Nov. 4, 1930. J. L. MANDEVILLE 1,780,596

BURNER

Filed Oct. 23, 1925 2 Sheets-Sheet 1

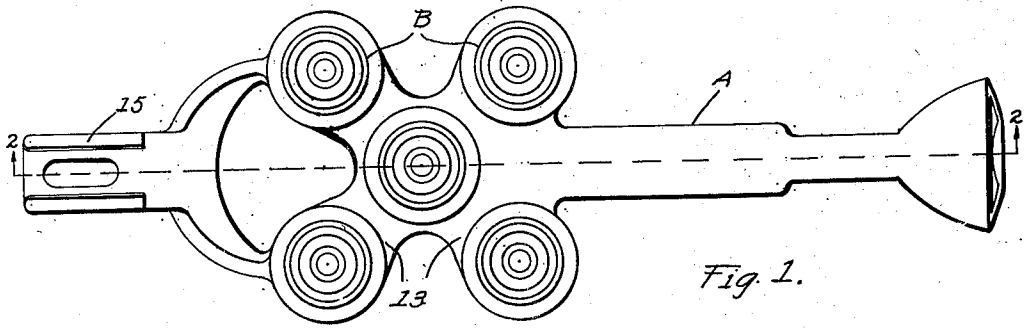


Fig. 1.

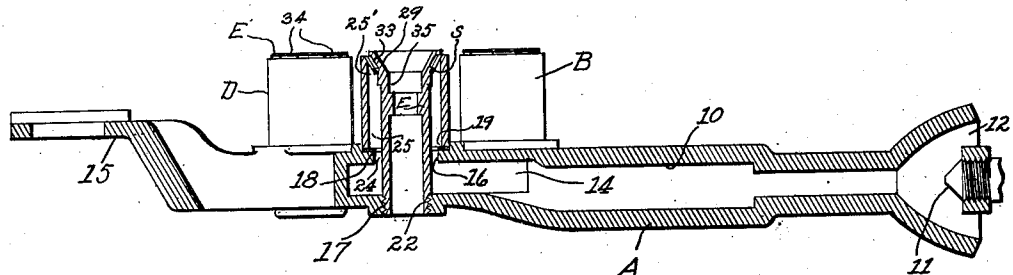


Fig. 2.

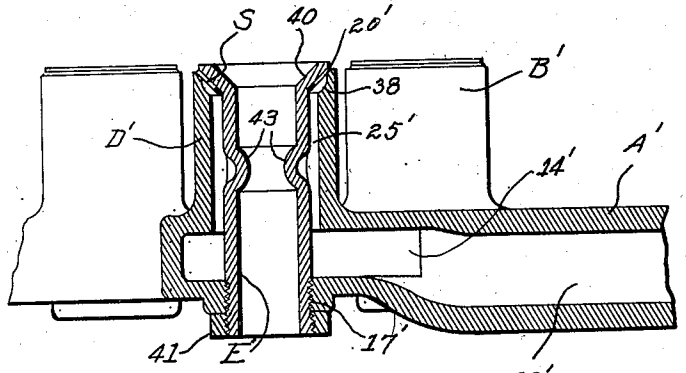


Fig. 7.

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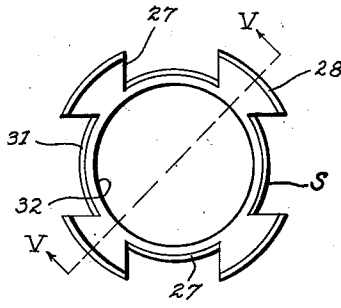


Fig. 4.

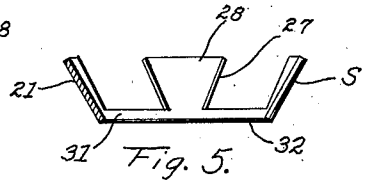


Fig. 5.

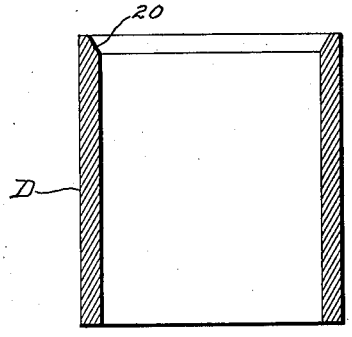


Fig. 3.

