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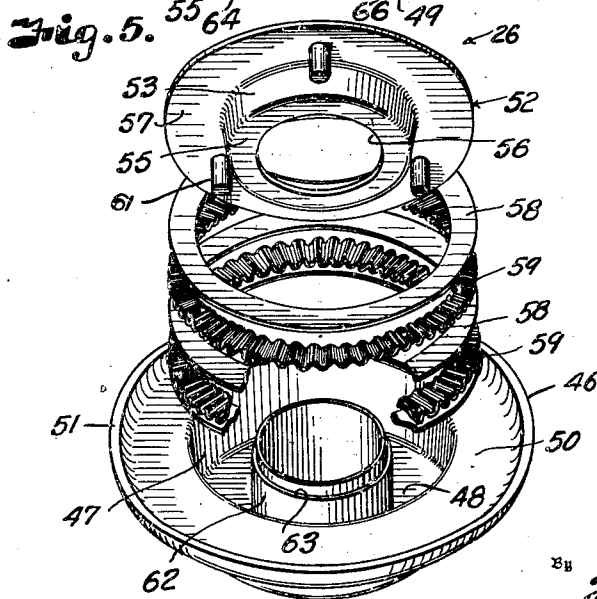
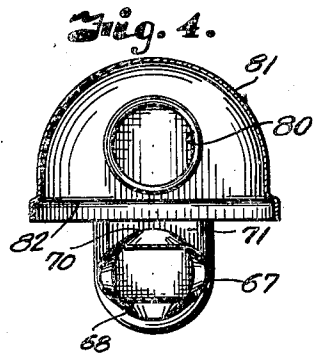
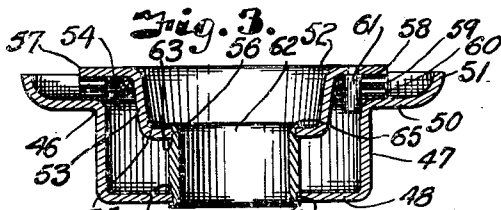
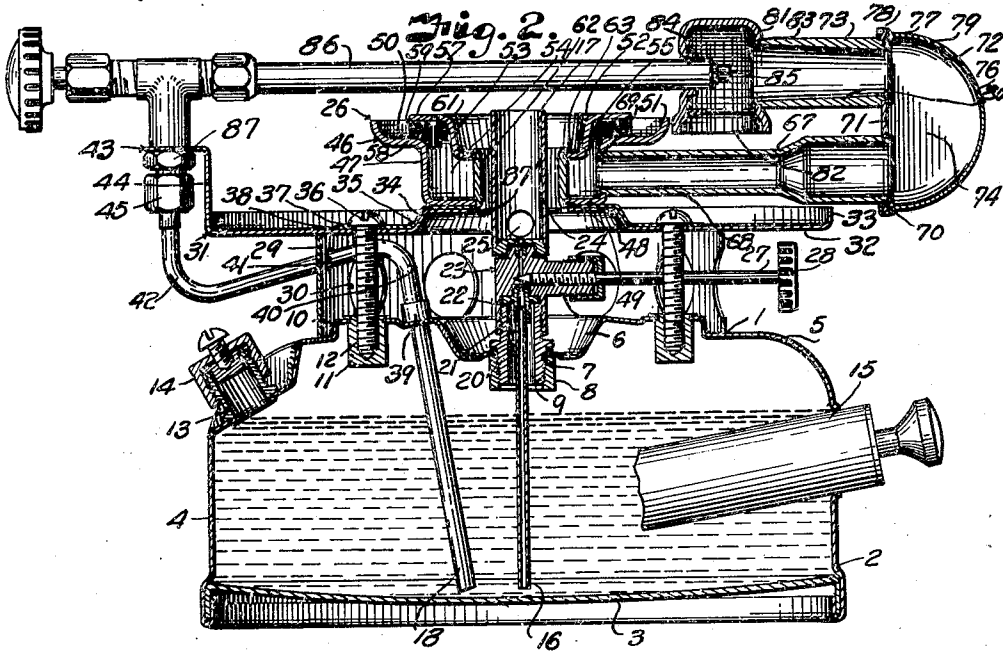
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2,491,430

UTILITY STOVE AND BURNER ASSEMBLY THEREFOR

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UTILITY STOVE AND BURNER ASSEMBLY
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1

This invention relates to a utility stove and particularly to liquid hydrocarbon burners therefor which include a generator for vaporizing the fuel and in the case of the heavier fuels such as kerosene, a fuel atomizing burner to preheat the generator and hereafter referred to as the "atomizer."

