

June 8, 1943.

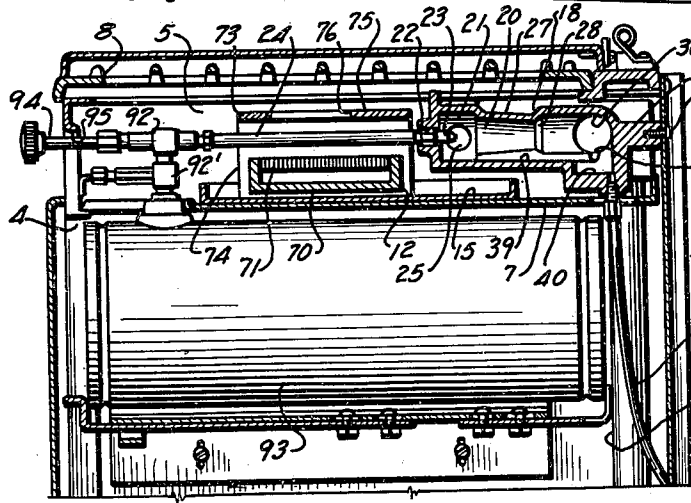
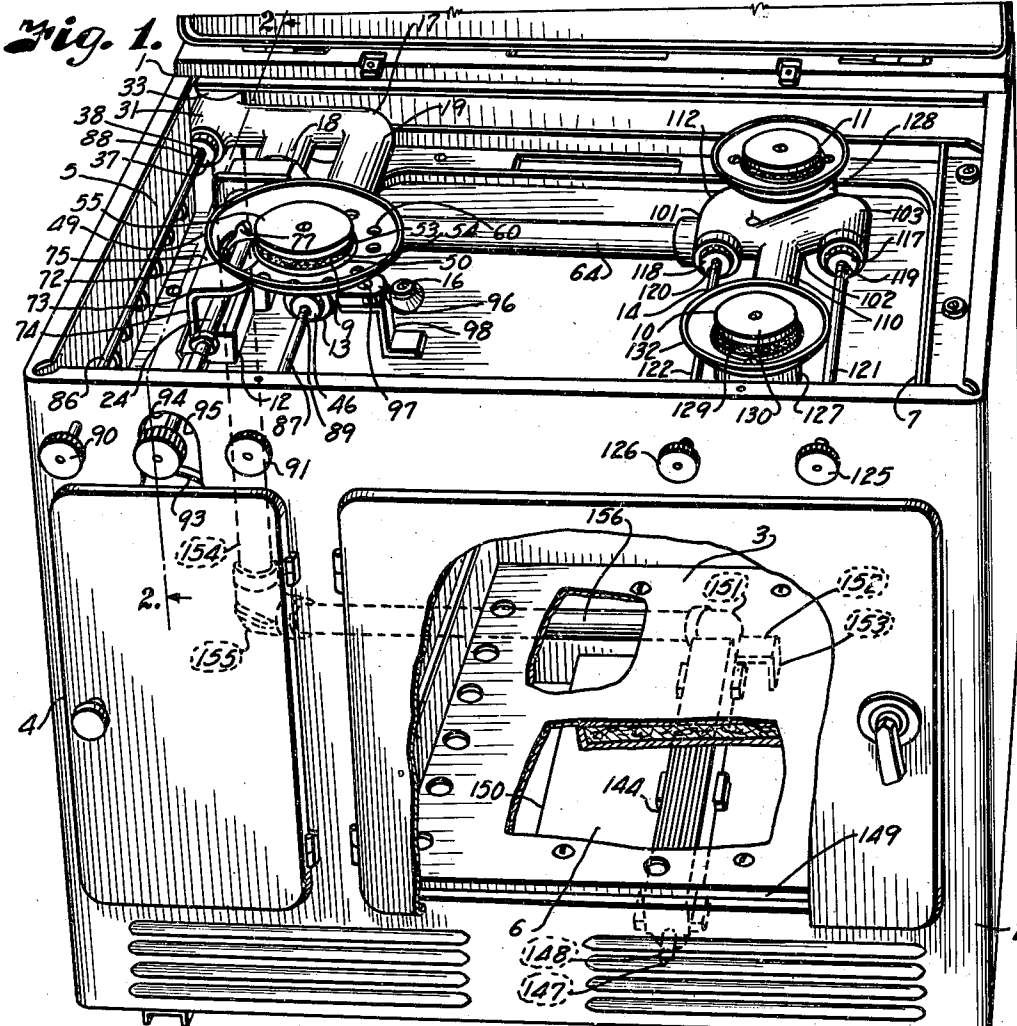
B. W. TULLIS