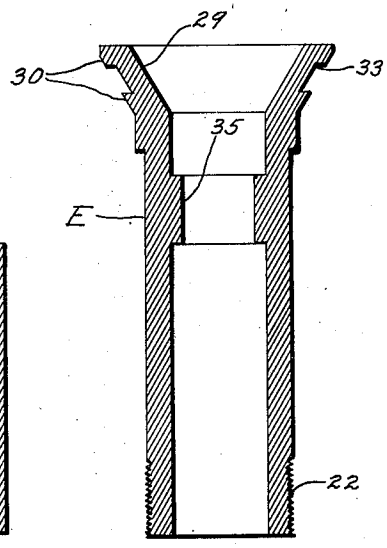


Fig. 6.

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UNITED STATES PATENT OFFICE

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BURNER

Application filed October 23, 1925. Serial No. 64,416.

This invention relates to stoves, hot plates, ovens, and the like, and more particularly to an improved burner therefor especially adapted to utilize acetylene as a heating gas.

The principal object of this invention is to improve the construction of the burner disclosed in Shaw Patent No. 991,759 in which an annular gas current is divided into a number of narrow elongated jets curved about a common center to prevent the objectionable singing or whistling noise produced by prior burners. The burner of the aforesaid patent comprises two concentric tubes, one of which has circumferentially extending integral projections at its upper edge, spacing the latter from the other tube and leaving a number of narrow elongated outlet orifices between the tubes at their upper ends. In manufacturing these burners, it is difficult to make the projections on the one tube always of even width, and to make the two tubes exactly cylindrical so that, when assembled, they will engage at all points and provide the desired uniform flame. The flame characteristics, such as its heating quality and color, become unsatisfactory when the parts at the orifice fit improperly, probably partly becouse the edges of the tubes get so hot that sufficient heat is conducted down the tubes to a zone where the acetylene gas is polymerized and a heating gas of a different composition is produced.

According to the present invention, uniform outlet orifices and flame characteristics are obtained by disposing a separately-formed recessed or scalloped sheet metal spacer between the upper ends of the inner and outer burner tubes or walls. The lower end of the inner tube may also be threaded or otherwise provided with means whereby it may clamp the spacer, or the spacer as well as the inner tube, in place.

The objects and novel features of the invention will be apparent from the following description, taken with the accompanying drawing, in which:

Fig. 1 is a plan view of a burner assembly, embodying this invention;

Fig. 2 is a central longitudinal sectional view of the same, taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view of the outer burner tube;

Figs. 4 and 5 are plan and sectional views of the sheet metal spacer;

Fig. 6 is a sectional view of the inner burner tube; and

Fig. 7 is a partial sectional view of another burner assembly embodying this invention.

Referring to the drawings, the improved burner is shown applied to the heating element of a gas stove but may of course be embodied in other gas heated devices, such as hot plates, ovens, and the like, and may be mounted singly or in groups of various numbers and arranged in various ways for the particular service for which they may be intended. While the improved burner as shown is primarily designed to utilize acetylene as the fuel gas, it will be understood that the invention may be adapted for use with various other fuel gases.

The heating unit shown, for the purpose of illustrating this invention, comprises a base casting A having an inlet passage 10 in which acetylene from a suitable valve 11 and air from the inlet ports 12 are mixed and supplied to the several burners B. In the particular heater shown, there are five burners, one arranged centrally of the others, which latter are individually mounted at the ends of radial arms 13 having passages 14 communicating with the main mixing passage 10. The casting A may also have a lug 15 or other means whereby it may be secured to the frame of a stove or other appliance upon which the heater is mounted. The several burners are identical in construction, so only one of them will be described in detail.

At the points where the burners are mounted, the base casting as well as each of the arms 13, has coaxial openings 16 and 17 in its top and bottom walls, respectively. The top opening 16 is desirably of somewhat larger diameter than the opening 17, and has a ledge or shoulder 18 extending along its upper edge to fit and support the lower edge of the outer burner tube D, an asbestos gasket 19 being desirably inserted at that point to more effectively prevent gas leakage.

The outer tube D may be a substantially

cylindrical metal shell and has an inwardly inclined circumferential surface or seat 20 at the inner edge of its upper end, which provides a bearing for the inclined annular wall 21 of the sheet metal spacer S. The wall 21 of the spacer S is clamped against the face 20 by the inner burner tube E which may be a casting or of sheet metal and has external threads 22 at its lower end to fit into the internally threaded opening 17, or to project through the latter and receive a threaded nut which bears against the bottom of the casting to hold the inner tube and associated parts in place. A suitable gas passage 24 is left between the tube E and the edge of the opening 16, as by making this tube of smaller external diameter than the diameter of the opening 16. The passage 24 admits the acetylene-air mixture from the mixing passage to the passage or chamber 25 between the spaced tubular walls D and E.

