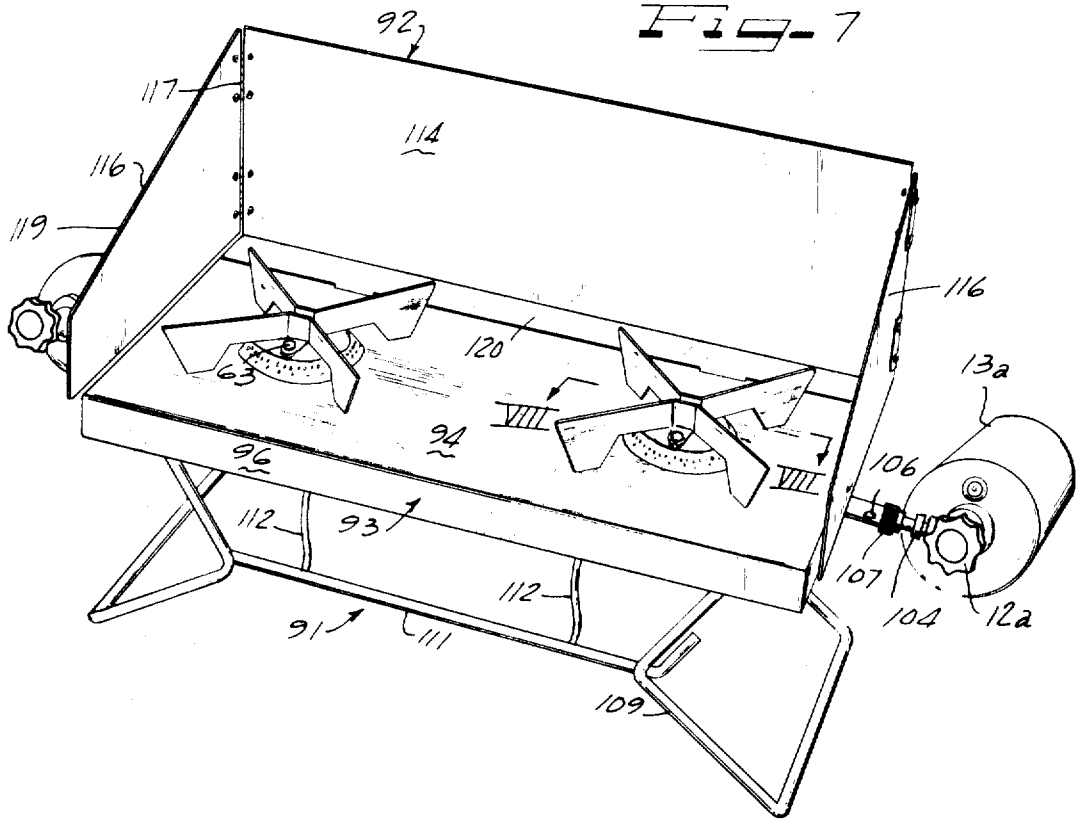
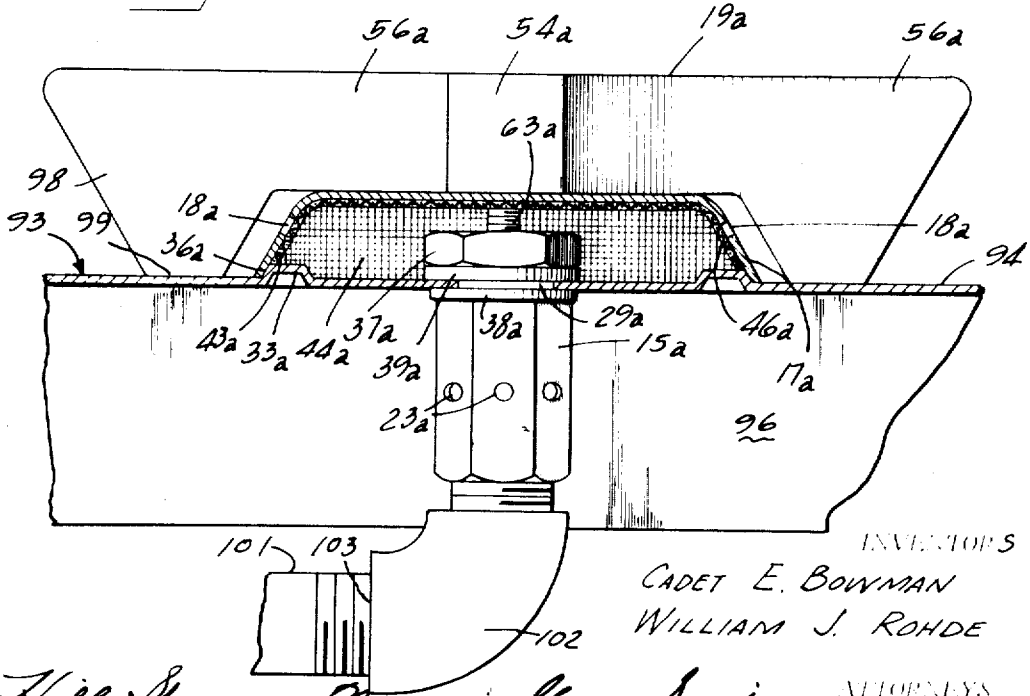


