(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 793 058 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.09.1997 Bulletin 1997/36

(51) Int. Cl.[6]: **F23D 14/46**, F23D 14/64

(21) Application number: **97103204.0**

(22) Date of filing: **27.02.1997**

(84) Designated Contracting States:
DE ES FR GB IT NL SE

(30) Priority: **01.03.1996 US 609203**

(71) Applicant: **EATON CORPORATION**
Cleveland, Ohio 44114-2584 (US)

(72) Inventor: **Kwiatek, David Joseph**
LaGrange, Illinois 60525 (US)

(74) Representative: **Patentanwälte**
Rüger, Barthelt & Abel
Postfach 348
73704 Esslingen a.N. (DE)

(54) Mixer tube assembly for fuel gas burner

(57) A fuel/air mixture tube assembly (10) for interconnecting a range top burner with a fuel gas manifold. The tube is preferably formed by stamping half shells (12,14) from thin sheet metal and joining the half shells to form a tube having an inlet (16) for connection to the manifold and an outlet (20) for connection to the burner inlet. An inlet flap or door (54) is integrally stamped in the half shells adjacent the inlet end. After assembly the flap or door may be mechanically deformed to vary the air inlet opening.

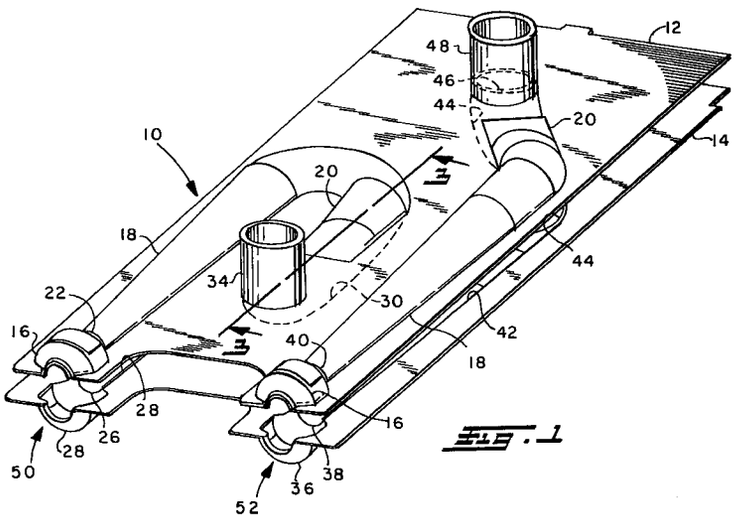

FIG. 1

EP 0 793 058 A2

Description

BACKGROUND OF THE INVENTION

The present invention relates to fuel/air mixture supply tubes for gas burners of the type employed for cooking and particularly for range top burners employed in household cooking appliances.

Burner assemblies for range tops typically employ a mixing tube for interconnecting a fuel gas source, such as a supply manifold to the individual burners employed on the range top. The mixing tube assembly incorporates an aspirator for drawing in air to mix with the fuel gas flowing through the tube between the manifold and the burner to provide the desired fuel/air mixture for combustion at the burner.

Heretofore, such burner tube assemblies for range tops have employed rotary valves either in the form of a rotating shutter formed in an enlarged inlet portion of the tube or in the form of a sleeve valve received over an aperture formed in the tube wall adjacent the inlet end connected to the manifold. Thus, both of the known techniques for providing a fuel/air mixture adjustment in a range top burner have required a separate moveable valve member for adjusting the fuel/air mixture and have thus inherently resulted in increased manufacturing costs, particularly in high volume production as is the case for household appliances in view of the cost of the additional part and the cost of assembly.

In the design and manufacture of household range top burners, it is necessary to make provision for use of the range with both natural gas or liquefied petroleum gas (LPG), each of which may require a different setting for the air inlet valve for fuel/air mixing in the burner supply tube in order to provide the most efficient combustion and proper flame characteristics at the burner flame generating ports. Thus, it is necessary to provide for the adjustment of the fuel/air mixture ratio in a range top burner.