The spacer S may be stamped from a disk of sheet steel of a thickness that is determined by the width of the outlet orifices desired, so that it becomes a very simple matter to make the dimensions of these orifices accurately. The disklike spacer is provided with rather deep radial recesses 27, four in the present instance, cut a predetermined width and depth at equal intervals into the edge of the inclined wall of the spacer, thus leaving four tongues 28 which separate the recesses from one another. The upper end of the tube E is flared outwardly, as at 29, to provide a circumferential seat 30 on its outer surface that is inclined outwardly the same degree as the seat 20 and disposed opposite the latter to cooperate therewith in clamping the spacer S. The seat 30 is of about the same width as the inclined wall of the spacer whereas the seat 20 is much narrower. The spacer is in the form of a collar, having a bottom portion 31 provided with a central aperture 32 of about the same size as the tube E just below the seat 30, to hold and center said spacer on said tube. The spacer may thus be initially assembled on the tube E by inserting the smaller end of the latter through the aperture 32 and sliding the spacer along the tube until it rests on the seat 30. The seat 30 may have a circumferential groove 33 to permit proper access and uniform distribution of the gas mixture to the outlet orifices 34 which are formed by the spacer recesses 27 and the seats 20 and 30 when the tube E and spacer S are assembled in the tube D. The tubes and the spacer between them are securely connected to the base A by the threads 22 of the tube E which engage the threaded opening 17. The tube E may be screwed into place by a suitable wrench or other tool inserted in an angular portion 35 within said tube.

The tube E projects slightly above the tube D, and its outwardly flaring part 29 contracts the chamber 25 just within the orifices to produce an annular nozzle, as at 25′, whereby the gas mixture is delivered at higher velocity to the inner ends of the recesses 27 and issues in four distinct jets from the orifices at the outer ends of these recesses. These gas jets discharge upwardly and outwardly to provide a flame of inverted frustro-conical shape and increased heating area. The devision of the issuing gas mixture into a plurality of jets affords a noiseless operation of the burner, and the use of the separately-formed spacer affords a convenient means for providing and maintaining outlet orifices of the exact size desired for a particular service. Moreover, the burner parts may be easily cleaned by uncoupling the inner tube E; and the spacer S, which is the only part likely to deteriorate in service, may likewise be replaced readily. The outer tubes of the burners are exposed on all sides to the atmosphere and the hollow inner tubes permit circulation of air upwardly therethrough, with the result that the tubes are kept cool to prevent polymerization of the acetylene and air is freely supplied to the gas mixture issuing from the outlet orifices to produce perfect combustion. The orifices are so uniform in size that backfiring is eliminated.

The construction of the burner may be varied without departing from the principles of the invention or sacrificing its advantages. The walls D and E and the radially recessed spacer S clamped between them may be of various shapes and proportions. Fig. 7, for example, illustrates another embodiment of the invention in which the outer burner tube D′ is cast integral with the base casting A′, which latter may be otherwise the same as the base casting A of Fig. 1. The tube D′ has an inclined inner seat 20′ at its upper end to support the spacer S which is in all respects similar to the spacer shown in Figs. 4 and 5. The tube D′ also has an annular groove 38 therein just below the seat 20′ and opposite the lower portions of the recesses 27 of the spacer, to direct the mixture to the recesses and uniformly distribute such mixture, as the groove 33 does. The spacer S is held on its seat 20′ by the seat on the lower side of the outwardly flared end 40 of the inner tube E′ which is secured in the opening 17′, as in Fig. 2 or by a nut 41 that fits the projecting threaded lower end of the tube E′ and bears against the bottom of the base A′, a suitable gasket 42 being inserted to prevent leakage of gas. The burner tube E′ is desirably formed from seamless steel tubing and has suitable indentations 43 to provide a grip for a tool, such as a wrench, whereby the tube may be coupled and uncoupled to the base A′ to clamp or unclamp the spacer S. Otherwise, the construction and operation of the heating unit are similar to the one shown in Figs. 1 to 6 inclusive.