2,321,169

BURNER ASSEMBLY FOR RANGES

Filed Jan. 29, 1940

3 Sheets-Sheet 1



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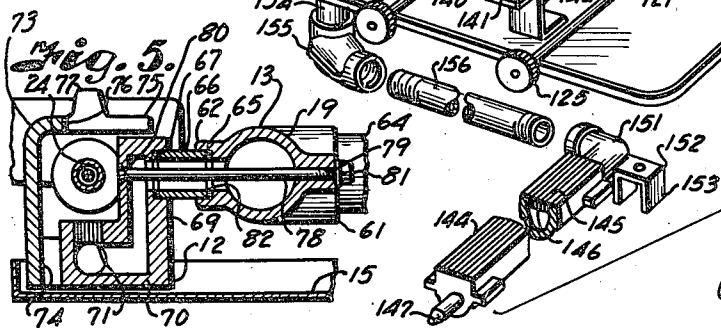
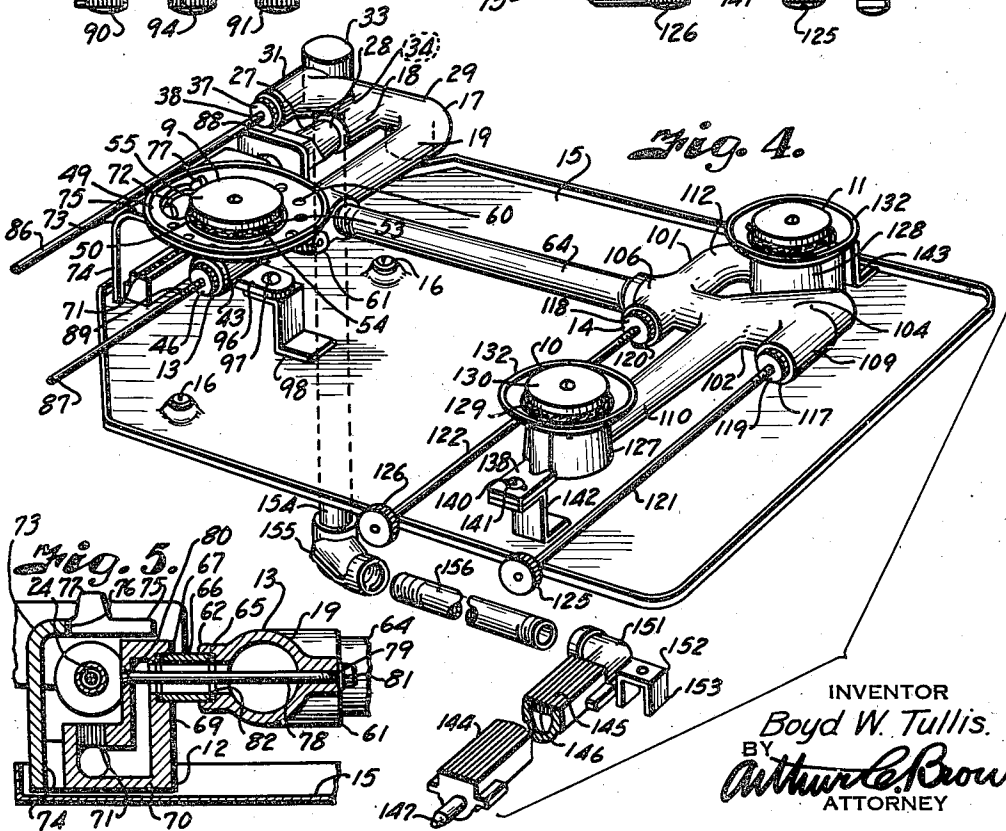
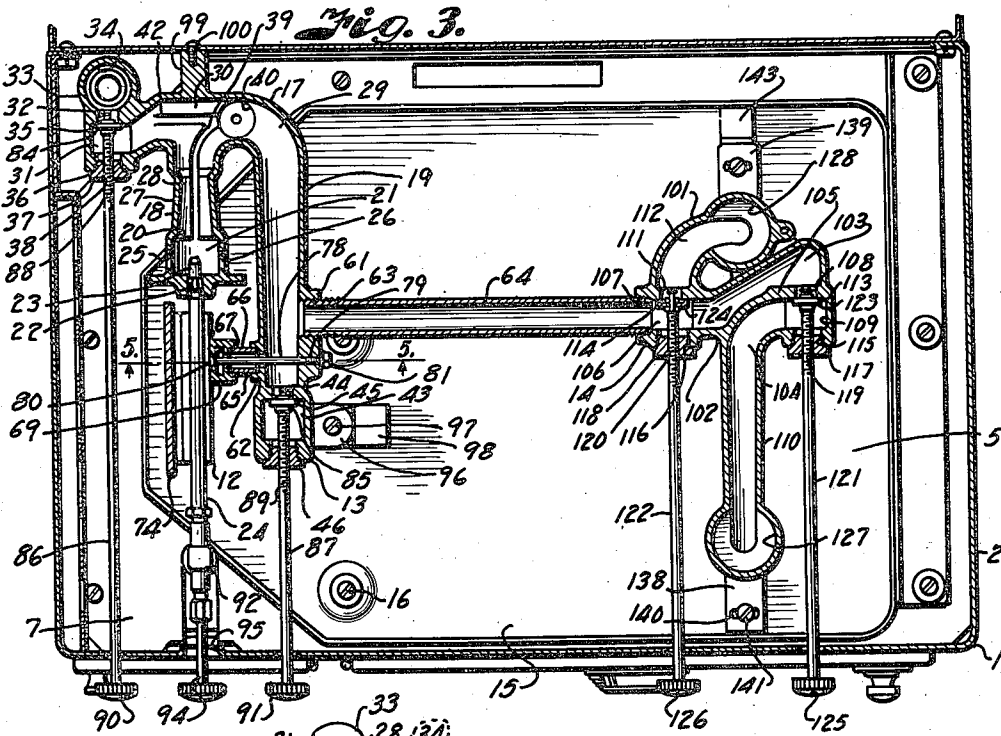
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3 Sheets-Sheet 2