It has therefore long been desired to provide a way or means of providing such air inlet adjustment for fuel/air mixing in a range top burner supply mixer tube and to provide such adjustment of the air inlet in a manner which is relatively easy to manufacture and adjust with a minimum cost.

SUMMARY OF THE INVENTION

The present invention provides a fuel/air mixture tube assembly for interconnecting a range top fuel gas burner to a fuel gas supply source such as a manifold. The invention provides for aspirating air into the fuel gas flowing from the manifold to the burner and provides for an adjustment of the amount of entrained air to provide the correct fuel/air mixture for the desired burner flame characteristics.

The present invention provides a fuel/air mixing assembly for a fuel gas burner in which the mixing tube assembly is preferably formed of two half shells each stamped from a sheet of relatively thin material which are subsequently joined together to form an air mixing tube having one inlet end adapted for connection to a fuel gas source such as a manifold and the opposite outlet end adapted for connection to the burner inlet. A flap or door is formed in a plenum at a location adjacent the inlet end for providing for intake of aspirated air. The flap or door may be deformed after assembly for adjusting the area of the air inlet. The present invention thus provides a unique and novel technique for manufacturing at minimum cost a fuel/air mixture tube assembly for a range top gas burner. In the preferred embodiment, a plurality of tube half shells are stamped in each of the pair of thin sheets of material such that upon joining the sheets, a plurality of burner tube assemblies are formed, although only a single mixer tube may be formed if desired.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of the burner mixture tube assembly of the present invention;

FIG. 2 is an enlarged view of the inlet end of the assembly of FIG. 1; and,

FIG. 3 is a portion of a sectional view taken along section indicating lines 3-3 of FIG. 1.

DETAILED DESCRIPTION

Referring to FIG. 1, the mixer tube assembly of the present invention is indicated generally at 10 and includes a first and second or upper and lower shells denoted by reference numerals 12, 14 which are preferably formed out of relatively thin sheet metal.

Referring to FIG. 1, the upper shell 12 preferably comprises generally a half-shell and has certain portions thereof formed, preferably by stamping, as recesses or cavities denoted by reference numerals, 16 for an inlet end portion, 18 for a nozzle portion and 20 for an outlet portion. In the presently preferred practice, the inlet portion is enlarged to form a plenum chamber; and, the nozzle portion 18 is a converging-diverging nozzle having a throat 22 with the diverging portion downstream of the throat formed integrally with the converging or tapered portion 20. The lower shell 14 has a correspondingly located recessed portion 24 disposed opposite inlet portion 16 which communicates with a throat portion 26 which communicates with the diverging nozzle portion 28.

Referring to FIG. 3, the diverging nozzle portion 28 communicates with an outlet portion 30 which communicates with the flanged aperture 32 formed in the upper half shell 12 over which is received an outlet tube or sleeve 34 which is secured thereon by any suitable expedient, as for example, swaging or expanding of the outlet flange 32 by inserting a tool in sleeve 34, or by welding.

Referring to FIG. 1, lower shell 14 has another input plenum portion 36 formed thereon corresponding to the

portion 16 which portion 36 also tapers to a throat 38 disposed opposite another throat 40 formed in the upper shell 12. Lower shell 14 has another diverging nozzle portion 42 formed therein corresponding to upper shell nozzle portion 18. The lower shell nozzle 42 communicates with another outlet portion 44 which corresponds to the outlet portion 30 and is disposed directly beneath the outlet portion 20. Outlet portion 44 in the lower shell 14 communicates with a second outlet flange 46 denoted in dashed outline in FIG. 1 formed in the upper shell. An outlet tube or sleeve 48 is received over flange 46 and secured thereon in a manner similar to the sleeve 34. Thus, the upper and lower shells 12, 14 cooperate to form a pair of burner tubes having inlets indicated generally at 50, 52 and outlets at sleeves 34, 48 over which may be assembled the inlets of individual burners (not shown).

It will be understood that the upper and lower shells 12, 14 may be joined by any suitable expedient as for example resistance welding or metal deformation.

