Nov. 20, 1945. R. L. MILLER 2,389,270

GAS BURNER

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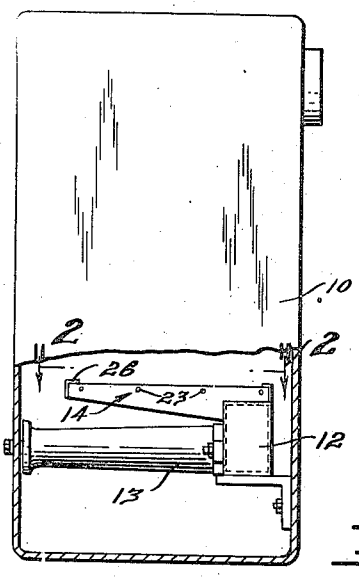


Fig. 1.

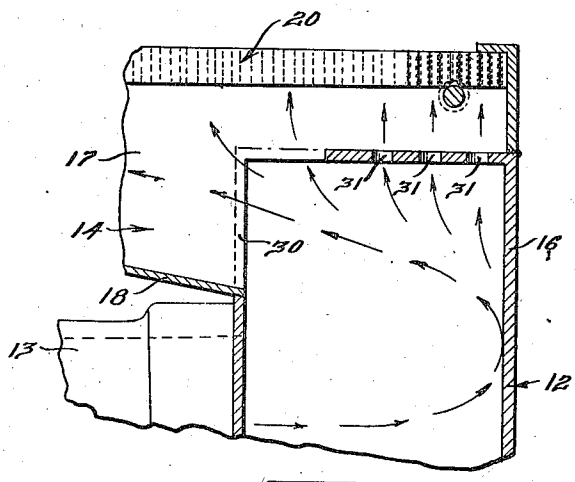


Fig. 3.

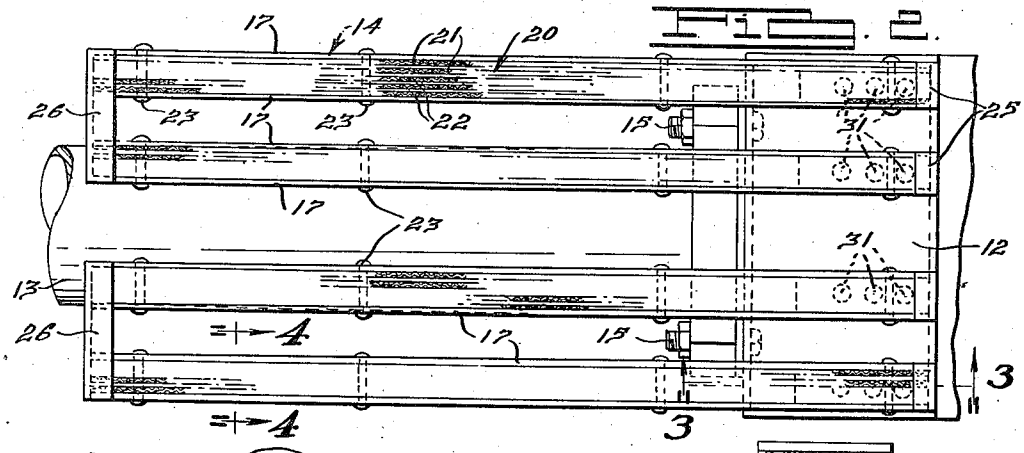


Fig. 2.

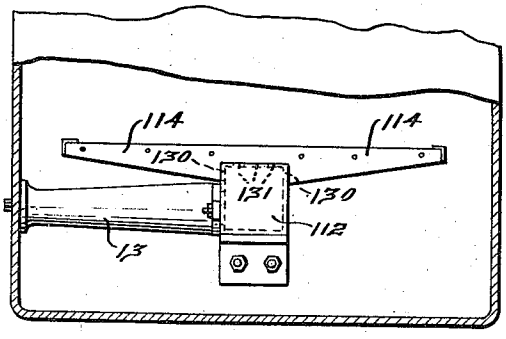


Fig. 5.

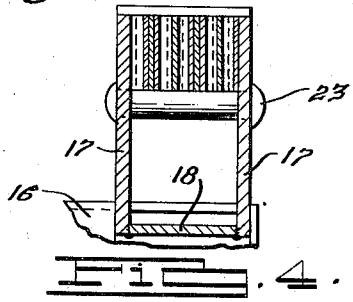


Fig. 4.

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GAS BURNER

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5 Claims. (Cl. 158—104)

My present invention relates to gas burners for heating appliances.