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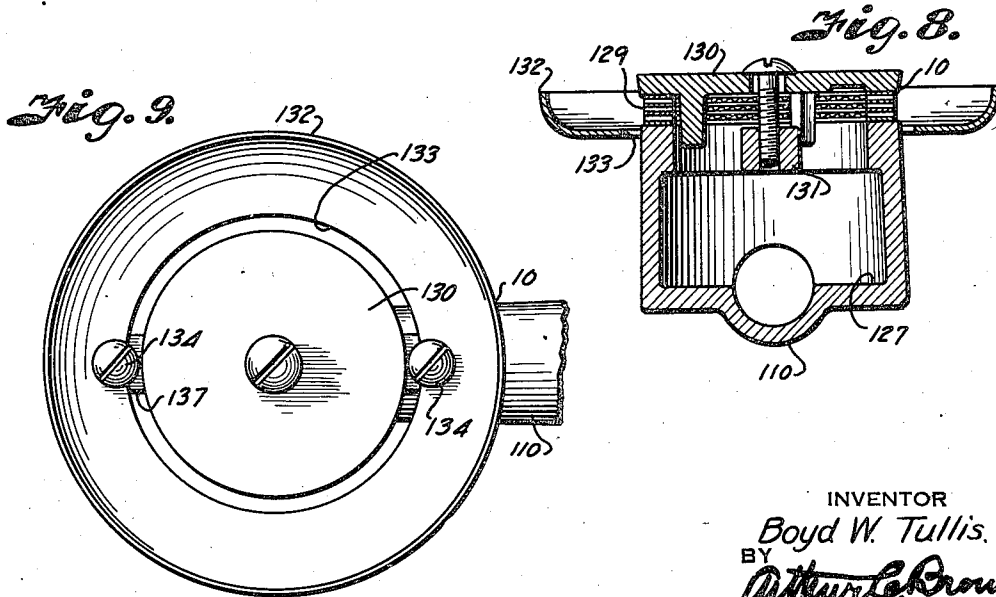
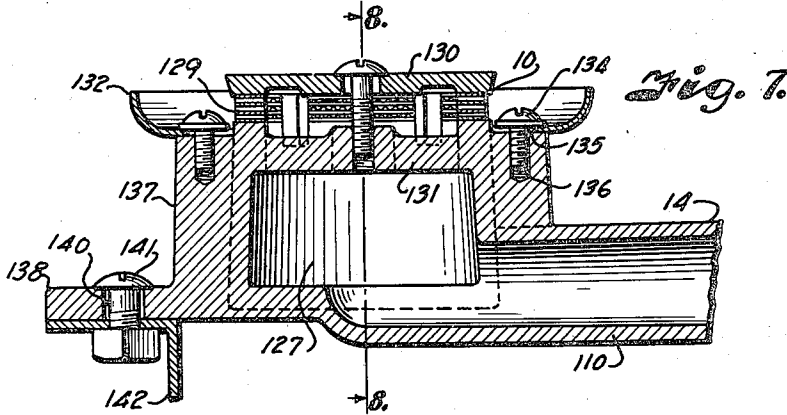
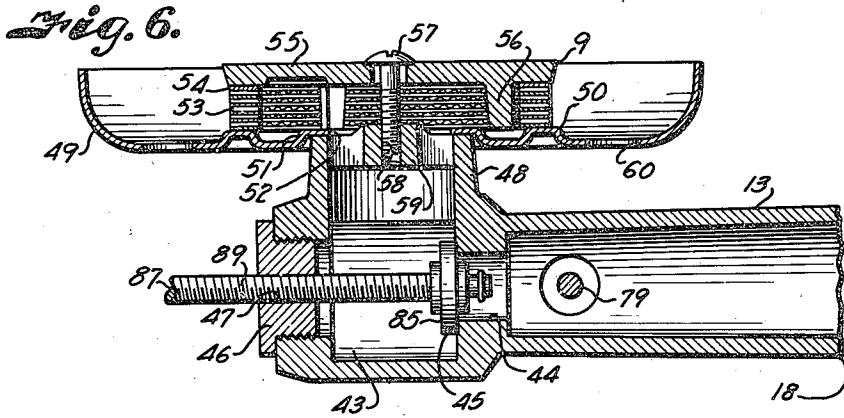
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BURNER ASSEMBLY FOR RANGES

