Nov. 16, 1954 L. C. SASSMANHAUSEN 2,694,445

MIXING TUBE FOR GAS BURNERS

Filed June 8, 1949 2 Sheets-Sheet 1

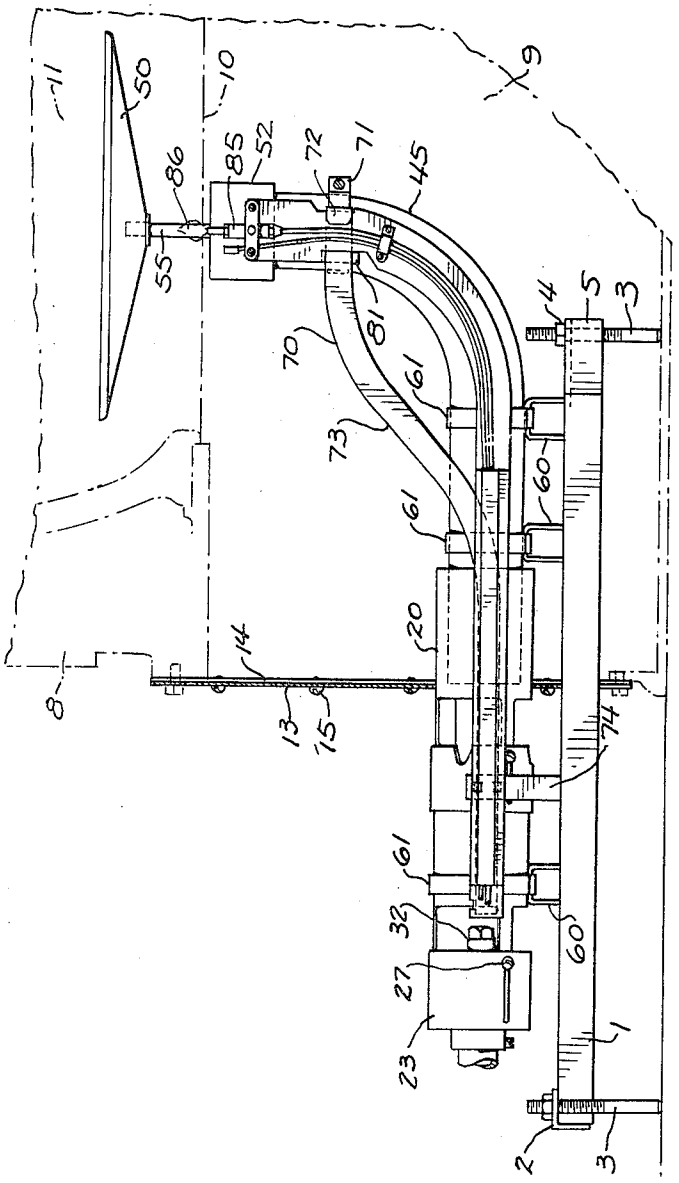


Fig. 1.

INVENTOR.
Lee C. Sassmanhausen
BY
Barnes, Kisselle, Laughlin & Raisch
Attorneys.

Nov. 16, 1954 L. C. SASSMANHAUSEN 2,694,445

MIXING TUBE FOR GAS BURNERS

Filed June 8, 1949 2 Sheets-Sheet 2

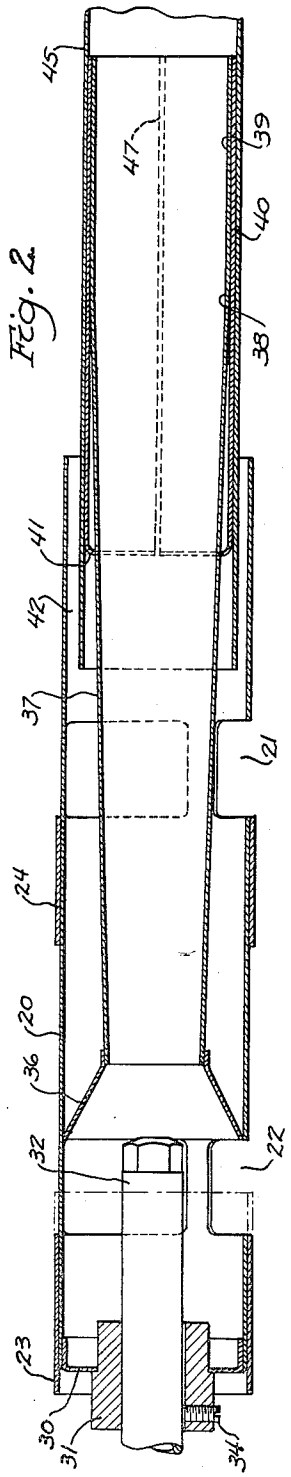


Fig. 2.

