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GAS BURNER FORMED BY STACKED ANNULAR MEMBERS

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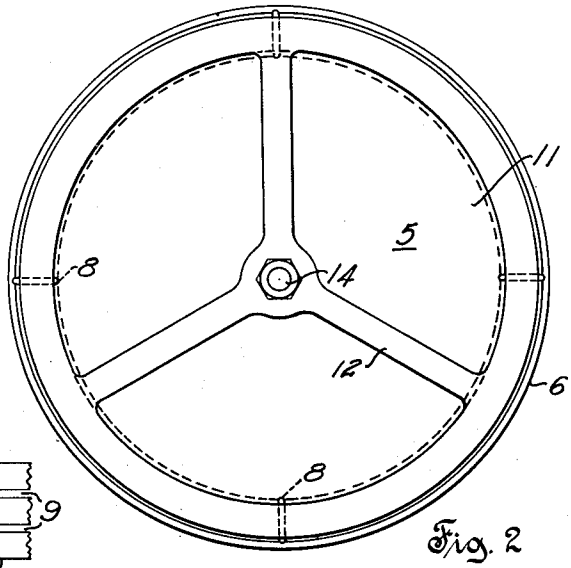


Fig. 2

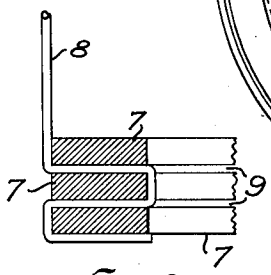


Fig. 3

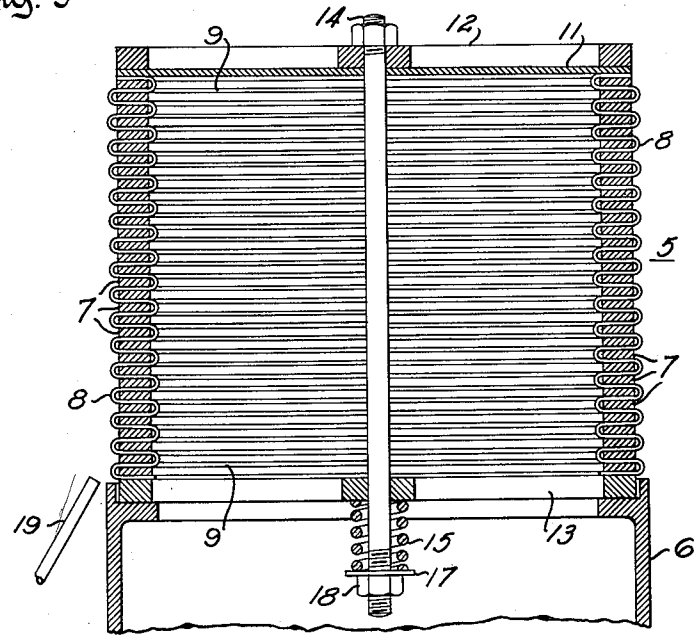


Fig. 1

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GAS BURNER FORMED BY STACKED ANNULAR MEMBERS

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6 Claims. (Cl. 158—116)

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The present invention relates generally to improvements in burners and relates more particularly to the provision of an improved burner adapted for use with gas and like combustible products and to the method of assembling the same.

It is an object of the present invention to provide an improved burner wherein the gas and air mixture is properly and uniformly distributed in a free and unobstructed manner to the combustion zone.

Various means have heretofore been proposed for spacing the burner bars or rings of gas burners to provide for the passage of the combustible air and gas mixture to the combustion zone immediately adjacent the burner. One form of prior art device consists of a plurality of rings retained in spaced apart relationship by means of internal ribs or studs disposed transversely of the rings and cast integrally therewith or secured thereto in a well-known manner to provide a series of parallel slots between the rings through which the vapor is distributed to the combustion zone. Another well-known and widely used structure consists of a plurality of rings spaced apart by means of washers or flat metallic strips and retained in coaxial alignment by means of bolts adapted to pass through annularly spaced apart and coaxially aligned holes in the rings. In another prior art device, a plurality of burner bars or plates are provided with spaced knobs or bosses adapted to space the bars from each other the desired distance with suitable separate means provided for retaining the bars in alignment. In still another known prior art assemblage, the spacing means consists of a series of crimped or plaited strips adapted to receive the bars or plates from one side thereof to hold the bars between alternate folds with separate suitable means being provided to retain the parts in assembled condition.