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3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,321,169

## BURNER ASSEMBLY FOR RANGES

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Application January 29, 1940, Serial No. 316,106

6 Claims. (Cl. 126-44)

This invention relates to a burner assembly for cooking ranges adapted for installation within confined spaces such as automobile trailers, boat galleys, small cabins, and other compartments where space is limited. Ranges of this character are very compact and it is difficult to arrange burners and controls therefor so as to give ample cooking facilities and provide for symmetry of the valves.

The principal objects of the present invention are, therefore, to provide an improved burner arrangement and structure adapted for this type of range giving maximum cooking and baking capacities; and to provide a burner arrangement and structure which is economical to produce and capable of ready assembly, thereby reducing cost of the range to the purchaser.

Other objects of the invention are to provide symmetrical arrangement of the burner valves; to provide interchangeable valve parts for facilitating repair and replacement; to provide burner units designed to facilitate machining of the valve seats and related parts; to provide burner and valve bodies in one unitary casting; to provide a common support of the burner units of the cooking top; to provide a burner structure equipped with a drain for automatically discharging excess liquid portions of the fuel; and to provide burner units having integral attachments for the connecting pipes of the respective units.

It is a further object of the invention to provide a burner assembly with a generator unit having the control valve on substantially the same horizontal plane as the control valves of the burners.

Another object of the invention is to provide a burner assembly including a drip pan for mounting all the parts to facilitate assembly of the burner units exteriorly of the range.

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

Fig. 1 is a perspective view of a range equipped with a burner assembly constructed in accordance with the present invention and showing the grids of the cooking top removed and with parts of the range casing broken away to better illustrate the burner assembly.

Fig. 2 is a partial section through the upper portion of the range on the line 2-2 of Fig. 1, particularly illustrating the fuel supply tank, generator tube, atomizing device, and mixing

chamber for delivering fuel vapor to the respective burner units.

Fig. 3 is a horizontal section through the top of the range showing arrangement of the burner parts, including the flow passages, and valves.

Fig. 4 is a detail perspective view of the burner assembly as it appears before insertion in the range.

Fig. 5 is a detail cross-section on the line 5-5 of Fig. 3, particularly illustrating the method of attaching the generating unit to the burner assembly.

Fig. 6 is a section through the master burner.

Fig. 7 is a section through one of the auxiliary burners of the cooking top.

Fig. 8 is a sectional view on the line 8-8, Fig. 7.

Fig. 9 is a plan view of the burner shown in Figs. 7 and 8.