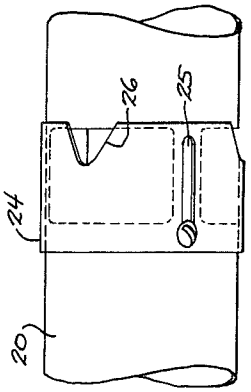


Fig. 4.

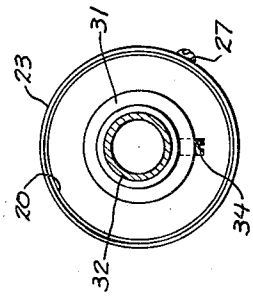


Fig. 3.

INVENTOR.
Lee C. Sassmanhausen
BY
Barnes, Kisselle, Laughlin & Raisch
Attorneys.

United States Patent Office

2,694,445

Patented Nov. 16, 1954

2,694,445

MIXING TUBE FOR GAS BURNERS

Lee C. Sassmanhausen, St. Clair Shores, Mich.

Application June 8, 1949, Serial No. 97,836

3 Claims. (Cl. 158—118)

This invention relates to a gas burner and it has to do particularly with a gas burner for space heating purposes.

The gas burner structure of the present invention is admirably adapted as a conversion burner in the sense that it may be installed in a furnace which, previous thereto, was arranged to consume a different type of fuel, such as coal or oil, or the burner of the present invention may be used as a replacement for another gas burner. On the other hand, the burner of the present invention, and particularly some of the features thereof, may be employed with original equipment.

The general objects of the invention are to provide a simplified light weight burner and burner structure which can be manufactured economically so that the retail cost thereof may be reflected in the price to the ultimate purchaser and user. Due to its light weight it may be easily and economically transported. In connection with the weight of the structure, it may be pointed out that heavy metal castings are very largely dispensed with and in place thereof parts are fabricated from sheet metal with some parts of tubular form.

A furnace structure made in accordance with the invention is shown in the accompanying drawings:

Fig. 1 is a side elevational view of a burner constructed in accordance with the invention showing the same mounted in a furnace with some of the furnace structure shown in broken lines.

Fig. 2 is an enlarged cross sectional view showing the structure of the mixing tube and the air control openings.

Fig. 3 is an end view showing the gas conduit in section.

Fig. 4 is a side elevational view showing an air control sleeve.

The support for the burner advantageously comprises a member **1**, and a cross piece **2**, provided with floor engaging screw threaded studs **3** which are threaded into the cross support and the inner end **5** of the member **1** and which may be locked in position by nuts **4**.

As shown in Fig. 1, a portion of a furnace is illustrated at **8** and the support is disposed to lie partially within an area **9** within the furnace. This is the lower part of the furnace and if the furnace previously used coal, the area **9** could have been the ash pit. The former grate level of the furnace is indicated at about the broken line **10** while the combustion chamber is illustrated at **11**. The compartment **9** is to be closed and this may be done by two sheet metal members **13** and **14** secured together in their central portion by screws **15**.

The mixing tube and air control portions of the burner are shown in detail in Fig. 2. There is an outer tube **20** of sheet metal provided with a set of apertures **21** which are circumferentially spaced and a set of apertures **22**. Slidably mounted on the tube **20** is a sleeve **23** for controlling the apertures **22** which serve as inlets for primary air, and a sleeve **24** which controls the apertures **21** for secondary air. The sleeve **24** is mounted on the tube **20**, as shown in Fig. 4, as by means of a set screw positioned in an elongated slot **25**. It will be readily appreciated how, by loosening the screw, the sleeve **24** may be axially adjusted and then held in position by tightening the screw. The sleeve has a scalloped or notched edge, the notches being shown at **26** to better obtain a fine adjustment of the throttling of the apertures **21**. In this way, instead of providing a small crack for a small opening, separate

openings at the notches **26** are provided which have sufficient cross sectional areas for the passage of air therethrough with a minimum of tendency to collect or trap lint or dust. The sleeve **23** is similarly adjusted and set by a screw **27**.