Fig. 8



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CAMP STOVE AND BURNER CONSTRUCTION THEREFOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a burner construction utilizing propane or other fuel and having special utility in a camp stove.

2. Description of the Prior Art

Burner assemblies for propane operated camp stoves described in the prior art are usually mounted in a boxlike structure with a separately supported grill providing a supporting surface above the flame area for cooking utensils. Thus, these prior art devices require transporting both the burner assembly and the boxlike frame for supporting the grill. It should be appreciated that a camper will frequently desire to quickly set up a burner for a short heating operation, for example—to prepare coffee. In accordance with prior art teachings, the camper would have to assemble the box frame and connect the propane source to the burner assembly.

SUMMARY OF THE INVENTION

A burner assembly, constructed in accordance with the present invention, generally includes a base member formed to be connectable to an outlet fitting of a propane cylinder for providing an inlet passageway for the burner assembly, a reflector attached to the base member, an inverted cup-shaped, apertured burner engaging the reflector in a manner to form a fuel receiving chamber, and grill forming supporting members directly attached to the burner for providing a supporting surface above the flame area for cooking utensils. It is contemplated by the present invention that the base member be a hollow tubular member which may be easily fabricated on a screw machine, while the reflector, burner and support members may be conveniently economically stamped or otherwise formed from sheet metal. Thus, the present invention provides a burner assembly for a camp stove which is economical to manufacture and which includes an integral grill made of two metal strips standing on edge and bent to form support wings for supporting the article to be heated.

The burner assembly described hereinabove may be directly attached to an outlet fitting of a throwaway propane tank, thereby to form a compact and easily assembled single-burner camp stove. It should also be noted that the burner assembly may be easily transported and stored.

Furthermore, in accordance with the present invention, a camp stove having multiple burner units may be economically and quickly constructed by attaching a series of burner assemblies, as described hereinabove, to a manifold which is in fluid communication with a fuel source. Since the burner assembly has an integrally formed grill for supporting the cooking utensils above in the flame area, single or multiple unit camp stoves utilizing this burner assembly need not have an auxiliary boxlike structure for providing a surface to support the cooking utensil. A multiple burner unit camp stove utilizing the principles of the present invention may be easily and readily disassembled into its component parts, namely, the self-contained integral burner assemblies, the manifold, manifold support members, and a throwaway propane fuel bottle, thereby eliminating the necessity for transporting a bulky, boxlike structure.

The burner assembly of the present invention may also be disposed in an opening of a flat plate surface and the grill strips disposed on edge so that a supporting grill is positioned directly on the flat surface. In such an arrangement, the flat plate takes the place of the cup-shaped reflector.