Referring more in detail to the drawings:

1 designates a range of the type described for installation in confined and restricted spaces. The range includes a sheet metal casing 2 having an oven compartment 3, a fuel tank compartment 4, a cooking top burner compartment 5 located above the oven and tank compartments, and a burner compartment 6 located below the oven. The burner compartment 5 has a bottom 7 and removable grids 8 which form the cooking top of the range.

The burners supplying the cooking top are shown as three in number, 9, 10, and 11. The burner 9 constituting the main burner is associated with a generator burner 12 and is a part of a unit 13. The auxiliary burners 10 and 11 include a second unit 14. For convenience both units are mounted upon a tray or pan 15 which is secured to the bottom 7 by suitable fastening devices 16.

The unit 13 includes a casting 17 having hollow, duct-like arms 18 and 19 arranged with parallel axes located in the same horizontal plane. The arm 18 is shaped to constitute a mixing chamber 20 including a portion 21 having an axial opening 22 in the front thereof for passing the tip 23 of a generator tube 24 and having side openings 25-26 for the admission of combustion supporting air.

The mixing chamber also includes a tapered neck portion 27 forming a venturi having its constricted end 28 connected by a substantially U-shaped passage 29 with the duct of the arm 19 as clearly shown in Fig. 3. Also formed as a part of the casting and extending therefrom in alignment with the passage 29 is a lateral branch 30

having a valve chamber 31 provided with a port 32 with the axis thereof extending parallel with the axes of the arms 18 and 19 and which connects with an integral fitting 33 having a downwardly opening threaded outlet 34, for a purpose later described.

Encircling the port 32 is a valve seat 35 aligning with an internally threaded opening 36 at the front of the valve chamber 31 and which is closed by a plug 37 having an axial threaded opening 38 to mount a valve stem later described.

Formed in the bottom of the mixing chamber arm 18 and sloping rearwardly in reverse direction to the walls of the venturi is a drain channel 39 curving toward a sump 40 that is provided in the bottom of the U-shaped passage 29, the sump being formed as an integral part of the casting and having an outlet in the bottom thereof to connect with a drain pipe 41. Also connected with the sump is a downwardly sloping channel 42 leading from the branch 30 which connects the mixing chamber with the valve chamber 31. The arm 19 extends forwardly of the arm 18 and terminates in a valve chamber 43 having connection with the passage in the arm through a port 44 encircled by a valve seat 45. The front of the valve chamber also has an internally threaded opening mounting a plug 46 which in turn is provided with a threaded opening 47 similar to the plug previously described.

Projecting upwardly from the valve chamber is a collar 48 seating a reflector 49. The reflector 49 is substantially bowl-shaped and has a circular rib 50 spaced from an inset boss 51 which is provided with an opening 52 in aligning registry with the opening in the collar 48. Seated on the rib 50 is a series of preferably alternate corrugated and flat rings 53 and 54 retained in position by a plate 55. The plate 55 has depending fingers 56 engaging the inner peripheries of the respective rings to keep the rings centered with respect to the reflector 49 and opening 52. The reflector, rings 53-54, and plate 55, are retained on the seat of the collar by a screw 57 extending through an opening in the plate 55 and into a threaded opening 58 of a spider 59 which bridges the opening through the collar 48. The reflector and parts of the burner body, are thus supported directly on the valve chamber and are securely retained in assembly thereon by means of the single fastening device 57. The spacing between the rings afforded by the corrugations provides outlet for the discharge of vaporized fuel delivered through the valve port into the valve chamber, secondary air being supplied through openings 60 in the bottom of the reflector.

The arm 19 is provided on opposite diametrical sides thereof at a point to the rear of the valve chamber with bosses 61 and 62 respectively, the boss 61 having a threaded opening 63 therein to receive a pipe 64 connecting the auxiliary burner unit 14, later described. The boss 62 on the opposite side has a recessed seat 65 for a spacing nipple 66, the opposite end of which is received in a similar recess 67 of the generator burner 12, it having been necessary to form the generator burner of a separate part to conform to best foundry practice in that the pattern forming the arms 18 and 19 may be divided horizontally for core purposes. The lower level of the generator burner would not permit of removal of the pattern if it were cast as an integral part of the arm 19.