A principal object of the present invention is to provide a burner structure adapted for fabrication from pressed metal parts or stampings which permit a uniform standard of burner operation due to smooth surfaces of the stamped parts in contact with the vaporized fuel, accuracy in shape of the fuel passageways formed by such parts and accuracy with which the parts may be made and assembled.

It is also an object of the invention to provide a compact burner and atomizer arrangement which results in a stove of low height.

Other objects of the invention are to provide for securing the burner cap and bowl members in assembly by means of a tubular member which also serves to provide a passageway through which the atomizer operates in concentric relation with the burner; to provide a stove structure which allows for concentric mounting of the burner and atomizer relative to the fuel supply tank and an eccentric position of the main fuel supply tube; to provide a simplified mounting of the burner on an insulating plate which in turn is carried by the fuel tank and shields the tank from radiant heat of the burner; and to provide the main fuel supply duct with a flexible portion to facilitate assembly of the burner and positioning the fuel duct connections where they are readily accessible.

In accomplishing these and other objects of the invention hereinafter pointed out, I have provided improved structure, the preferred form of which is illustrated in the accompanying drawing wherein:

Fig. 1 is a perspective view of a utility stove constructed in accordance with the present invention and equipped with my improved burner and atomizer assembly.

Fig. 2 is a vertical section through the stove, particularly illustrating the fuel supply ducts and the atomizer and burner assembly.

Fig. 3 is an enlarged section through the body of the burner, particularly illustrating connection of the parts by means of a tubular member.

Fig. 4 is a cross section through the mixing chamber and ducts through which vaporized fuel is delivered to the burner.

Fig. 5 is a perspective view of the parts of the

2

burner shown in disassembled relation to better illustrate the construction.

Referring more in detail to the drawings:

1 designates a utility stove constructed in accordance with the present invention and which is an improvement on the stove covered in Patent 2,246,080 on "Portable stove" granted to me June 17, 1941, the stove of the present invention being equipped with an improved burner of the type disclosed in Patents 2,020,626 and 2,023,624, issued to me on November 12, 1935, and December 10, 1935, respectively, the present burner structure being adapted for use of one of the heavier hydrocarbon fuels such as kerosene.

The stove includes a fuel tank or fount 2 that has a bottom 3, a circumferential wall 4 and a crowned top 5. The center of the top 5 is pressed inwardly to provide a depression 6 having a central opening 7 in which is attached a collar 8 that extends inwardly of the tank and which is preferably provided with internal pipe threads 9. The top is also provided with outwardly struck bosses 10 located on opposite diametrical sides of the depression 6 and having apertures and in which are mounted lugs 11 having outwardly opening internally threaded sockets 12 for a purpose later described. The top of the fount also has a fill opening 13 located adjacent the marginal portion of the dome normally closed by a cap 14, and through which a liquid hydrocarbon fuel, for example, kerosene, is poured into the fount. The fount is also provided with a pump 15 by which air pressure is established on the top of the fuel to effect discharge of the fuel through a tube 16 supplying an atomizer 17 later described and a main tube 18 supplying fuel to a generator 19 also later described.

Threaded into the opening of the collar 8 is a nipple 20 having an upwardly extending externally threaded neck 21 which mounts a fuel atomizer 22 constructed in accordance with the atomizer disclosed in Patent 2,235,689, issued to me on June 9, 1942. The atomizer is supplied with fuel through the tube 16 and is contained within a valve body 23. The valve body carries a vertically positioned tube 24 having an air inlet 25 at the base thereof and which is of sufficient length to extend through the burner 26 later to be described.

The valve body also carries a laterally positioned valve stem 27 having an operating knob 28 for shutting off and regulating atomized fuel to the tube 24.

Positioned on the dome-shaped top of the fount and in encircling relation with the bosses

10 is a sheet metal band 29 having circumferentially spaced openings 30 through which air is admitted for supplying air to the air inlet opening of the torch and to maintain a cool space over the top of the fount. The lower edge of the band seats upon the top of the fount and the upper edge carries a base plate 31 on which the burner 26 is mounted as later described. The base plate 31 includes a sheet metal disk 32 having an upwardly extending marginal edge 33 to form a shallow pan adapted to catch drippings and the like. The central portion of the pan has an upwardly embossed portion 34 for enhancing the rigidity thereof and seating a burner mounting bracket 35.