Therefore, the present invention provides a simple and reliable basic burner assembly which may be variously adapted to form a single-burner camp stove or multiple-unit camp stoves of different types, for example, multiple burners on a single manifold tube or multiple burners on a flat support surface.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, forming a part of this specification and in which like reference characters are employed to designate like parts throughout the same:

FIG. 1 is a side elevational view of a camp stove including a burner assembly constructed according to the principles of the present invention and attached to a throwaway propane fuel cylinder to form a single-unit camp stove;

FIG. 2 is a top plan view of a burner assembly embodying the present invention;

FIG. 3 is a transverse sectional view taken along lines III–III of FIG. 2;

FIG. 4 is an exploded view, in section, illustrating the individual components forming the novel burner assembly of the present invention;

FIG. 5 is an elevational view of a multiple-unit camp stove wherein a manifold tube is provided with multiple burner units including the cup-shaped reflectors;

FIG. 6 is an end view of the camp stove illustrated in FIG. 5;

FIG. 7 is an isometric view of a multiple-unit camp stove wherein multiple burner units are assembled directly on a flat supporting surface; and

FIG. 8 is a sectional view taken along lines VIII–VIII of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, and first particularly referring to FIGS. 1 through 4, inclusive, there is shown a single-unit camp stove generally designated as 10. The single unit camp stove 10 includes a burner assembly 11 attached to a fuel control valve 12, which, in turn, is connected to a standard throwaway propane fuel cylinder 13. The fuel cylinder 13 includes an outlet fitting to which is connected the valve 12 which is opened by a manual actuating knob 12*a* to permit the passage of fuel through the control valve 12 to a point of utilization.

In accordance with one embodiment of the present invention, the burner assembly 11 is directly attached to an outlet side of the control valve 12. To permit the burner assembly 11 to be directly attached to the control valve 12, the burner assembly includes a base member 15 having an internally threaded portion engageable with a corresponding externally threaded fitting 14 formed on the control valve.

Referring specifically to FIGS. 2 through 4, the burner assembly shown generally at 11 and constructed in accordance with the present invention, includes the base member 15, a reflector 16, an inverted cup-shaped burner 17 having apertures 18 and support members 19.

The base member 15 comprises an elongated hollow article formed from bar stock having a hexagonal cross section, thereby providing three pairs of opposed side surfaces suitable for engagement with a tool to facilitate gripping the base member 15. A through-bore 22 has an enlarged internally threaded portion 21 extending axially of the elongated base member 15. In order to supply combustion supporting air for mixture with the fuel, a series of radially extending air passageways 23 are formed within the base member 15 and intersect the bore 22. The air passageways 23 may be selectively opened or closed by adjusting the extent of engagement of the threaded portion 21 with the outlet fitting 14 formed on the control valve 12. In this manner, the appropriate amount of air may be mixed with the fuel to provide the proper air-fuel mixture for sustaining combustion. A reduced end portion 24, opposite the threaded inlet portion 21, provides an annular shoulder 26 and is externally threaded as at 27.

The reflector 16 comprises a sheet-form member in which is formed a centrally disposed aperture 29 having a diameter sized to receive the reduced end portion 24 of the base member 15 in fitted relationship. The reflector 16 is formed into a cup-shaped configuration, and in particular provides a generally circular bottom wall 31 forming a surface for upwardly reflecting heat generated by the burner and an upstanding side wall 32 having a generally parti-spherical con-

figuration. The bottom wall 31 is embossed to form an annular ridge 33 providing a shallow cup-shaped recess 34. The ridge 33 provides an annular, outwardly projecting conical wall surface 36.

The reflector 16 is fitted over the reduced end portion 24 of the base member 15 with the centrally disposed aperture 29 engaging the reduced end portion 24, and a nut 37 threadingly engages the threads 27 formed on the reduced end portion of the base member. A pair of washers 38 and 39 are disposed on opposite sides of the reflector 16 so that the reflector is clamped in an assembled relationship with the base member 15.

The burner 17 comprises a sheet-form member having a generally inverted cup-shaped configuration providing a flat circular top wall portion 41 and depending side walls 42 having a generally divergent conical configuration. The depending side walls 42 provide an interior conical surface 43 shaped to closely fit over the conical wall surface 36 of the ridge 33, thereby to form a sealed chamber 44 between an interior surface of the burner 17 and the shallow depression 34 of the reflector 16.