The generator burner includes an elongated, 75

hollow casting of substantially L-shaped cross-section as best shown in Fig. 5, the vertical arm 68 of which connects through the nipple with the arm 19 so that fuel is delivered therethrough to the horizontal portion 70 of the casting for discharge through jet openings 71 against a side of the generator tube, the jets being preferably formed by alternate flat and corrugated strips of material similar to the construction of the burner rings. The fuel is lighted through an opening 72 in the reflector, and the flame (known as a sub-flame) is preferably protected by an angle-shaped shield 73 having a leg 74 attached in spaced relation to the side of the burner and having a horizontal leg 75 extending over the top of the generator tube. The portion thereof extending under the reflector is notched, as at 76, in registry with the opening 72 and the side edges thereof are provided with ears 77 extending upwardly through the opening 72 to retain alignment of the reflector opening with the notch 76. The generator burner is anchored to the arm 19 by means of a bolt 78 extending through the vertical leg of the burner casting through the nipple 66 and through an opening 79 in the boss 61. The head 80 of the bolt is preferably countersunk in the side face of the generator burner casting. The threaded shank of the bolt extends through the opening 79 to mount a draw-nut 81, suitable gaskets 82 having been preferably inserted in the bottoms of the recesses at the ends of the nipple so as to avoid leakage of vapor or liquid fuel through these connections.

It is thus obvious that the spacing nipple not only forms a duct for delivery of vapor to the generator, but it also provides for proper spacing and location of the generator burner with respect to the arm 19.

Cooperating with the valve seats 35 and 45 are disk-like valves 84 and 85 attached to valve stems 86 and 87 having threaded portions 88 and 89 mounted in the openings of the respective plugs 37 and 46. The stems project through the front of the casing and are provided with handwheels 90 and 91. The generator is connected through a valve 92 and fuel atomizer 92' used in initially lighting the burners, with a fuel supply tank 93 carried in the compartment 4 of the casing. The valve 92 has an actuating stem 94 extending through a notch 95 in the front of the casing in substantially horizontal alignment with the valve stems 86 and 87. The burner unit also includes a lug 96 extending laterally from the arm 19 at a point below the main burner which is adapted to connect by a fastening device 97 with a bracket 98 carried by the tray 15. The rear of the unit may have a lug 99 extending therefrom which may be secured to the back of the casing by a fastening device 100.

The auxiliary unit 14 includes the auxiliary burners 10 and 11 which are arranged one directly in front of the other in spaced relation with the burner 9 which provides an arrangement whereby three cooking vessels of substantial size may be applied to the cooking top and centered over a respective burner. With this arrangement of burners a novel scheme has been arranged for supplying vapor from the unit 13 and controlling flow thereof to the respective burners 10 and 11, with the valves being located so that they permit of like parts and to facilitate spacing of the valve seats and machining of the casting 101.

The casting is formed of a single member having a body portion forming a manifold 102 pro-

vided with spaced passageways 103 and 104 that are separated by a partition 105 formed as an integral part of the casting. The passageway 103 includes a valve chamber 106 at the inlet end thereof and has a threaded opening 107 facing the threaded opening 63 of the other unit whereby the units are intercoupled through the pipe 64. The passageways 103 and 104 have connection through a valve port 108 in the partition 105 which connects with a valve chamber 109 controlling flow of vapor through an arm 110 leading to the burner 10. The valve chamber 106 has a similar port 111 opening rearwardly thereof and connecting with a duct 112 leading to the burner 11. Encircling the ports 108 and 111 are seats 113 and 114 located in the same vertical plane so that the seats may be faced with a single setting of the casting. With this arrangement the valve chamber 106 substantially aligns laterally with the valve chamber 109 and is directly connected with the offset passageway 103 which in turn connects with the passageway 104 through the port 108 of the valve chamber 109. Located in alignment with the respective seats are threaded openings 115 and 116 closed by plugs 117 and 118 having threaded openings 119 and 120 therein to mount the threaded stems 121 and 122 which carry disk type valves 123 and 124 for controlling flow of vapor through the respective ports. The stems project through the front of the casing in substantially the same horizontal plane as the valve stems previously described and are provided with hand-wheels 125 and 126. The arm 110 and duct 112 terminate in bowls 127 and 128, having open tops on which are seated rings 129 forming outlets and which are retained in position by plates 130 secured to spider-like bridges 131 similar to the attachment of the ring elements of the burner previously described. The reflectors 132, however, include ring-like members arranged to fit over the rim of the bowls and which are spaced therefrom to provide substantially annular air passageways 133. The reflector rings are retained in position by fastening devices 134 extending through slots 135 in the inner edges of the reflectors and into threaded sockets 136 formed in bosses 137 projecting from the sides of the bowls. The bowls have laterally extending lugs 138 and 139 provided with slots 140 through which fastening devices such as bolts 141 are inserted to connect the burner unit with brackets 142 and 143 that are secured to the tray 15.