Referring to FIG. 2, the inlet end 50 of one of the mixer tubes is shown in enlarged detail wherein the inlet plenum 16 of the upper shell has a flap or door 54 integrally formed therein, preferably upon stamping of the upper shell, and which door is deformable from the position shown in sold outline to the position shown in dashed outline. It will be understood that the flap 54 may be deformed by any suitable mechanical expedient as for example forming the door to the open position and thereafter adjusting the open position, as required for varying air flow, by means of a simple tool such as a screwdriver or pliers. In the presently preferred practice, a second flap or door 56 is also formed in the inlet portion 24 of the lower shell 14 and may be similarly adjusted in the manner described above with respect to flap 54.

Although the illustrated embodiment includes a pair of mixer tubes for two burners, it will be understood that the invention may be embodied in a single burner tube. It will be further understood that alternatively, particularly for a single tube, that the tube may be roll formed from a single sheet of material instead of joining half shells.

For example, where a single mixer tube is roll-formed, the plenum and flap or door could be stamped in a sheet of material and the tube subsequently roll formed and the margins welded.

The present invention thus provides a unique and novel way of forming an air fuel mixing tube for a gaseous fuel burner from sheet material and preferably from a pair of stamped shells and joining the shells together forming a mixer tube having an inlet and an outlet. The inlet portion of at least one of the shells has formed therein a flap or door which is mechanically deformable for varying the air inlet opening for air fuel mixing.

Although the present invention has been described hereinabove with respect to the illustrated embodiments, it will be understood that the invention is capable of modification and variation and is limited only by the scope of the following claims.

Claims

1. An adjustable aspirator assembly for a fuel gas burner comprising:

   (a) a first shell formed integrally from a relatively thin sheet of material having a certain portion thereof configured to provide generally one-half of a fuel/air charge tube and having an inlet end and an outlet end;
   (b) a second shell formed integrally from a relatively thin sheet of material having a certain portion thereof configured to provide generally one-half of a fuel/air charge tubing and having an inlet end and an outlet end with an integrally formed flap or door disposed adjacent the inlet end; and,
   (c) means operable to secure said first and second shells together such that said certain portions thereof form an air/fuel charge tube having the inlet end adapted for connection to a source of fuel gas and the outlet end adapted for connection to a fuel burner, wherein said flap or door is deformable for varying an air inlet opening in said tube.

2. The assembly defined in claim 1, wherein at least one of said first and second shells has a flange formed thereon on each of the opposite sides of said certain portion.

3. The assembly defined in claim 1, wherein said first shell includes a plurality of said certain portions; and said second shell includes a plurality of said certain portions corresponding to said certain portions of said first shell and cooperating to form a plurality of air/fuel charge tubes.

4. The assembly defined in claim 1, wherein said certain portion of at least one of said shells includes a tubular outlet portion formed integrally with said sheet and extending generally normal to said sheet.

5. The assembly defined in claim 1, wherein at least one of said first and second shells has said certain portion thereof configured to define a converging-diverging nozzle between the inlet and outlet end thereof.

6. The assembly defined in claim 1, wherein said first and second shells each have the said certain portion thereof cooperating to define a converging-diverging nozzle between the inlet end and outlet end of said tube.

7. The assembly defined in claim 1, wherein said second shell has an enlarged section of said certain

portion formed adjacent said inlet end with said flap or door formed in said enlarged section.

8. A method of making an aspirator tube for a fuel gas burner comprising:

(a) forming a first tubular shell with an inlet end and an outlet end from a sheet of relatively thin material;
(b) forming a second tubular shell with an inlet end and outlet end from a sheet of relatively thin material and forming a flap or door thereon near the inlet end;
(c) joining said first and second shells to form a tubular member and deforming said flap or door and varying an aspirator air opening.

9. The method defined in claim 8, wherein said step of joining includes welding.

10. The method defined in claim 8, wherein said step of forming said first shell and said step of forming said second shell include forming a flange on each opposite side of said shells.