The principal object of my present invention is to provide a lightweight, readily fabricated gas burner of efficient operating characteristics. The purpose of the present invention is to provide a gas burner of the ribbon burner type made of sheet metal, rather than of cast iron as has been the custom in the past, thus saving critical materials and reducing manufacturing cost and shipping weight. The principal obstacle to be overcome in a construction of the type involved was that of obtaining uniform distribution of the gas to all burner ports. Another problem was to provide a construction which is not subject to excessive warping under fire and which would have sufficient expansion and contraction freedom so as not to fracture at joints or corners.

The objects and advantages of the present invention will be more readily understood from a study of the following specification and drawing wherein like numerals refer to like parts throughout.

In the drawing:

Fig. 1 discloses a heating appliance with a burner of the present invention incorporated therein;

Fig. 2 is a plan view of the burner of the present invention taken substantially along line 2—2 of Fig. 1;

Fig. 3 is a vertical section taken substantially along line 3—3 of Fig. 2;

Fig. 4 is a vertical section taken substantially along line 4—4 of Fig. 2; and

Fig. 5 is a view similar to Fig. 1 of a modified form of the invention.

The present invention is designed to be employed in gas burning appliances such as the furnace body 10. The burner comprises a plenum chamber 12 adapted to be attached to the end of a Venturi inspirator tube 13 and to support a plurality of parallel distributing troughs 14. The plenum chamber 12 may be fabricated from sheet metal plates since it is entirely rectilinear in configuration. The plenum chamber is adapted to be fastened to the end of the inspirator tube by means of bolts 15, and comprises an upwardly projecting portion 16 extending above the top of the inspirator tube 13 upon which are supported the plurality of distributing troughs 14. The mixture of gas and primary air admitted through the inspirator tube 13 strikes the back wall of the plenum chamber opposite the end of the tube 13 and is diverted upwardly into the projecting portion 16, the size of the chamber 12 being sufficient more or less to reduce turbulence to a minimum and distribute the gas evenly to the various distributing troughs.

Each of the distributing troughs 14 is made up of flat sheets comprising parallel flat side sheets 17 welded to a sloping bottom sheet 18. The upper edges of the plates 17 lie in a substantially horizontal plane parallel to the longitudinal axis of the inspirator tube and are substantially parallel to each other so as to provide parallel openings lying in the same plane. Each trough holds a pack 20 of alternate corrugated ribbons 21 and plain ribbons 22 forming therebetween a plurality of small orifices through which the gas escapes into the burner chamber. The open mouths of the troughs are adapted to be held together by a plurality of rivets 23, the bodies of which form bridges adapted to support the packs of burner ribbons. The ribbon material preferably has the same coefficient of expansion as the side plates 17 so as to expand uniformly therewith, or may be slightly shorter than the troughs so that some difference in expansion may be accommodated. A plurality of end clips 25 and 26 form the ends of the troughs and have horizontal portions projecting over the ends of the ribbon packs so as to retain the packs within the troughs.

In order to prevent undue expansion difference between the various troughs it is preferred that the ends of the troughs 14 be capable of expanding relative to each other, and yet for rigidity it is preferred that the end of each trough be anchored to at least one other trough. Accordingly, the end clips 26 extend across the spaces between pairs of the distributing troughs as illustrated in Fig. 2. Thus, unequalities in expansion of one trough with respect to another may be taken care of by canting of the end clip 26, but differences in expansion will not be multiplied or exerted against each other as would be the case if all the troughs were connected by one clip.

In order to achieve uniform distribution to each of the distributor troughs the upwardly projecting portion 16 of the plenum chamber is provided with a plurality of slots 30 extending through the upper portion of the side wall of the plenum chamber to which the inspirator tube is attached and into the adjacent portion of the upper wall of the plenum chamber, the volumetric center of the opening thus formed being substantially directed along the major axis of the distributing trough which axis substantially bisects the angle between the bottom wall 18 and the ribbon pack 20. The center of volume of the gas stream flowing through the opening 30 is preferably lo-

cated along a smooth flow path of the gas emerging from the inspirator tube 13 and rebounding from the rear wall of the plenum chamber 12 so as to reduce internal turbulence to a minimum and have even distribution of the gas, as indicated by the arrows in Fig. 3. Thus the portions of the burner lying toward the front of the appliance in the direction from which the gas enters the inspirator tube are assured of a steady flow of gas. The ribbon packs overlie the top wall of the plenum chamber so as to provide a burner of maximum length in a chamber of minimum size, and accordingly a plurality of perforations 31 are provided in the top wall of the plenum chamber through which gas may be directed toward the portion of the ribbon pack overlying the plenum chamber. The sizes of the perforations 31 are so selected with respect to the slots 30 as to direct the major portion of the gas stream longitudinally of the distributing trough 14.