There is a closure for one end of the tube **20** in the form of a sheet metal cup or disc **30** and a hub or bushing **31** receives the jet or orifice member of the gas supply pipe. This gas jet member is shown at **32** and it may be held in position by a set screw **34**.

The venturi or mixing tube comprises a partially cone shaped or funnel shaped element **36**, the outer peripheral edge of which may be welded to the inside of the tube **20** and this is connected, as by means of welding, to a tapered mixing tube **37**. The mixing tube **37** is of tapering form from its end which connects to the inlet element **36**, to about the point **38**, and from the point **38** to its opposite end the portion, as shown at **39**, is preferably cylindrical. Positioned over the portion **39**, and a part of the portion **37**, is a tubular element **40**, which preferably has some considerable axial extent and which has its inner end turned inwardly, as at **41**, and secured to the mixing tube **37**. The parts just described are all of sheet metal structure and indeed some of them may be made from steel tube. For instance, the element **20** may be fashioned from steel tube; the mixing tube **37** may be fashioned from steel tube swedged into its tapered form and the element **40** may be of steel tube.

The element **40** is designed to telescopingly receive the main burner tube **45**. The fact that the member **40** has considerable axial extent provides for a good strong engagement and it might be pointed out that the element **40** is provided with a longitudinal split where its edges are spaced apart as shown at **47** so that the element **40** may be slightly contracted by the burner tube **45** to provide a tight engagement. The burner tube **45** is somewhat of L shape so that its free end extends upwardly, as shown in Fig. 1. The burner tube supports a baffle or deflector **50** preferably in the form of a pan shaped stamping of heat resisting metal, such as one of the stainless steels. A post or rod **55** supports the deflector and the post is secured to the burner tube by means of a member **52**.

The described mixer tube, venturi and burner tube assembly is mounted on the support for which purpose the body member of the support is provided with a number of U shaped brackets each shown at **60**, and a series of clamps **61** (Fig. 1) are engaged around the exterior tubular form and are passed through the U shaped brackets and tightened each by a screw (not shown). The two clamps **61** disposed within the furnace chamber **9** engage the tube **45** while the exterior clamp **61** engages the outer tube **20** and is of slightly larger size. The structure is disposed as shown in Fig. 1, with the tube **20** and the frame member **1** passing through the enclosing plates **13** and **14** with the parts so positioned that the secondary air apertures **21** are disposed just outside the closure plates **13** and **14**.

The operation is as follows: The fuel gas, of course, is projected in the form of a jet from the jet **32** into the venturi constituted by elements **36** and **37**. The venturi action causes a draft of air to enter the primary air ports **22** which, as above explained, can be regulated by the sleeve **23**, so that the proper combustible mixture of gas and air is obtained in the venturi. This mixture passes into the tube **45** and upwardly where the flame burns at the upper and outlet end of the pipe **45**. The flame thus burning upwardly strikes the diverter or baffle **50** and is spread outwardly in all directions in the fire box or fire chamber **11**. Of course, suitable controls may be used for automatically governing the inlet of the gas but the controls constitute a separate art. Secondary air is supplied to the flame through the control ports **21** located just outside the plates **13** and **14** and regulated by the sleeve **24**. This secondary air flows through the circumferential space **42** between the outer tubular member **20** and/or the tube **45** and tube **39**, depending upon the adjustment of the tube **45**. It will be appreciated that this telescoping adjustment is capable of accommodating furnaces of different sizes and,

while in Figs. 1 and 2, the tube **45** is telescoped well over the member **40**, it may, in some instances, be shifted to the right, as Fig. 7 is viewed. The secondary air passes into the furnace chamber **9** and then upwardly by the convection currents.