The chamber 44 formed between the reflector 16 and the burner 17 receives an air-fuel mixture through the throughbore 22 formed at the base member 15. The apertures 18 provided in the depending side wall 42 of the burner 17 are disposed in staggered relationship on two or more rows, thusly to form alternate circumferential rows of fuel ports through which the air-fuel mixture received within the chamber 44 is directed to provide an annular flame pattern for the burner assembly 11.

It is contemplated by the present invention to provide a screen 46 fittingly received within the burner 17 to prevent the flame from "blowing back" into the chamber 44. In particular, the screen 46 includes a flat circular top wall 47 and depending side walls 48 having a conical configuration sized to be complementary to and fittingly received within the interior conical surface 43 of the burner 17. Additionally, the depending, conical side walls 48 have a length to permit an annular bottom edge portion 51 to rest on the ridge 33 embossed on the reflector 16.

To provide an updraft of air to the burner assembly 11 for assisting the combustion of the air-fuel mixture escaping through the apertures 18, the reflector 16 includes a series of circumferentially spaced apertures, as at 52, disposed radially outwardly of the ridge 33.

In accordance with the principles of the present invention, a grill for supporting a cooking utensil above the flame area is provided by a pair of grill forming support members 19, 19 which are directly attached to and supported by the burner assembly 11. Each support member 19 comprises a sheet-form member or metal strip having a generally V-shaped configuration in plan view providing a short, medial section or bight portion 54 and a pair of outwardly extending, planar arm sections 56, 56 formed at an obtuse angle to the medial section 54. An uppermost edge 57 of the medial section 54 and the uppermost edges 58, 58 of the arm sections 56, 56 are formed coplanar one to the other, and with the pair of support members 19, 19 properly positioned on the burner 17, the uppermost edges 57 and 58 of one support member 19 is coplanar with the uppermost edges of the other support member, thereby to provide coplanar edges forming a supporting surface above the flame area upon which a cooking utensil may be positioned.

Additionally, the outermost end portion of each arm section 56 of the support members 19 is notched out, as at 59, to permit the arm section to extend beyond the edge of the reflector 16 to provide a supporting surface having a diameter greater than that of the reflector.

It is contemplated by the present invention to provide attachment means for securing each support member 19 directly to the burner assembly 11. The attachment means include a lug or tab 61 extending outwardly of a lowermost edge portion of the medial section 54 of each support member 19 and having an aperture 62 formed therethrough. The pair of support members 19, 19 are positioned on the circular top wall 41 of the burner 17 in diametrically opposed relationship with the pairs of arm sections 56 extending generally radially outwardly of the burner. A self-tapping screw 63 passes through the aperture 62 formed in each tab 61 of the support members 19 and engages into aligned apertures formed in the top wall 41 of the burner 17, the top wall 47 of the screen 46 and the bottom wall 31 of the reflector 16, thereby, to securely attach the support members to the burner assembly 11.

In accordance with one embodiment of the present invention, a single-unit camp stove may be formed by threadingly engaging the internal threads 21 of the base member 15 onto the externally threaded fitting 14 of the control valve 12 which is secured to the outlet fitting of a propane tank 13.

Referring now specifically to FIGS. 5 and 6, a multiple unit camp stove, generally indicated at 71, may be formed by assembling two or more burner assemblies 11', constructed in accordance with the principles of the present invention, onto a manifold. The multiple unit camp stove 71 includes an elongated hollow tube forming a manifold 72 having an inlet fitting 73 formed on one end portion thereof for receiving a connector 74 to which is connected a flexible conduit 85 providing a fuel passageway from a remote fuel source. Thus, the manifold 72 is, in effect, substituted for the tank 13 and as many burner units as there are openings in the manifold may be assembled therewith. The individual burner units would be of identical construction to that already described and like parts are identified with like numerals to which a prime has been added. In this form of the invention the reflectors 16 (or 16') form a part of the burner to reflect and radiate thermal energy toward the area at which the heat is to be concentrated.

