Nov. 13, 1951 W. B. ENSIGN ET AL 2,575,101

DUAL BAND GAS BURNER WITH CROSSOVER BURNER GRID

Filed Feb. 19, 1948

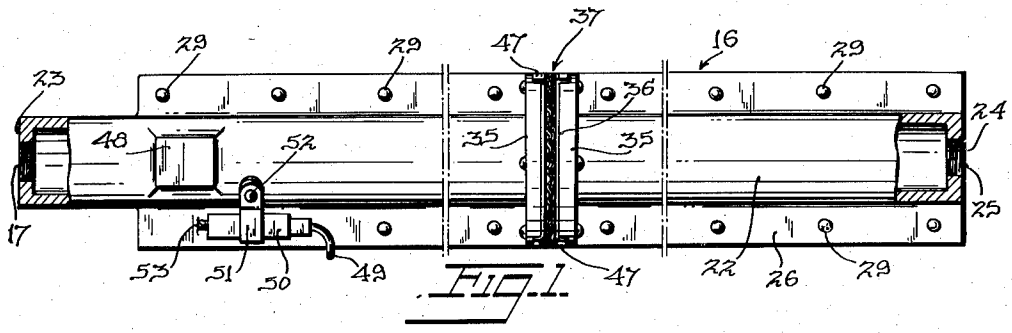


FIG. 1.

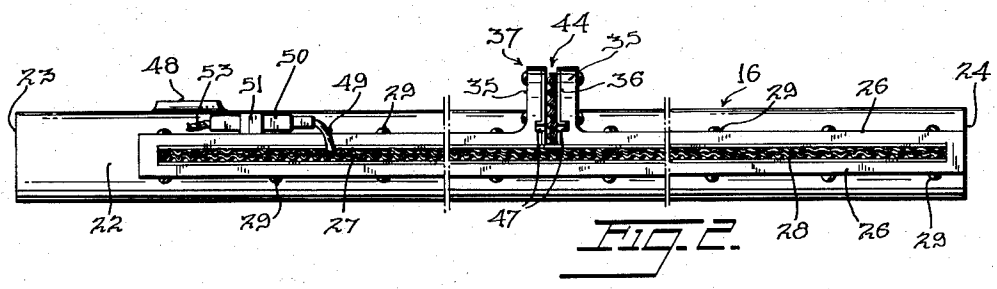


FIG. 2.

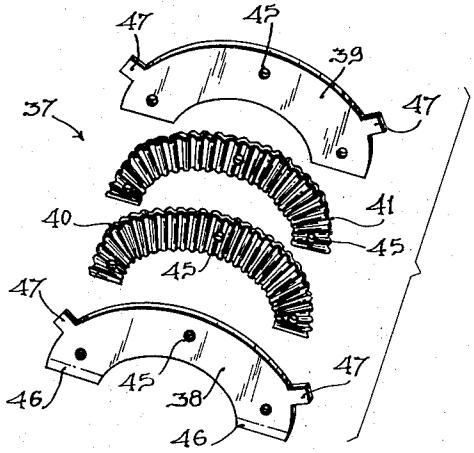


FIG. 3.

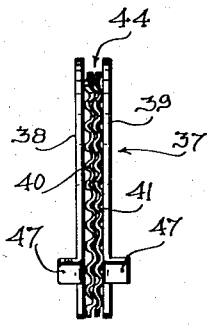


FIG. 4.

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DUAL BAND GAS BURNER WITH CROSS-OVER BURNER GRID

William B. Ensign, New Rochelle, N. Y., and Otto Wildermann, River Edge, N. J., assignors to Ensign Ribbon Burners, Inc., Mount Vernon, N. Y.

Application February 19, 1948, Serial No. 9,524

4 Claims. (Cl. 158—116)

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This invention relates to new and useful improviments in gas burners, and, more particularly, aims to provide a novel and valuable component for a gas burner especially adapted for use in baking ovens by providing a dual or two main burner flames in one burner body and a cross-over means for igniting one burner flame from the other.

The type of burner to which the invention is applied is a burner, wherein, as one feature thereof, the burner orifices are provided by means including a plurality of metal bands or ribbons corrugated and crimped and arranged in face to face relation in such manner that a multiplicity of closely spaced orifices are established at opposite sides of each ribbon and also between immediately joining ribbons, thereby to obtain the various advantages set forth in U. S. Patent No. 2,210,069 issued to William B. Ensign, or by employing a multiplicity of small drilled holes. A burner of this kind has come to be known in the art as a band burner.