The pilot burner and its support are carried by a bar or strip of metal, as at **70**, with its inner end mounted on the tube **45** as by means of a clamp **71** and the extreme inner end is folded back upon itself to provide a hook **72**. The intermediate portion of this bar is inclined as at **73** and the portion of the track which extends out through the plates **13** and **14** is preferably horizontally disposed and is supported by a bracket **74** carried by the support member **1**.

The support has a part **81** for engaging the track **70**, that is notched to engage the hook **72**. The pilot burner is shown at **85** and from the burner a pilot flame as at **86** burns.

I claim:

1. A gas burner structure substantially as described comprising, an outer sheet metal tubular member, means for discharging a jet of gas into the said tubular member, a mixing tube of sheet metal within the outer tubular member having a flared inlet positioned to receive a jet of gas and a tubular body portion spaced from the inner wall surfaces of the outer tubular member, the outer tubular member having one or more openings therein adjacent the inlet end of the mixing tube for the passage of primary air into the mixing tube, the outer tubular member having other openings positioned downstream from the inlet end of the mixing tube for the passage of secondary air therethrough and through the space between the outer tubular member and the mixing tube, a split metal sleeve of spring characteristic mounted on the inner end of the mixing tube and a burner tube arranged to frictionally telescope in slidably adjustable manner over said split sleeve.

2. A gas burner structure comprising, an outer tubular member of sheet metal construction and substantially of uniform diameter from end to end, a mixing tube of sheet metal construction, tapered toward its inlet end and disposed within the outer tubular member with a space between the outer tubular member and the mixing tube, the mixing tube having a flared inlet the extreme end of which fits against the inner surfaces of the outer tubular member, the outer tubular member extending beyond the inlet end of the mixing tube, gas supply means for projecting a stream of gas into the tapered inlet of the mixing tube, the outer tubular member having openings in its wall upstream from the inlet end of the mixing tube for the entrance of primary air therethrough and into the inlet end of the mixing tube, the outer tube having apertures therein downstream from the inlet end of the mixing tube for the entrance of secondary air therethrough and into the space between the outer tubular member and the mixing tube, means on the outer tube for regulating the said openings therein

for controlling both the entrance of primary air and secondary air, a split sleeve having yielding characteristics mounted on the mixing tube adjacent its downstream end, and a burner tube adapted to be slidably fitted over said split sleeve for relative axial adjustment and to project into the outer tubular member with clearance between the burner tube and the outer tubular member for the passage of the secondary air therethrough, the outer tubular member adapted to be passed through a wall of a furnace or the like with the openings therein disposed outside of said wall, the burner tube and the mixing tube being axially adjustable whereby to adjust the structure to the size and dimensions of the furnace.

3. A gas burning structure for use with a furnace which has a wall, comprising an outer tubular member adapted to pass through the wall, a mixing tube within the outer tubular member having a flared inlet, a device for projecting gas into said inlet, the outer tubular member extending outwardly beyond the flared inlet and having openings in its walls positioned adjacent its outer end and outwardly beyond the flared inlet to permit the passage of primary air into the mixing tube, the mixing tube being spaced from the interior surfaces of the outer tubular member, the outer tubular member having openings positioned downstream from the flared inlet for the passage of secondary air therethrough and into the space between the outer tubular member and the mixing tube, characterized by; the said openings for admitting primary air and the said openings for admitting secondary air being adapted to be positioned outside of the furnace wall, adjustable means being provided for regulating the size of the said openings, said means being adapted for disposition outside of the furnace wall, and a burner tube connected to the mixing tube for the discharge of combustible gaseous mixture to support a flame, said burner tube being adapted for dispostion within the burner wall and being adjustably connected to the mixing tube.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
391,537	Kloeb	Oct. 23, 1888
1,165,835	Birkholz	Dec. 28, 1915
1,350,226	Igou	May 18, 1920
1,572,833	Baker	Feb. 9, 1926
1,731,306	Hileman	Oct. 15, 1929
1,994,547	Urquhart	Mar. 19, 1935
2,178,703	Robbins	Nov. 7, 1939
2,241,583	Campbell	May 13, 1941
2,260,167	Cope	Oct. 21, 1941
2,461,913	Mosier	Feb. 15, 1949

FOREIGN PATENTS

Number	Country	Date
43,019	France	Nov. 7, 1933