The base plate is anchored to the fount by screws 36 having shanks thereof extending through openings 37 in legs 38 of the bracket 35 through registering openings in the base plate and into the internally threaded sockets 12 previously mentioned. The base plate is thus stably mounted and is adapted for rigidly supporting a grid in such a manner that there is no strain upon the fuel connection if a grid is desired.

The main tube 18 extends through the top of the fount by way of a collar 39 which is sealed in an opening of the top offset from the depression 6. The portion of the tube projecting from the collar has a substantially lateral bend 40 and extends loosely through and opening 41 of the spacing band 29 and which connects by a reverse bend 42 with an inlet connection of the generator unit that is located outwardly of the rim of the base plate and extends through an ear 43 that projects laterally from a tongue 44 formed as an upward continuation of the marginal edge 33, the connection of the tube being effected by a union nut 45.

The burner unit 26 includes a bowl member 46 provided with a base portion having a substantially cylindrical wall 47 and a flat bottom 48 that is provided with an axial opening 49. The upper edge of the wall 47 terminates in an outwardly extending portion 50 extending into an upwardly curving flange 51. The burner also includes a cap member 52 having a cylindrical wall portion 53 inset within the wall portion 47 to provide an annular passageway 54 therebetween. The cap also has a bottom 55 spaced above the bottom 48 and provided with an axial opening 56. The upper edge of the wall 55 terminates in an outwardly extending flange 57 spaced above the outwardly extending portion 50.

Located between the flanges are flat and transversely corrugated rings 58 and 59 alternating one upon another to provide a plurality of radial passageways 60 about the burner so that a combustible mixture is distributed from the chamber of the burner bowl circumferentially of the burner. In order to retain the rings in stacked relation the flange of the cap carries a plurality of depending pins 61 preferably three in number and which are adapted to engage the inner circumference of the rings as best shown in Fig. 3.

In order to retain the cap and bowl members of the unit assembly and to provide a passageway for the tube 24 the burner parts are connected together by a tubular member or sleeve 62 having circumferential shoulders 63 and 64 at the ends thereof for spacing the members apart and having portions 65 and 66 spun over the outer faces of the bottoms 48 and 55 as shown in Fig. 3 to retain the parts in assembly. The chamber 54 is supplied with a combustible fuel mixture

through a tube 67 which may be formed of thin wall tubing and shaped to provide a flattened end 68 that is welded or suitably soldered in an opening 69 in the wall portion 47 of the burner bowl. The opposite end of the tube is similarly connected in an opening 70 of a plate 71 that closes the open side of a header 72 which connects the tube with a Bunsen tube 73. The member 72 includes substantially flat side walls 74 and 75 of substantially semi-circular shape and which are connected by an arcuate wall 76 merging at the ends in transversely rounded portions 77 corresponding in curvature to the tubes 67 and 73. The marginal edge of the walls of the member 72 terminate in an offset flange 78 to provide a seat 79 for the plate 71. The flange extends a sufficient distance beyond the plate 71 so that the projecting portion may be turned inwardly to secure the plate to the seat 79. The Bunsen tube 73 has a tapering bore 80 extending from the outer end thereof toward the arcuate wall 76 and through which fuel is directed in impinging contact therewith to be guided into the inlet end of the tube 67.

Carried on the free end of the tube 73 is a mixing chamber 81 having the same construction as the body portion of the header 72. The mixing chamber, however, is turned so that the flange side is arranged in downwardly faced relation with respect to the flattened end of the tube to provide an air inlet 82. One flat side wall thereof is provided with an opening 83 in which the end of the Bunsen tube is sealed as by soldering or the like. The opposite wall has a registering opening 84 to support the nozzle end 85 of the vaporizing tube 86 of the generator unit so that the vaporizing tube is securely supported transversely of the burner and in position to be preheated by the atomizer burner.

The bracket 35 previously mentioned is in the form of a strap having a central aperture 87 to pass the atomizer tube and the ends are bent downwardly over opposite sides of the central boss of the base plate to provide the anchoring legs. The bracket is applied to the bottom of the burner bowl member by spot welding or other suitable fastening means.