More specifically, the type of burner to which the present invention is pertinent, is a dual burner, that is, one equipped with burner orifices preferably in accordance with the teachings of the said patent, and at the same time a burner so constituted that the number of burners in any oven of a given capacity may be halved, thereby correspondingly eliminating burner accessories. Elimination of as many burners as possible is exceedingly important, because for each burner eliminated, the necessary oven sleeve, extended through a wall portion of the oven and through which the burner must pass, is eliminated. The more of these auxiliaries that can be eliminated, the less heat loss will result. Reduction of heat losses, to the maximum extent possible, is naturally desirable, and is actually, as a matter of fact, essential to perfect control of the baking temperature and to maintenance of a uniform temperature throughout the oven interior, for producing a standard baked product. Needless to say, the saving of fuel is likewise an important, although a secondary, advantage.

Also, the reduction of the number of burners correspondingly reduces the amount of ignition equipment necessary, resulting in a further considerable saving. Again, the less the number of burners in an oven, the less amount of maintenance necessary.

Such a dual burner, which may be substituted for two separate burners as previously employed, is fully described and claimed in applicants' U. S. patent application Serial No. 9,525. The dual

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burner there disclosed is an elongate one having along each of its opposite sides a line of burner orifices of the aforesaid band type, and also having a cross-over line of burner orifices also of the said band type; with the opposite ends of said cross-over line of burner orifices in such adjacency to the two first mentioned lines of burner orifices that, following ignition of the combustible mixture where issuing from any one of the orifices, a burner flame is there initiated, and such flame instantly spreads for the establishment and maintenance of a burner flame all along said three lines of burner orifices.

As explained in our said patent application, while said cross-over line of burner orifices may be placed at any point along the length of the burner where it may serve as a link or transmission line for transferring the flame across the burner from one of the first mentioned lines of burner orifices to the other such line, the preferred placement of said cross-over line is intermediate the ends of said first mentioned lines of burner orifices. As there explained, this preferred arrangement of the said cross-over line of burner orifices allows the two first mentioned lines of burner orifices to be shortened from either or both ends, as desired, in order properly to balance out the heat in the oven.

The above discussed dual band burner, as such, forms the subject matter of a separate application for patent filed by applicants herewith.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is a top plan view of a dual band burner, partially broken away and partially in section, equipped with an embodiment of the invention as now favored.

Fig. 2 is a side elevation.

Fig. 3 is an exploded view showing a plurality of parts for face to face assembly to constitute said embodiment.

Fig. 4 shows said embodiment, assembled, in edge elevation, and drawn to a larger scale than in Fig. 3.

Referring to the drawings more in detail, the burner is shown as comprising an elongate tubular casting 16. The casting 16 at one end has a tapped aperture 17 for attachment of a suit-

able pipe for supplying a combustion mixture of gas and air.

The casting 16 includes a main hollow cylindrical portion 22, closed at opposite ends by walls 23 and 24. The wall 23 is provided with the tapped aperture 17 while the opposite wall 24 has a tapped hole 25 closable by a matchingly threaded plug not shown.

Exteriorly offset from and extended along opposite sides of portion 22 of the casting 16 are a pair of like horizontal ribs 26, these extended from close to one end of said casting, to a short distance from the other end thereof. Through said ribs, and extending almost from end to end thereof, are cut slots 27, within which are band or ribbon assemblies pursuant to the patents aforesaid. These assemblies, one of which is seen at 28 in Fig. 2, are made of corrosion-proof and non-oxydizing metal ribbons. Such assemblies are secured in the slots 27 in any desired way; for instance, by lines of rivets as indicated at 29.

Extending laterally across the top of the casting 16, at a point intermediate its ends, is an external arcuate rib which at its opposite bottom portions joins the upper portions of the side ribs 26. This arcuate rib is divided into two like rib halves 35 by a slot 36; which slot, as shown best in Fig. 2 connects with the two side slots 27.

All the foregoing is illustrative of the subject matter of applicants' said patent application filed herewith.

Referring to the invention disclosed and claimed herein, between the two rib halves 35 is mounted a burner assembly 37 pursuant to the present invention, for providing burner-orifices for the connecting cross-over.

The burner assembly 37 is of arcuate formation, and is here shown as comprising two outer plane band or ribbon elements 38 and 39 and two inner corrugated band or ribbon elements 40 and 41.

The elements 40 and 41 are semi-annular and have their corrugations, as illustrated, extended along lines radial to such annulus. These elements are sandwiched in between the elements 38 and 39, which latter are also semi-annular. The bottom curvilinear edges of all said elements are aligned, to partially nest the crest portions of the corrugations of one of the elements 40 and 41 in the trough portions of the corrugations of the other of said elements 40 and 41, thereby to provide inner smaller orifices 42 and outer larger orifices 43 within the assembly 37.