The oven burner 144 consists of an elongated casting having an open top closed by a series of flat and corrugated strips 145 and 146 to form outlets similarly to the construction of the generator burner previously described. The forward end of the casting has a lug 147 engaged in an opening 148 of a plate 149 attached to a support 150 on the bottom of the burner chamber 6. Integrally connected with the opposite end of the casting is an ell 151 to which is integrally connected a lug 152 having legs 153 engaging the burner support. The burner thus described is supplied with fuel through the fitting 33, through a pipe 154, that is threaded into the opening 36 and which extends downwardly in the corner of the compartment 4 and terminates substantially at the level of the oven burner in an ell fitting 155 which is connected with the fitting 151 by a pipe 156.

In assembling the burner units the generator burner is attached to the arm 19 by the bolt 78 which is passed through the openings therefor

and through the spacing sleeve prior to application of the shield 73. The valves 84 and 85 and stems 86 and 87 are applied. After application of the burner elements and reflector rings the valves, valve stems and burner elements of the other units are similarly assembled and connected with the unit 13 by the pipe 64. The pipe 154 carrying the ell fitting 155 is then screwed into the threaded outlet 34 of the part 33. The lugs 96, 138 and 139 are connected to the respective brackets on the tray 15 so that the entire assembly may be applied in the burner chamber and secured by the fastening devices 16. It is obvious that this arrangement facilitates the assembly in that the burner, manifolds, valves, etc., are mounted on the pan exteriorly of the range and then inserted in the compartment and secured firmly in place, thereby avoiding the inconvenience of manipulating the necessary tools, wrenches, and the like, in the relatively small space within the burner chamber. This unit assembly also reduces the cost and is a convenience in removing the burners from the range for servicing or repairs. The oven burner is then inserted in the chamber therefor and the fittings 155 and 151 are connected by the pipe 156. The pipe 156 has a long thread on one end and a short thread on the other so that when the long thread is screwed up tight in the fitting 155, the opposite end is in position to enter the threaded opening of the fitting 151. The pipe is then rotated so as to unscrew the end thereof from the fitting 155 and screw the opposite end in the fitting 151, there being sufficient threads to retain threaded connection with the fitting 155 when the pipe is tightened in the fitting 151.

In operating the burner unit constructed as described, the tank is filled with liquid fuel and moved into the tank compartment so that the tip of the generator passes through the opening of the mixing chamber. With the generator valve closed, a pump in the tank is operated to generate pressure on the fuel in the tank and force the fuel through the generator tube when the valve 92 is opened. The atomizer 92' is regulated to cause atomization of the fuel. The generator valve and at least one of the burner valves are opened, preferably the valve of the main burner, so that a lighted match held above the main burner lights both the main burner and sub-flame of the generator burner. The sub-flame playing on the generator tube converts the liquid fuel to a vapor sufficient in volume to supply all of the burners. A supply of vapor accumulates in the pipe 64 and passageway 103. If the rear auxiliary burner 11 is to be lit, the valve 124 is opened to permit flow of vapor through the duct 112 to that burner. Likewise vapor may be delivered to the front auxiliary burner by opening the valve 123 to admit vapor from the passage 103 into the passage 104 of the arm 110. When the generator has heated sufficiently to effect vaporization of the fuel, the atomizer 92' is turned to its original position. The oven burner is preferably lighted after the generator burner has been in operation. This is accomplished by opening the valve 84 and applying a match to the oven burner.

From the foregoing it is obvious that I have provided a novel burner arrangement and construction which facilitates assembly and provides full cooking capacity of a three burner top including ample baking capacity of the oven.

It is also obvious that the unit assembly provides for simple machining of the parts and they

may be relatively inexpensively manufactured. The units are also arranged so that the valve operating controls are located symmetrically which greatly enhances the pleasing appearance of the range front.

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

1. A burner unit including an integral casting having parallel arms in the same horizontal plane when in operative condition and interconnected by a substantially U-shaped bend, one of said arms forming a mixing chamber therefor, the other arm forming a flow duct, a generator burner supported by the last named arm, a vaporizer heated by said burner, a valve controlling flow of liquid fuel to the vaporizer and having an operating stem, a master burner carried by the last named arm, and a valve connected with said last named arm and having an operating stem located in parallel alignment with the first named valve.