In all of the prior art burner units hereinabove briefly described, certain objectionable features are present either in the operation of the burner or in the manufacture and assembly thereof. In some of these prior art structures, it is apparent that, although the burner rings or bars may be spaced to provide parallel slots of the desired area, the spacing means and the retaining means are such as to cause undesirable obstructions and consequent interference with the outward passage of the combustible mixture, thereby preventing uniform distribution of the mixture to the combustion zone. A further objectionable feature of

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some of these prior art assemblages is that they are difficult and expensive to assemble, considerable care being required in aligning and stacking the bars or rings and separate means being required for retaining the bars or rings in proper alignment after the spacing means have been applied.

It is therefore an object of the present invention to provide an improved burner and method of assembling the same which obviate the objectionable features of prior devices.

Another object of the present invention is to provide an improved burner wherein uniform distribution of the combustible mixture to the entire combustion zone is provided.

Another object of the present invention is to provide an improved burner which may be readily and economically constructed and which is moreover highly efficient in operation.

Another object of this invention is to provide an improved burner wherein the spacing means is adapted to support and retain the burner rings in coaxial alignment in addition to spacing the rings from each other to provide parallel slots of any desired width.

Another object of our invention is to provide a burner with simple and inexpensive means for maintaining the rings under constant axial pressure while nevertheless providing for expansion and contraction of the various parts during heating and cooling thereof.

A further object of the present invention is to provide an improved burner comprising a plurality of aligned burner bars and means interlacing the bars to retain the same in spaced apart and aligned condition.

Still another object of our invention is to provide an improved burner comprising a plurality of coaxially disposed rings and a series of elongated corrugated elements coacting with the rings at spaced intervals to retain the same in spaced apart and coaxial relationship, the rings being retained between successive corrugations of the elongated elements.

An additional object of the present invention is to provide an improved burner comprising a plurality of coaxially disposed annular members, means interlacing the members to retain the same in spaced apart and coaxial relationship, and means for resiliently urging the members toward each other.

Still another object of the present invention is to provide a method of assembling a plurality of annular members in spaced apart and coaxial relationship which comprises causing a series of

elongated elements to successively engage the members internally and externally and between adjacent surfaces thereof.

Other objects and advantages of the present invention will be apparent from the following detailed description.

A clear conception of one embodiment of the present improvement and of the mode of constructing and utilizing and the method of assembling improved devices built in accordance with the invention may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters denote the same or similar parts in the several views.

Fig. 1 is a central vertical section through a burner constructed in accordance with the present invention;

Fig. 2 is an end view of the burner; and

Fig. 3 is an enlarged section through several of the burner rings showing the method of interlacing the rings with wire to separate and align the same.

Referring to the drawing, the improved burner, generally designated by the numeral **5**, is attached in any suitable manner to the tube **6** adapted to supply a mixture of gas and air to the burner. The burner comprises a plurality of coaxially disposed annular members or rings **7** retained in spaced apart and coaxial relationship by a series of elongated elements or wires **8** interlacing the rings, as shown, at annularly spaced intervals, thereby providing a series of parallel slots **9** between the rings through which the combustible mixture is adapted to pass for distribution to the combustion zone immediately adjacent the burner. At the end of the burner **5** opposite the point of attachment to the tube **6** and closing the central opening of the end ring, a plate **11**, which is imperforate with the exception of a single central opening, is provided. It is thus apparent that the rings **7** and closure plate **11** cooperate to form a cylindrical chamber, open at one end and closed by the plate **11** at the opposite end. To retain the plate **11** securely in position and to clamp the rings and prevent separation thereof, a pair of spiders **12**, **13** and a clamping bolt **14** are provided. The spider **12** is seated on the plate **11** and the spider **13** is seated on the open end ring of the burner with the bolt **14** extending through the central opening of the closure plate and axially through the ring openings to coact, at opposite ends, with the spiders **12**, **13**. To allow for unequal expansion and contraction of the various parts of the burner and avoid distortion caused by temperature changes, a relatively heavy spring **15** is positioned on the bolt **14** for coaction with the spider **13** and a washer **17** upon tightening of the nut **18**. By this means, the rings are resiliently urged toward each other to maintain the parts under a constant spring tension, and the closure plate is retained in position. Suitable means, such as a pilot light **19**, may be provided for initially igniting the gas mixture as it is distributed through the slots **9**.