In such assembly the plane elements 38 and 39, while semi-annular like the elements 40 and 41 as just stated, are of greater width than the elements 40 and 41, so that when these parts are arranged as just above described, an arcuately extending compartment or channel 44, to provide a gas expansion and distribution space, is established in offset relation from the outer ends of said orifices between the elements 40 and 41.

Any suitable means may be employed to establish the assembly 37 by coupling the elements 38—41 to clamp the elements 40 and 41 between the elements 38 and 39; such clamping coupling being preferably done before the device 37 is mounted in the slot 36.

For instance, the four elements 38—41 may be provided with matching apertures 45 as shown in Fig. 3, for connecting said elements 38—41 as in Fig. 4 by applying rivets through said apertures, such rivets countersunk in the outer ends of the apertures through the elements 38 and 39 so as to have the rivet ends flush with the outer surfaces of said elements 38 and 39.

Another way of establishing the device 37 is, with the parts tightly squeezed together as in Fig. 4, to apply silver solder at both lower ends of all the elements, as at the areas marked 46 in Fig. 3.

The width of the slot 36 is such that when the assembly 37 is forced down all the way into said slot, the upper portions of the outer elements 38 and 39 will close in to establish the required intimacy of contact between said elements 38 and 39 and the inner elements 40 and 41 and between the corrugations of the latter.

Also, silver solder may be used as just described, and the apertures 45 may also be present, with the latter used, in connection with matching apertures through the rib halves 35, for anchoring the assembly 37 in place in the slot 36, by readily removable L-shaped pins applied at the apertures through said assembly and said rib halves.

A now preferred way of mounting the assembly 37 in the slot 36, however, is to shape one of the two outer plane elements 38 and 39 so that the same includes tabs 47 to be bent over for projection perpendicularly from one side of the assembly 37, so that such tabs at their underlying faces will engage the top of a half rib 35 when the assembly 37 is properly positioned in the slot 36. As here shown, both of the elements 38 and 39 are provided with tabs 47. Whether one or both of the elements 38 and 39 carry said tabs, at least one of said elements will preferably be provided with at least two of the tabs, these located at suitably spaced points in the direction of curvilinear extension of the assembly 37 to insure that when both the last mentioned tabs engage the adjacent rib half 35 the assembly will be properly centered in the slot 36.

Adjacent a pad 48 at the top and near one end of the casting 16 is an electrical ignition means including a sparking electrode 49 projected from a casing 50 of insulating material, such casing held in a mounting clip 51 suitably attached, as by a screw 52, to the main cylindrical portion 22 of the casting.

The burner may be ignited from any desired point along the entirety of the H-shaped array of burner orifices. When, as is preferred, the point of ignition is along one of the main flame spaces at a slot 27, the flame instantly travels all along such space, and, instantly also flashes along the cross-over line of burner-orifices at the device 37, and then instantly all along the other main flame space at the other slot 27.

The ribs 35 forming the cross-over is shown at substantially the center of the burner and extended at right angles thereto; however, it is pointed out that the ribs may be formed at any point intermediate the length of the burner and at any desired angle. Furthermore, while the intermediate ribbons of the ribbon assemblies 28 and 37 are illustrated as being corrugated, this is by way of illustration, as they may take any desired shape which provides spaces between the adjacent faces.

While we have illustrated and described the preferred embodiment of our invention, it is to be understood that we do not limit ourselves to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we

claim as new, and desire to secure by United States Letters Patent is:

1. A gas burner comprising a hollow casting for connection to a source of combustible gas and formed along diametrically opposite sides with parallel ribs having elongated slots, burner assemblies in said slots for discharging the combustible gas from the casting in a burnable spray, a burner assembly for igniting the gas discharging from one side when the gas discharging from the other side has been ignited said burner assembly comprising an arcuate rib formed across the top of the casting and extended between the tops of the parallel ribs, said arcuate rib being divided into a pair of adjacent rib portions by an intermediate slot, said slot communicating with the interior of the casting and with the slots of the parallel ribs, and an arcuate burner assembly mounted in position between the adjacent faces of said adjacent rib portions to have the combustible gas discharge therefrom in a burnable spray to be ignited by the burning gas along the said other side of the casting to carry the flame to the said one side thereof and ignite the combustible gas discharging from that said one side, said arcuate burner assembly comprising a pair of adjacent inner corrugated arcuate ribbon elements, a flat outer arcuate ribbon element located on either side of said inner ribbon elements and concentric therewith, means securing said ribbon elements together as a unit to be slipped into position in the slot between said arcuate rib portions, and tabs integrally formed on the outer peripheries of said outer arcuate ribbon elements adjacent their ends, said tabs being bent to extend outward at right angles to said outer arcuate ribbon elements to engage the outer peripheries of said arcuate rib portions securing said arcuate burner assembly against lateral shifting relative to said arcuate rib.