In assembling the stove and assuming that the pump 15 and fill connection 13 are applied to the fount, the nipple 20 is screwed into the collar 8 to make an air and liquid tight joint by reason of the tapered threads. The vaporizing mechanism 22 is applied to the tube 16 and the tube inserted through the nipple 20. The valve body 23 is then screwed over the nipple with the stem 27 positioned in the desired direction. The tube 24 is then connected with the valve body so as to project upwardly coaxial with the fount. The main tube 18 is then applied in the collar and sealed in position. The spacing band 29 is moved to a position where the end of the reverse bend 42 of the main tube passes through the opening 41. The band is then shifted to pass the valve stem through one of the openings 30 and to a position seating upon the dome-shaped top 5 of the fount. The insulating plate 31 is then applied over the torch 17 so that the tube 24 passes through the center opening therein. The bracket 35 is then applied to the bottom 48 of the burner bowl 46 with the aperture 87 of the bracket registering with the passageway through the tube 62. The burner unit is then applied over the tube 24 with the legs of the bracket resting upon the disk portion 32 of the base plate 31. The openings 37 in the legs of the bracket are then registered with

5

the openings 38 in the disk portion of the insulating plate and the plate is turned so that the openings register with the sockets 12. The screws 36 are then inserted through the openings and turned into the internally threaded sockets 12 to draw the insulating plate tightly against the spacing band 29 and the spacing band in firm contact with dome-shaped top of the fount. The vaporizer unit 19 is then applied so that the nozzle end 85 passes through the opening 84 of the air mixing chamber 81 and the connecting branch of the generator valve is passed through the ear 43 to be anchored by a lock nut 87. The main tube is then connected by the union nut 45 to complete the assembly.

In using the stove, a liquid hydrocarbon fuel such as kerosene is poured into the fount through the fill opening 13 after which the cap 14 is applied and firmly seated to close the fount. With the valves closed, pressure is generated in the tank by means of a pump 15. The knob 28 is then actuated so that the air pressure acting on the top of the fuel in the fount forces a stream of fuel out the tube 16 and through the vaporizing mechanism in a manner pointed out in the above mentioned patents so that the fuel is discharged into the tube 24 in a very finely divided state so that it is readily lighted to heat the vaporizing tube 86. When the tube is heated sufficiently to vaporize the fuel, the knob 28 is rotated to close flow through the tube 16. The air in the fount then forces the fuel through the main duct 48 and through the vaporizer tube for vaporization by the heat of the torch. The fuel is discharged through the nozzle 85 as vapor which mixes with the air admitted through the air inlet 82 of the mixing chamber and the mixture is discharged through the Bunsen tube 73 and against the rounding surface 76 of the heater 72 so that the mixture is directed into the tube 67 for discharge into the chamber 54 of the burner bowl. The vapor then flows out through the radial openings formed between the burner rings 58 and 59 and burns when the burner is lighted so as to provide the necessary heat and to heat the vaporizer tube without continued operation of the atomizer burner.

From the foregoing it is obvious that I have provided a burner unit capable of formation from stamped metal parts and which may be readily secured together to provide burners having uniform operating characteristics. It is also obvious that I have provided a very compact structure and a substantially low stove by locating the atomizer concentric of the burner. I have also provided a concentric support for the burner on the fount and have provided for offcenter mounting of the main supply pipe which connects the fount with the generator to facilitate assembly and stability of the stove structure.

What I claim and desire to secure by Letters Patent is:

1. A device of the character described including a burner for liquid hydrocarbon fuels and having an axial air passageway, a fuel vaporizer, means for supporting the fuel vaporizer above the burner and extending across said passageway in position to be heated by the flames from said burner, duct means for connecting the vaporizer with the burner, and a liquid fuel atomizer substantially coaxial with and positioned to operate through the air passageway of the burner for preheating the vaporizer.

2. In a device of the character described, a burner including a bowl member having an open-

6

ing, a cap member having an opening registering with the opening of the bowl member, means between the cap and bowl members for forming jet openings for the burner, a tube having ends anchored in the registering openings of the bowl and cap members to retain said parts in assembly, and a liquid fuel atomizer coaxially of the tube and discharging above the cap member.

3. In a device of the character described, a burner including a bowl member having a central opening, a cap member having an opening registering with the central opening of the bowl member, alternate flat and corrugated rings stacked one upon another between the bowl and cap members, a tube concentric with said rings and having ends anchored in said registering openings of the bowl and cap members to retain said parts in assembly, and lugs on one of the members and engaging the rings to retain the rings in concentric relation.