It is contemplated by the present invention to provide two or more separately controlled fuel outlet passageways onto which burner assemblies 11' may be attached. Each such separately controlled fuel outlet is provided by forming an internally threaded outlet passageway through a side wall of the manifold for receiving an externally threaded portion of a fuel control valve 12' in a manner similar to that provided for a standard throwaway propane cylinder. The fuel control valve 12' includes an outlet fitting 14' having an externally threaded portion for threadingly engaging the threads 21' of the base member 15' of the burner assembly 11'.

If it is desired to enhance the stability of the multiple unit camp stove 71, a pair of supporting legs 77,77 may be provided as shown in FIGS. 5 and 6. As illustrated in FIG. 6, each supporting leg 77 includes a substantially U-shaped medial section 78 forming a cradle to receive an end portion of the manifold 72. Lateral support is provided for the multiple unit camp stove 71 by a pair of laterally outwardly and downwardly extending leg sections 79,79 attached to the medial section 78. One of the leg members 77 is disposed on either end portion of the manifold 72 with the leg section 79 extending outwardly and downwardly of the manifold, thereby to provide both lateral and longitudinal support for the camp stove 71. It should be understood, that the leg members 77 are detachable from the manifold 72 to facilitate storing and transporting of the camp stove.

In the form of the invention shown in FIGS. 7 and 8 a flat plate common to a plurality of burners is substituted for the individual reflectors 16 or 16'. In other respects, the burner assemblies are the same as already described so like parts are identified with like numerals but with a suffix *a*.

As illustrated in FIGS. 7 and 8, the camp stove 91 includes a pair of burner assemblies generally comprising a base member 15*a*, a burner 17*a*, a screen 46*a*, supporting members 19*a* providing a supporting surface upon which a cooking utensil may be positioned, and a flat plate reflector 93. The reflector 93 is a sheet-form member having spaced openings for receiving burner units therein. A rectangular upper wall 94 and two pairs of depending, parallel side walls 96 and 97 formed at right angles to the side wall are provided and form together with the reflector a boxlike frame.

In accordance with the principles of the present invention the reflector **93** is embossed to form a pair of annular ridges as at **33***a* having an outwardly projecting conical wall surface **36***a* sized to fittingly engage an interior conical surface **43***a* of the burner **17***a*, thereby to form a fuel receiving chamber **44***a*.

In the manner described hereinabove for the burner assembly **11**, a support grill is provided above the flame area for receiving a cooking utensil by a pair of grill forming supporting members **19***a* formed of sheet metal and each having a substantially V-shaped configuration to provide a medial section **54***a* and a pair of obtusely formed leg sections **56***a*. In this embodiment of the present invention, each leg section **56***a* of the support members **19***a* is characterized by a generally downwardly extending foot portion **98** formed on an outermost end portion thereof for engaging against the top wall **94** of the reflector **93**.

Attachment means are provided for the support members **19***a* by a horizontally extending tab **61***a* formed at right angles to the medial portion **54***a* of the support members **19***a* and characterized by an aperture formed therethrough. A self-tapping screw **63***a* passes through each aperture formed in the tabs **61***a* and engages appropriately formed apertures in the burner **17***a*, the screen **46***a* and the top wall **94** of the reflector **93**, thereby to securely attach the support members **19***a* to the burners **17***a* and to clamp the burner **17***a* and the screen **46***a* in an assembled relationship with the reflector **93**.

It is contemplated by the present invention to provide a fuel inlet passageway extending from a propane fuel tank indicated generally at **13***a* by means of a tube **101**, an elbow **102** having one end portion thereof threadingly engaging internal threads formed in a through bore of the base member **15***a* and having the other end thereof threaded onto one end portion of the tube **101** as at **103**, and a fuel control valve **12***a* having an outlet end thereof attached to another end portion of the tube **101** as at **104** and also having an inlet end threadingly engaging an outlet fitting of the propane tank **13***a*. Additional combustion supporting air for mixture with the fuel may be supplied through a series of radially extending air passageways as at **106**, formed through a side wall of the tube **101**. The air passageways **106** may be selectively opened or closed by selective movement of the slip collar **107**, thereby to adjust the amount of air mixed with the fuel to provide the proper air-fuel ratio for sustaining combustion.