11. The method defined in claim 8, wherein said step of forming said first shell includes forming a converging-diverging nozzle portion between said inlet end and said outlet end.

12. The method defined in claim 8, wherein said step of forming said first shell includes forming a half-shell.

13. A method of making an aspirator tube for a fuel gas burner comprising:

(a) forming from sheet material a tubular member having an inlet end adapted for connecting to a fuel gas source and an outlet end adapted for connection to a burner;
(b) forming a plenum adjacent the inlet end of said tubular member;
(c) forming integrally with said plenum a flap or door; and,
(d) deforming said flap or door and varying an air inlet opening.

14. The method defined in claim 1, wherein said step of forming said tubular member includes forming a converging-diverging nozzle between the inlet end and the outlet end.

15. A method of making an aspirator tube for a fuel gas burner comprising:

(a) forming a plenum having a flap or door therein in a sheet of material;
(b) roll-forming said sheet and forming an aspirator tube having the plenum adjacent one end and joining the margins of the tube; and,
(c) deforming said flap or door and varying an air inlet opening.

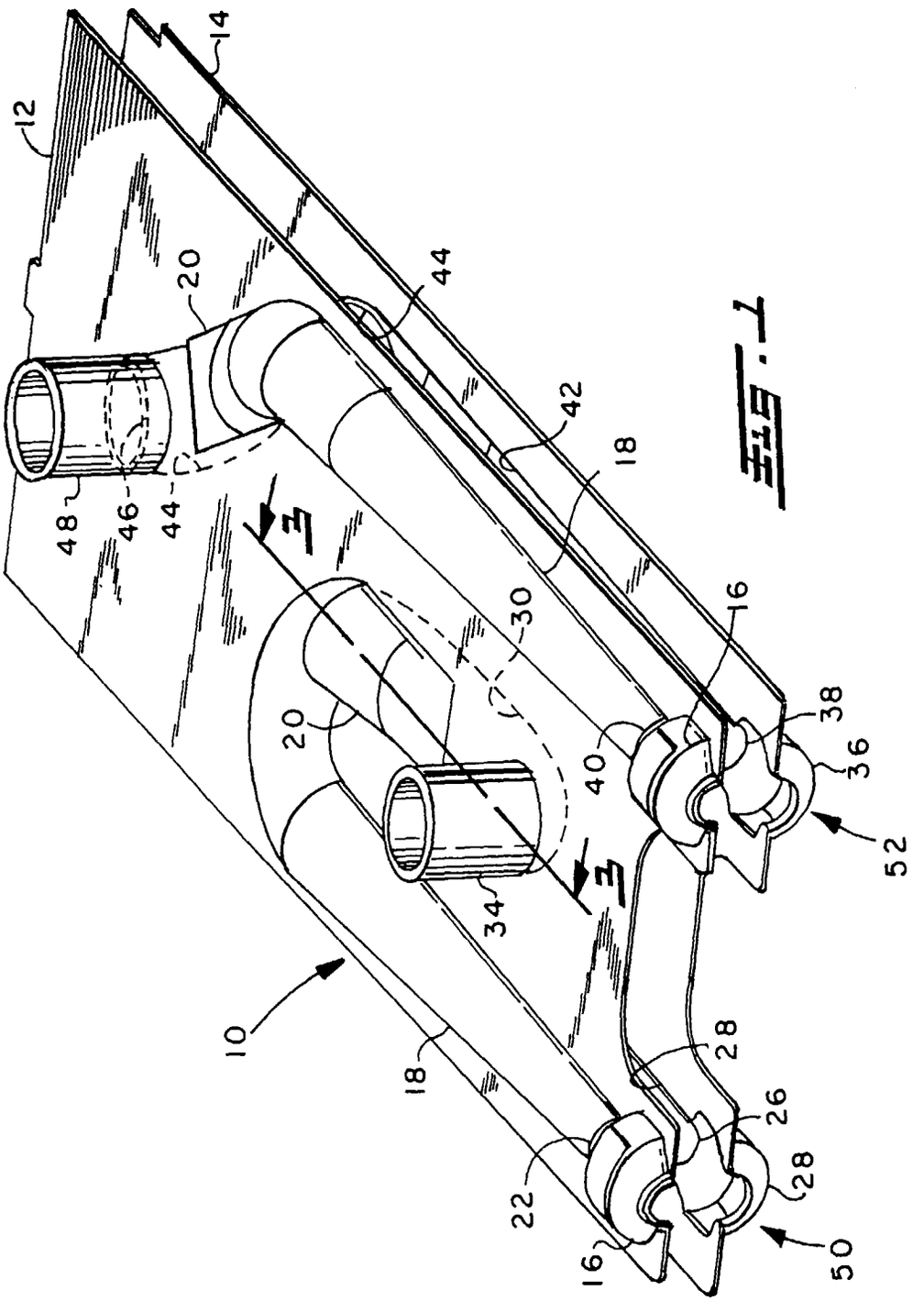
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FIG. 5