4. In a device of the character described, a burner assembly of stamped metal parts including a bowl member having an outwardly and upwardly curving flange, a cap member for the bowl member and having an annular flange overlying said first named flange but terminating short of the curving portion of said flange, jet rings supported between said flanges, a spacing tube having ends anchored in the bowl and cap members to retain said members in assembly and providing an opening through the burner, a fuel vapor supply tube connected with the bowl member and extending outwardly therefrom, an air inlet member arranged transversely of the vapor supply tube and having a nozzle receiving opening above the plane of the flange of the cap member, a Bunsen tube connected with the air inlet member, a header connecting the Bunsen and supply tubes, a vaporizing tube extending across the cap member of the burner and having a nozzle in the nozzle receiving opening for discharge into the air inlet member, and a fuel atomizer discharging through the spacing tube for preheating the vaporizing tube.

5. In a device of the character described, a burner assembly of stamped metal parts including a bowl member having an outwardly and upwardly curving flange, a cap member for the bowl member and having an annular flange overlying said first named flange but terminating short of the curving portion of said flange, an assembly of rings having lateral jet openings supported between said flanges, a spacing tube having ends anchored in the bowl and cap members to retain said members in assembly and providing an opening through the burner, a fuel vapor supply member connected with the bowl member and extending outwardly therefrom, a U-shaped duct connected with the fuel vapor supply member, an air inlet member arranged transversely of the vapor supply tube and having a nozzle receiving opening above the plane of the flange of the cap member, a Bunsen tube connected with the air inlet member, and having connection with the vapor supply tube through the U-shaped duct, a vaporizing tube extending across the cap member of the burner and having a nozzle positioned within the nozzle receiving opening of the air inlet member, and an atomizer discharging through said opening of the burner for preheating the vaporizing tube.

6. A stove of the character described including a fount for containing fuel under pressure, a burner, means providing an axial opening

7

through the burner, means for supporting the burner above the fount, a vaporizer extending across the axial opening of said burner and having discharge into the burner, an atomizer extending through said axial opening of the burner and terminating under the vaporizer, and separate means for supplying the atomizer and the vaporizer with fuel from said fount.

7. A stove of the character described including a fount, a burner, means providing an axial opening through the burner, an insulating plate, a spacing band having support on the fount and mounting the insulating plate, means for supporting the burner on the insulating plate, fastening devices having anchorages in said fount to retain said parts in assembly, a vaporizer extending across the center of the burner, duct means connecting the vaporizer with the burner, an atomizer having a fuel tube extending from adjacent the bottom of the fount through the top of the fount concentrically with the axial opening in said burner, a valve member connected with the atomizer, a tubular discharge for atomizer extending through said axial opening of the burner and terminating under the vaporizer, and a main fuel supply tube excentrically of the axis of the tank and having a lateral bend extending through an opening in the spacing band and connected with the vaporizer for supplying fuel to the vaporizer.

8. A stove of the character described including a fount, a burner, means providing an axial opening through the burner, a vapor supply tube connected with the burner, an air inlet member above the supply tube, a Bunsen tube connected with the air inlet member, a header connecting the Bunsen and supply tubes, an insulating plate, a spacing band having support on the fount and mounting the insulating plate, a bracket fixed to the burner and having leg portions supported on the insulating plate, fastening devices extending through said leg portions of the bracket and the insulating plate and having anchorage in said fount to retain said parts in assembly, a vaporizer extending across the center of the burner and having a discharge end supported in an opening of the air inlet member, means on the insulating plate supporting the other end of the vaporizer, an atomizer, a supply tube for the atomizer extending from adjacent the bottom of the fount through the top of the fount concentrically with

8

the axial opening in said burner, a valve member connected with the atomizer, a discharge tube connected with the atomizer and extending through said axial opening of the burner and terminating under the vaporizer, and a main supply tube extending from the fount eccentric of the fount and having connection with the vaporizer for supplying fuel to the vaporizer.

9. In a device of the character described, a burner including a bowl member having a central opening, a cap member having an opening registering with the opening in the bowl member, means between the cap and bowl members for forming jet openings for the burner, and a tube extending through the registering openings of the bowl and cap members and having annular shoulders for seating against said members to space said members and having flanges extending over the marginal edges encircling the openings to retain the members in assembly.

10. A burner assembly including a bowl member having an outwardly and upwardly curving flange, a cap member for the bowl member and having an annular flange overlying the first named flange but terminating short of the curving portion of said flange, jet rings supported between said flanges, a tube having ends anchored in the bowl and cap members to retain said members in assembly and providing an opening through the burner, an atomizer with discharge outlet coaxial with said opening for preheating the vaporizing tube.

BOYD W. TULLIS.

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