I claim:

1. A burner comprising coaxial cylindrical members spaced apart to provide a gas passage therebetween and having opposed tapered seats adjacent the outlet end of said passage, one of said seats having an annular groove coaxial with said cylindrical members; and a separately formed spacer clamped between said seats having spaced recessed portions cooperating with said seats to provide outlet orifices for said passage.

2. A burner comprising tubular walls spaced apart to provide a gas passage therebetween and having opposed inclined circumferential seats adjacent the outlet end of said passage, one of said seats having an annular groove coaxial with said tubular walls, and a spacer disk clamped between said seats and having spaced recesses extending inwardly from its edge cooperating with said seats to provide spaced inclined outlet orifices for said passage.

3. A burner comprising coaxial tubular walls spaced apart to provide a gas passage therebetween; and a spacer having a part fitting one of said walls to center said spacer on said wall on which said spacer fits, and another recessed part disposed between and having contact with said walls to provide separate outlet orifices for said passage.

4. A burner comprising tubular walls spaced apart to provide a gas passage therebetween, one of said walls having an inclined part contracting said passage adjacent its outlet end and a seat on said inclined part, the other wall having an inclined seat opposite the aforesaid seat; and a spacer having a part centering it on one of said walls and a radially recessed part clamped between said seats and cooperating therewith to provide spaced inclined outlet orifices for said passage.

5. A burner comprising inner and outer coaxial tubular walls spaced apart to provide a gas passage therebetween; and a spacer disk apertured to fit and center itself on said inner wall, said spacer also having a part clamped between said walls and recessed to provide outlet orifices for said passage.

6. A burner comprising the combination of a base having a gas supply passage and alined openings; a removable outer wall registering with one of said openings; an inner wall spaced from said outer wall to provide a gas chamber that communicates with said supply passage, said inner wall having a portion registering with the other opening; a removable spacer disposed between said walls adjacent the outlet end of said chamber and cooperating with said walls to provide outlet orifices for said chamber; and means whereby one of said walls is secured to said base and clamps said spacer and other wall together and holds said other wall against the base.

7. A burner comprising the combination of a base having a gas supply passage and alined openings of different size; an outer tubular wall registering with the larger of said openings; an inner tubular wall spaced from said outer wall to provide a gas chamber therebetween that communicates with said supply passage, said inner wall having an outwardly flaring portion at one end and a portion at its other end fitting the other of said openings; a spacer having a recessed portion disposed between said flaring portion and said outer wall and cooperating therewith to provide spaced outlet orifices for said chamber; and means cooperating with said inner wall to secure it to said base and clamp said spacer against said outer wall and said outer wall against said base.

8. A sheet metal spacer for burners comprising an annular portion adapted to center the spacer and an inclined portion having spaced recesses.

9. A burner comprising in combination a base having a gas mixture supply passage therein and an upper and a lower aligned opening in the walls of said passage; an outer tubular extension registering with the upper opening and extending upwardly therefrom; an inner tube having its outer walls spaced from the inner walls of the outer tubular extension, said inner tube passing through said outer tubular extension and registering with said lower opening at its lower end and sealing the opening against the passage of the gas mixture and allowing the atmospheric air to pass through said tube; a washer clamped between the upper ends of the inner tube and the outer tubular extension, said washer having radial sections removed from its outer perimeter to form slits therein to provide gas outlet orifices formed by the walls of said slit and the outer wall of the inner tube and the inner wall of the outer tubular extension.

10. A burner comprising outer and inner co-axial tubular members having the inner wall of the outer member spaced from the outer wall of the inner member to form a gas passage between said members, said walls of said members having parallel conical shaped surfaces at their outlet ends, and a conical shaped washer having portions removed therefrom exceeding the length of the conical surface of said inner wall of said outer member, said conical surface of said washer being clamped between said conical surfaces of said members.

11. A burner comprising outer and inner co-axial tubular members having the inner wall of the outer member spaced from the outer wall of the inner member to form a gas passage between said members, said walls of said members having parallel conical shaped surfaces at their outlet ends, one of said surfaces having an annular groove formed therein,

and a conical washer having portions removed therefrom exceeding the length of the inner conical surfaces of the outer member, an annular portion of said washer fitting around said inner member, said conical surface of said washer being clamped between said conical surfaces of said members.

12. A burner as in claim 11 in which said annular groove is in the outer conical surface of said inner member

In testimony whereof, I affix my signature.

JOHN L. MANDEVILLE.