Referring particularly to Fig. 3, the burner rings **7** are readily assembled by causing each of the series of wires **8** to successively pass between adjacent rings and to alternately engage the inner and outer surfaces of the rings, whereby the rings are interlaced with the wire as they are stacked. Stated in a somewhat different manner, the series of elongated elements are caused to successively engage the rings internally and externally and between adjacent surfaces of the

rings to simultaneously space and align the rings. Obviously the wire may be of any desired thickness and may be located at any desired annularly spaced intervals, preferably in series of three or more to assure provision of uniform parallel slots between the rings. After the rings are thus completely assembled in spaced apart relationship and retained in coaxial alignment by the wires, the closure plate **11** may be placed in position over one of the end rings. The spider **12** may then be placed over the plate **11** with the spider **13** being placed against the opposite end ring, as shown. The bolt **14** may then be passed through the aligned openings provided therefor in the spiders and in the closure plate. After the spring **15** and washer **17** have been slid into place over the end of the bolt adjacent spider **13**, the nut **18** may be applied, with the desired pressure being placed on the spring in an obvious manner. The entire burner is thus completely assembled and may be secured in any well-known manner to the open end of the tube **6**, as shown.

From the foregoing detailed description, it will be apparent that the present invention provides an improved burner of simple and sturdy construction and an improved method of assembling the same in a convenient and highly practical manner. The wires, which function to space the bars or rings from each other as well as to align the rings as they are stacked during assembly, offer minimum obstruction to the fuel as it is distributed through the slots to the combustion zone; and the single clamping bolt, which serves to retain the closure plate in position as well as to prevent axial separation of the rings, is located centrally of the cylindrical chamber formed by the rings, thereby in no way interfering with or obstructing the passage of the fuel. It is also apparent that the rings may readily be spaced apart to provide slots of any desired width by merely selecting wires of the proper gauge without otherwise changing parts. The provision of the spring **15** permits axial expansion and contraction of the several parts and has proven highly desirable in minimizing distortion of the burner due to temperature changes. During assembly of the rings, no separate jig or other means is necessary to properly align the rings, since they are automatically aligned by the wire as they are interlaced. Burners constructed in accordance with this invention have proven highly efficient in actual use, and it has been definitely determined that the flame is more uniformly distributed throughout the cylindrical surface of a burner manufactured in accordance with the present invention than in the devices previously used by applicants. It has been observed that the main burner lights faster and quieter and that the burner is furthermore quieter during normal operation than the burners previously used.

While the invention has been shown and described as being applied to a burner of cylindrical shape, it may obviously be applied to burners of the grid type, wherein straight bars are used, with equal success; and it should therefore be understood that it is not desired to limit this invention to the exact details of construction or to the precise method of assembling herein shown and described, since various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. A gaseous fuel burner, comprising: means providing a chamber having an open end adapted

for connection to means for feeding fuel in gaseous form through said open end into said chamber; said chamber-providing means comprising a series of annular coaxially disposed elements spaced axially from each other to permit the passage of gaseous fuel from the inside of said chamber to the space surrounding said elements in which space the gaseous fuel is to be burned, and means for spacing said elements axially from each other and maintaining said coaxial disposition of said elements, said spacing means comprising a plurality of generally axially extending filamentous members disposed at spaced intervals around the circumference of said elements, each filamentous member having portions thereof extending axially along the outer circumference of alternate elements of said series of elements and axially along the inner circumference of elements interleaved between said alternate elements, and portions extending radially between adjacent elements to connect said axially extending portions; and means for pressing the end elements of said series toward each other.