If it is desired to elevate the camp stove **91**, elevating means may be provided as shown in FIG. **7** wherein is shown a wire form frame work on which the reflector **93** is supported. As shown at **109**, two identical leg sections are fastened together by a pair of brace members **111**. The legs **109** may be longitudinally spaced so that each leg member engages an end portion of the reflector **93**. Additional support may be provided for the camp stove **91** by a pair of upwardly extending arm members **112,112** secured to each brace member **111**. Each arm member **112** comprises a wire form spring member disposed to engage an inwardly projecting wall surface of the pair of depending parallel side walls **96,96** in a manner to provide two pairs of outwardly biased spring members for engaging the reflector **93** so that the wire form elevating means is retained in an assembled relationship with the reflector **93** by the spring tension.

In accordance with the principles of this embodiment of the present invention, a windshield **92** is provided for the camp stove **91** and is supported on the reflector **93**. The windshield **92** comprises three sheet-form members including a back wall **114** and a pair of hinged side walls **116,116** attached to opposite end portions of the back wall by hinges as at **117**. The back wall **114** of the windshield **92** extends upwardly from a rear edge portion of the reflector **93** and is sized to extend along the length of the reflector. Each side section **116** includes a tapered upper edge as at **119** and is of a length to extend along each end portion of the reflector **93**. Means for attaching the windshield **92** to the reflector **93** is provided by an elongated flange **120** formed at right angle to the back wall **114** at a lower edge portion thereof. The flange **120** is characterized by a pair of downwardly extending tabs **121,121**.

The pair of tabs **121,121** engage into a pair of slots **122,122** formed in the top wall **94** of the reflector **93**, thereby to detachably secure the windshield **90** to the reflector **93**. It will be apparent from the above description of the windshield **92** that the same may be detached from the deflector **93** and the side walls **116** pivoted about the hinges **117** to lie flat against the back wall **114** thereby to facilitate storing and transporting the windshield separate from the burner assembly.

Also, it should be understood that the elevating means may be detached from the deflector **93**, as may the propane fuel tanks **13***a*, thereby to permit the camp stove to be disassembled into its various component parts for ease of transporting and storing the unit.

It will be apparent from the above disclosure that the present invention provides a burner assembly construction having an integrally formed grill for providing a supporting surface above the flame area upon which a cooking utensil may be rested. With a burner assembly formed as thus provided, various configurations of camp stoves may be constructed including—a single unit, compact camp stove and multiple-unit camp stoves either with individual separate reflectors or with a single common reflector plate.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim:

1. A camp stove utilizing fuel from a propane cylinder having an outlet fitting, comprising:

means forming a reflecting surface;

a burner having an inverted cup-shaped configuration, engaging said reflector to form a fuel-receiving chamber and having circumferentially spaced apertures formed therein through which fuel received within said chamber is directed for combustion;

coupling means for directly connecting said reflector and said burner to the outlet fitting of a source of fuel under pressure and having an inlet passageway formed therethrough opening into said chamber;

strip members disposed on edge to form a grill for supporting a cooking utensil in the path of flames extending from said apertures, each said strip member including a pair of arm portions extending outwardly from a medial portion at an obtuse angle thereto and from opposite end portions thereof; and

each said strip member being directly attached to said burner and arranged to provide four outwardly projecting, circumferentially spaced supporting arms.

2. A camp stove as defined in claim **1** and further characterized by a screen member having an inverted cup-shaped configuration disposed within said chamber and fittingly engaging an interior surface of said burner to prevent the flame from blowing back into said chamber.

3. A camp stove as defined in claim **1** and further characterized by said reflector comprising a cup-shaped member having upstanding side walls and having a circumferential row of apertures formed therein exteriorly of said burner.

4. A camp stove as defined in claim **1** further characterized by said reflector comprising a flat plate member having an aperture formed therein for receiving said burner and said strip members being disposed to overlie said reflector.