Where, as in Fig. 5, a larger size burner is desired, the same may be provided by extending the distributor trough from both sides of the plenum chamber, the upwardly projecting portion of the plenum chamber being provided with slots 130 similar to slots 30, each directing gas into an arm of the trough 114, which is similar to the trough 14 in every other respect. The central portion of the trough overlying the plenum chamber 112 is provided with gas by a plurality of perforations 131 similar to the perforations 31.

Where, as in Fig. 5, the distributing troughs extend in both directions, uniform flow may be achieved by making the plenum chamber 112 large enough to reduce the velocity pressure of the gas in the inspirator tube 13 almost entirely to static pressure which causes escape of gas along smooth flow paths upwardly through the perforations of the plenum chamber, thus eliminating turbulence differences as much as possible.

Modifications in detail and arrangement of the present invention should be apparent to those skilled in the art. All such as come within the scope of the following claims are considered a part of my invention.

I claim:

1. A gas burner comprising an inspirator tube having its axis lying in a horizontal plane, a rectilinear plenum chamber having opposite side walls disposed in right angular relation to the longitudinal axis of said tube, one of said side walls being attached to the egress end of said inspirator tube, said chamber having a portion thereof projecting above the top of said inspirator tube, and a plurality of parallel gas distributing troughs attached to the upwardly projecting portion of said plenum chamber and having their upper edges lying in a horizontal plane parallel to and above the axis of said inspirator tube, each of said troughs having a first portion thereof overlying said chamber and a second portion thereof extending laterally from said one side wall of said chamber, said plenum chamber having slots in said one side wall and adjacent portion of the top wall thereof above said inspirator tube in communication with said first and second trough portions.

2. A gas burner comprising an inspirator tube having its axis lying in a horizontal plane, a rectilinear plenum chamber having longitudinal side walls disposed transverse to the longitudinal axis of said tube, one of said side walls being attached to the egress end of said inspirator tube, said chamber having a portion thereof projecting above the top of said inspirator tube, and a plurality of parallel gas distributing troughs attached to the upwardly projecting portion of said plenum chamber each of said troughs having a first portion thereof extending laterally from said one side wall and a second portion overlying said chamber, said plenum chamber having slots in said one wall and adjacent portion of the top wall thereof above said inspirator tube providing communication directly between the first and second portions of said troughs and said chamber, and a plurality of perforations in the top wall of said chamber remote from the end of said inspirator tube in communication with the second portion of said troughs.

3. A gas burner comprising a horizontally positioned inspirator tube, a rectilinear plenum chamber attached to the egress end of the inspirator tube and having portions lying above and transversely to each side of said tube, a plurality of parallel gas distributing tubes having rear portions overlying the upper portion of the plenum chamber and projecting forwardly thereof in a plane parallel to the axis of said inspirator tube, said gas distributing tubes being connected to the plenum chamber at the transverse side portions thereof and intermediate said portions, spaced slots formed in the plenum chamber in the upper portion thereof to provide communication between the chamber and each of said gas distributing tubes, the volumetric centers of said slots being directed substantially along the longitudinal axes of said gas distributing tubes, and openings formed in the upper portions of the gas distributing tubes for the escape of the gases flowing therethrough.

4. A gas burner comprising a horizontally positioned inspirator tube, a plurality of gas distributing tubes positioned in spaced parallel relation in a plane parallel to and overlying the longitudinal axis of the inspirator tube, said gas distributing tubes having perforated top walls for the escape of gases to a flame region and sloping bottom walls tapering from the outer ends of said tubes to the rear thereof adjacent the egress end of the inspirator tube, and a plenum chamber interconnecting the egress end of the inspirator tubes and the rear ends of the gas distributing tubes, said plenum chamber having an upper portion disposed between the egress end of the inspirator tube and the rear ends of the gas distributing tubes, and slots formed in said upper portion, said slots having volumetric centers lying substantially in an axis bisecting the angle between the top and bottom walls of each of said gas distributing tubes.

5. A gas burner comprising a horizontally positioned inspirator tube having an egress end, a plenum chamber connected to said egress end and having an upper portion lying thereabove, a plurality of spaced gas distributing tubes extending outwardly from the upper portion of the plenum chamber, said gas distributing tubes having top perforated surfaces lying in a plane parallel to the longitudinal axes of the inspirator tube, said plenum chamber being formed with slots in its upper portion to direct gases from the inspirator tube into and along the distributing tubes, said slots having volumetric centers lying substantially in the longitudinal center lines of said gas distributing tubes, and clip members connected across the outer free ends of pairs of adjacent gas distributing tubes.

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