2. A burner unit including, an integral casting having parallel arms in the same horizontal plane when in operative position and interconnected by a substantially U-shaped bend, one of said arms forming a mixing chamber therefor, the other arm forming a flow duct, a generator burner supported by the last named arm, a vaporizer heated by said burner, a valve controlling flow of liquid fuel to the vaporizer and having an operating stem, a master burner carried by the last named arm, a valve connected with said last named arm and having an operating stem located in parallel relation with the first named valve stem, a duct-like arm connected with the U-shaped bend on the side of the mixing chamber opposite the flow duct and having a valve chamber, said chamber being provided with a fuel port for connection to an oven burner, a valve in said chamber, and an operating stem for said valve located in parallel relation with said operating stem controlling the master burner.

3. A burner unit including, a hollow body and spaced valve chambers located in substantially lateral alignment with respect to each other and having an offset passageway directly connected with one of the valve chambers and with the other valve chamber through a port in said body, duct-like arms connected with the respective valve chambers, burners connected with the free ends of said duct-like arms and located with their axes in a vertical plane substantially midway between the valve chambers, said hollow body having a port connecting the valve chamber to which the offset passageway is directly connected with its related duct-like arm, valves controlling said ports, and stems for said valves extending in parallel relation on the respective sides of the vertical plane extending through the axes of said burners.

4. In a burner assembly, a pair of burner units, one of said units having laterally spaced parallel duct-like arms connected by a substantially U-shaped bend and with the axes thereof located in a common horizontal plane, one of said arms forming a mixing chamber and the other a flow duct provided with a valve chamber having a valve port, the other unit including a hollow body having valve chambers and having a flow passageway between said chambers, duct-like arms connected with the respective valve chambers of said last-named unit with the axes of said arms in

said horizontal plane, burner bowls connected with ends of said arms and having vertical axes located in a vertical plane substantially midway between the valve chambers, said hollow body of the last-named unit having a port connecting one of the valve chambers thereof with its related duct-like arm and having a port connecting the other valve chamber with the flow passageway, a duct connecting the flow duct of the first-named unit with said valve chamber to which the flow passageway directly connects, valves in said valve chambers and controlling said ports, and stems for said valves all extending in parallel relation with said vertical plane and located in said horizontal plane.

5. In a burner assembly, a pair of burner units, one of said units having laterally spaced parallel duct-like arms connected by a substantially U-shaped bend and with the axes thereof located in a common horizontal plane, one of said arms forming a mixing chamber and the other a flow duct provided with a valve chamber having a valve port, the other unit having a hollow body provided with valve chambers located in substantially lateral alignment with respect to each other and having valve ports, said valve chambers being interconnected by an offset passageway directly connected with one of the valve chambers and with the other valve chamber through the valve port thereof, duct-like arms connected with the respective valve chambers of said last-named unit with the axes of said arms in said horizontal plane of the arms of the first-named unit, a duct connecting the flow duct of the first-named unit with said valve chamber of the last-named unit to which the offset passageway directly connects, valves in said valve chambers and controlling said ports, and stems for said valves all located in said horizontal plane.

6. In a burner assembly, a pair of burner units, one of said units having laterally spaced parallel duct-like arms connected by a substantially U-shaped bend and with the axes thereof located in a common horizontal plane, one of said arms forming a mixing chamber and the other a flow duct provided with a valve chamber having a port, a burner connected with the valve chamber, the other unit having a hollow body provided with valve chambers located in substantially lateral alignment with respect to each other and interconnected by an offset passageway directly connected with one of the valve chambers and with the other valve chamber through a port in said body, duct-like arms connected with the respective valve chambers of said last-named unit with the axes of said arms in said horizontal plane of the arms of the first-named unit, burners supported on terminal ends of said last-named arms with the centers thereof located in a vertical plane substantially midway between the valve chambers, said hollow body of the last-named unit having a port connecting the valve chamber to which said offset passageway is directly connected with its related duct-like arm, a duct connecting the flow duct of the first-named unit with said valve chamber of the last-named unit to which the offset passageway directly connects, valves in said valve chambers and controlling said ports, and stems for said valves all extending in parallel relation with said vertical plane and located in said horizontal plane.

ROYD W. TULLIS.