5. A camp stove as defined in claim **4** and further characterized by:

an upstanding propane fuel cylinder;

said connecting means including a base member supporting said reflector and having a through-bore formed therein and forming a portion of said passageway; and

a control valve having an upstanding outlet fitting supporting said base member and an inlet fitting adapted for direct connection to said fuel cylinder, whereby said fuel cylinder forms the sole support for said reflector and said burner.

6. A camp stove as defined in claim **1**, wherein:

said means forming a member having a reflecting surface comprises a disc-shaped member providing a circular bottom wall and upstanding side wall portions, said circular bottom wall having a centrally disposed aperture formed therethrough opening into said fuel-receiving chamber;

said connecting means comprises:

a control valve having a manual actuating knob, an inlet adapted for connection to said coupling means and an upwardly opening, threaded outlet fitting;

an elongated hollow base member having a through-bore formed therein and opening into said chamber, said base also having an inlet end threaded for direct connection to said threaded outlet fitting of said control valve, and an outlet end received in said central aperture; and

clamping means connecting said reflector to said outlet end of said upstanding base member.

7. A camp stove as defined in claim 1 and further comprising an elongated hollow tube forming a manifold having at least one outlet fitting along the length thereof for connection to said coupling means, and like members to carry said manifold on a support surface.

8. A burner assembly as defined in claim 1, wherein:

said means forming a member having a reflecting surface comprises a flat plate having at least one aperture formed therein for receiving a burner unit in assembly therewith; and

said strip form members being adapted to overlie said plate member and having the arms thereof in engagement with the upper surface of said plate member, thereby to provide a component subassembly suitable for incorporation in a portable camp stove.

9. A burner assembly for use in a camp stove comprising:

means forming a member having a reflecting surface;

a burner member having a flat top wall and offset side walls together forming an inverted cup-shaped configuration engaged with said reflector to form a fuel-receiving chamber and having apertures formed therein through which fuel received within said chamber is directed for combustion in an annular flame pattern;

a pair of strip-form members each shaped in a "V" configuration and disposed on edge to form a grill to provide support for a cooking utensil; and

fastening means connecting said strip-form members to said flat top wall of said burner member.

10. A burner assembly as defined in claim 9, further comprising a screen member disposed within said chamber and having an inverted cup-shaped configuration complementally shaped and sized to fittingly engage the inner surface of said burner, to prevent the flame from blowing back into the interior of said chamber.

11. A burner assembly as defined in claim 9, wherein said means forming a member having a reflecting surface further comprises:

a dish-shaped member providing a circular bottom wall and upstanding side wall having a substantially parti-spherical configuration;

said circular bottom wall having a centrally disposed aperture formed therethrough opening into said chamber;

said means forming an inlet passageway having a portion passing through said aperture of said circular bottom wall; and

means securing said dish-shaped member to said means forming an inlet passageway.

said burner member having a depending side wall formed with an inwardly projecting, substantially cylindrical wall surface sized to fittingly engage said cylindrical, outwardly projecting wall portion formed by said annular ridge for forming a seal therewith.

12. A burner assembly as defined in claim 9, wherein:

said means forming a member having a reflector surface comprising a flat plate having one or more apertures formed therein for receiving a burner unit in assembly therewith; and

said strip form members being adapted to overlie said plate member; and

thereby to provide a component subassembly suitable for incorporation in a portable camp stove.

13. A burner assembly for use in a camp stove comprising:

means forming a member having a reflecting surface;

a burner member having a flat top wall and offset side walls together forming an inverted cup-shaped configuration engaged with said reflector to form a fuel-receiving chamber and having apertures formed therein through which fuel received within said chamber is directed for combustion in an annular flame pattern;

said means forming a member having a reflecting surface embossed to form an annular ridge providing a substantially cylindrical, outwardly projecting wall portion; and

said burner member having a depending side wall formed with an inwardly projecting, substantially cylindrical wall surface sized to fittingly engage said cylindrical, outwardly projecting wall portion formed by said annular ridge for forming a seal therewith.