2. A gas burner comprising a hollow casting for connection to a source of combustible gas and formed along diametrically opposite sides with parallel ribs having elongated slots, burner assemblies mounted in said slots for discharging the combustible gas from the casting in a burnable spray, a cross-over for igniting the gas discharging from one side when the gas discharging from the other side has been ignited, said cross-over comprising an arcuate rib formed across the top of the casting and extended between the tops of the parallel ribs, said arcuate rib being divided into a pair of adjacent rib portions by an intermediate slot, said slot communicating with the interior of the casting and with the slots of the parallel ribs, and an arcuate burner assembly mounted in position between the adjacent faces of said adjacent rib portions to have the combustible gas discharge therefrom in a burnable spray to be ignited by the burning gas along the said other side of the casting to carry the flame to the said one side thereof and ignite the combustible gas discharging from that said one side, said arcuate burner asembly comprising a pair of adjacent inner corrugated arcuate ribbon elements, a flat outer arcuate ribbon element located on either side of said inner ribbon elements and concentric therewith, means securing said ribbon elements together as a unit to be slipped into position in the slot between said arcuate rib portions, and tabs integrally formed on the outer peripheries of said outer arcuate ribbon elements adjacent their ends, said tabs being bent to extend outward at right angles to said outer arcuate ribbon elements to engage the outer peripheries of said arcuate rib portions securing said arcuate burner assembly against lateral shifting relative to said arcuate rib, said securing means for said ribbon elements comprising spot welds applied to spaced points on said ribbon elements.

3. A gas burner comprising a hollow casting for connection to a source of combustible gas and formed along diametrically opposite sides with parallel ribs having elongated slots, burner assemblies mounted in said slots for discharging the combustible gas from the casting in a burnable spray, a cross-over for igniting the gas discharging from one side when the gas discharging from the other side has been ignited, said cross-over comprising an arcuate rib formed across the top of the casting and extended between the tops of the parallel ribs, said arcuate rib being divided into a pair of adjacent rib portions by an intermediate slot, said slot communicating with the interior of the casting and with the slots of the parallel ribs, and an arcuate burner assembly mounted in position between the adjacent faces of said adjacent rib portions to have the combustible gas discharge therefrom in a burnable spray to be ignited by the burning gas along the said other side of the casting to carry the flame to the said one side thereof and ignite the combustible gas discharging from that said one side, said arcuate burner assembly comprising a pair of adjacent inner corrugated arcuate ribbon elements, a flat outer arcuate ribbon element located on either side of said inner ribbon elements and concentric therewith, means securing said ribbon elements together as a unit to be slipped into position in the slot between said arcuate rib portions, and tabs integrally formed on the outer peripheries of said outer arcuate ribbon elements adjacent their ends, said tabs being bent to extend outward at right angles to said outer arcuate ribbon elements to engage the outer peripheries of said arcuate rib portions securing said arcuate burner assembly against lateral shifting relative to said arcuate rib, said arcuate burner assembly being of a length to have its ends rest directly on the burner assemblies of the parallel ribs providing a continuity of discharge ports.

4. A gas burner comprising a hollow casting for connection to a source of combustible gas and formed along diametrically opposite sides with parallel ribs having elongated slots, burner assemblies mounted in said slots for discharging the combustible gas from the casting in a burnable spray, a cross-over for igniting the gas discharging from one side when the gas discharging from the other side has been ignited, said cross-over comprising an arcuate rib formed across the top of the casting and extended between the tops of the parallel ribs, said arcuate rib being divided into a pair of adjacent rib portions by an intermediate slot, said slot communicating with the interior of the casting and with the slots of the parallel ribs, and an arcuate burner assembly mounted in position between the adjacent faces of said adjacent rib portions to have the combustible gas discharge therefrom in a burnable spray to be ignited by the burning gas along the said other side of the casting to carry the flame to the said one side thereof and ignite the combustible gas discharging from that said one side, said arcuate burner assembly comprising a pair of adjacent inner corrugated arcuate ribbon elements, a flat outer arcuate ribbon element located on either side of said inner ribbon elements and concentric therewith, means secur-

ing said ribbon elements together as a unit to be slipped into position in the slot between said arcuate rib portions, and tabs integrally formed on the outer peripheries of said outer arcuate ribbon elements adjacent their ends, said tabs being bent to extend outward at right angles to said outer arcuate ribbon elements to engage the outer peripheries of said arcuate rib portions securing said arcuate burner assembly against lateral shifting relative to said arcuate rib, said tabs being secured to the outer peripheries of said arcuate rib portions.

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