2. The method of making a gaseous fuel burner including a plurality of coaxial annular elements axially spaced from each other, which comprises, placing an annular element with one side in engagement with a plurality of circumferentially spaced filamentous members extending in a generally radial direction at the respective places of engagement, bending the respective members against a periphery of the element and then bending said members so that they extend in a generally radial direction across the other side of said element, placing a second annular element with a side in engagement with the portions of said members extending across said other side of said first named element, bending said members against a periphery of said second element and then bending said members so that they extend in a generally radial direction across the other side of said second element, and continuing the aforesaid steps of placing elements and bending said members until the so assembled elements have been built up to a stack of desired height.

3. A gaseous fuel burner, comprising: means providing a chamber having an open end adapted for connection to means for feeding fuel in gaseous form through said open end into said chamber; said chamber-providing means comprising a series of annular coaxially disposed elements spaced axially from each other to permit passage of gaseous fuel from the inside of said chamber to the space surrounding said elements in which space the gaseous fuel is to be burned, and means for spacing said elements axially from each other comprising a plurality of generally axially extending filamentous members disposed at spaced intervals around the circumference of said elements, each filamentous member having portions thereof extending axially along the outer circumference of alternate elements of said series of elements and axially along the inner circumference of elements interleaved between said alternate elements, and portions extending radially between adjacent elements to connect said axially extending portions; and a spider adjacent each of the end elements of said series with a single clamping bolt extending axially through the chamber formed by said elements and engaging with said spiders to press said end elements toward each other.

4. A gaseous fuel burner, comprising: means providing a chamber having an open end adapted

for connection to means for feeding fuel in gaseous form through said open end into said chamber; said chamber-providing means comprising a series of annular coaxially disposed elements having substantially equal diameters and said elements spaced axially from each other to permit passage of gaseous fuel from the inside of said chamber to the space surrounding the elements in which space the gaseous fuel is to be burned, and means for spacing said elements axially from each other comprising a plurality of generally axially extending filamentous members disposed at spaced intervals around the circumference of said elements, each filamentous member having portions thereof extending axially along the outer circumference of alternate elements of said series of elements and axially along the inner circumference of elements interleaved between said alternate elements, and portions extending radially between adjacent elements to connect said axially extending portions; a spider adjacent each of the end elements of said series; a single clamping bolt extending axially through the chamber formed by said elements; and a spring engaging one of said spiders and said clamping bolt to resiliently press said end elements toward each other to allow for unequal expansion and contraction of the elements and avoid distortion caused by temperature changes.

5. The method of making a gaseous fuel burner including a plurality of coaxially annular elements axially spaced from each other, which comprises, placing a spider with one side in engagement with a plurality of circumferentially spaced filamentous members extending in a generally radial direction at the respective places of engagement, placing an annular element coaxially to said spider with one side of said annular element in engagement with said filamentous members, bending the respective members against a periphery of said element and then bending said members so that they extend in a generally radial direction across the other side of said element, placing a second annular element with a side in engagement with the portions of said members extending across the other side of the said first named element, bending said members against a periphery of said second element and then bending said members so that they extend in a generally radial direction against the other side of said second element, continuing the aforesaid steps of placing elements and bending said members until the so assembled elements have been built up to a stack of desired height, placing a second spider on the opposite end of said stack from said first spider, placing clamping means through said spiders to pass axially through the chamber formed by said annular elements, and tightening said clamping means to press said annular elements together.

6. The method of making a gaseous fuel burner including a plurality of coaxially annular elements axially spaced from each other, which comprises, placing a spider with one side in engagement with a plurality of circumferentially spaced filamentous members extending in a generally radial direction at the respective places of engagement, placing an annular element coaxially to said spider with one side of said annular element in engagement with said filamentous members, bending the respective members against a periphery of said element and then bending said members so that they extend in a generally radial direction across the other side of said

element, placing a second annular element with a side in engagement with the portions of said members extending across the other side of the said first named element, bending said members against a periphery of said second element and then bending said members so that they extend in a generally radial direction against the other side of said second element, continuing the aforesaid steps of placing elements and bending said members until the so assembled elements have been built up to a stack of desired height, placing a second spider on the opposite end of said stack from said first spider, placing a bolt through said spiders to pass axially through the chamber formed by said annular elements, placing a spring about a portion of said bolt extending beyond one of said spiders, and attaching fastening means to said bolt to compress said spring between said fastening means and said spider to resiliently press said annular elements together.

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HARRY J. WELCH.

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