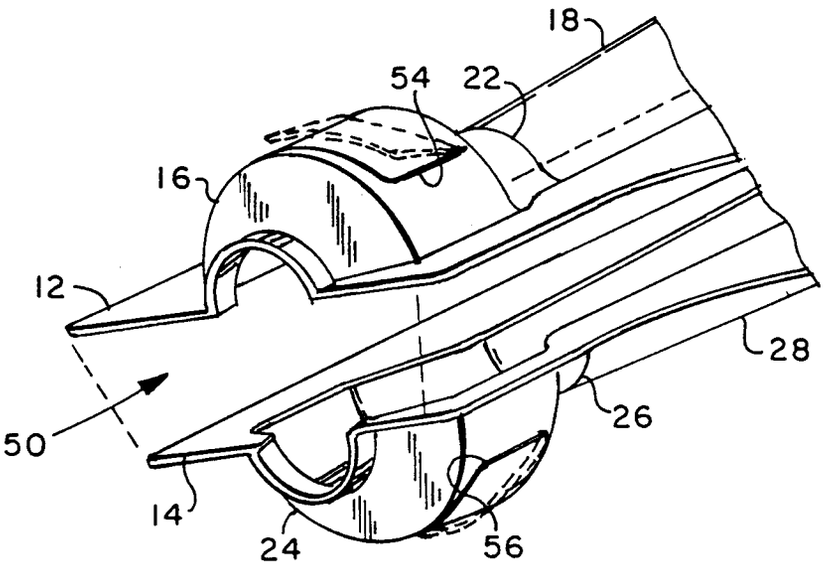

Fig. 2

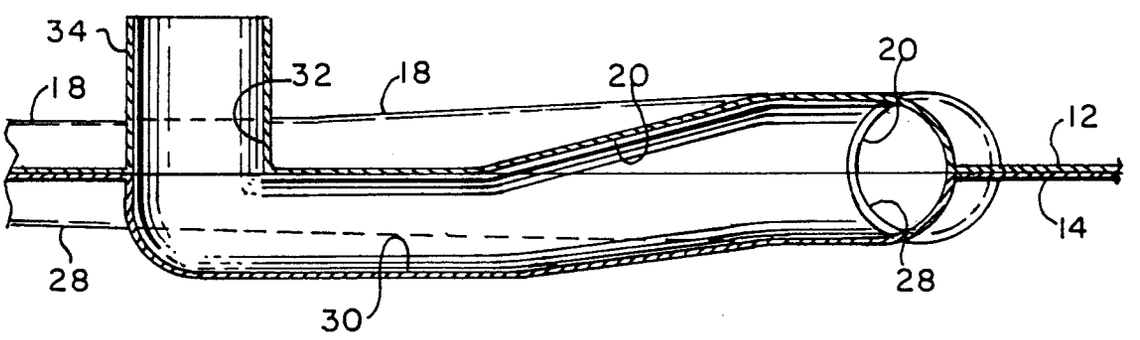

Fig. 3